Information and Communication Technology (ICT)

for Rwanda Schools

Learner's Book

Senior Three

CONTENTS

TOPIC: Application software

Subtopic: Graphics and Multimedia

TOPIC: Computer Network and Data Communication

TOPIC: Programming

Introduction

Activity-based learning

This book is full of **activities** for you to do, as well as information for you to read.

These activities will help you learn to find out more information for yourself.

Do all the activities. They are the most important part of this book.

Research

Since you have to find out information for yourself, many activities in this book calls you to do research using books in the library, the internet and other sources such as newspapers and magazines.

Icons

To guide you, each activity in the book is marked by a symbol or **icon** to show you what kind of activity it is. The icons are as follows:

Fieldwork Activity

Fieldwork icon

Fieldwork means learning outside the classroom either in the school compound, the local area or in the learner's home area. It is suitable since it engages the learner and makes him/her involved in the learning process. Fieldwork can be used in all subjects.

Discussion/Vocabulary Reading

Discussion icon

Some activities require you to discuss an issue with a partner or as part of a group. It is similar to group work, but usually does not require any writing, although some short notes can be written for remembrance.

Computer/Internet Activity

Computer/Internet Activity icon

Some activities require you to use a computer in your computer laboratory or elsewhere.

Listening Activity

Listening Activity icon

The listening activity requires you to carefully listen to the teacher or your fellow learner reading a passage, poem or extraction on the subject and then answer the questions.

Observation Activity

Observation Activity icon

You are expected to observe and write down the results from activities including experiments or social settings overtime.

Practical Activity

Practical Activity icon

The hand indicates a practical activity, such as a role play on resolving a conflict, taking part in a debate or following instructions on a map. These activities will help you to learn practical skills which you can use when you leave school.

Writing/Research Activity

Writing Activity icon

Some activities require you to write in your exercise book or elsewhere.

INTRODUCTION TO ICT

ICT Fundamental

Unit 1

Application and Utility Software Installation

Key Unit Competence

Understand the functions of operating system; install and use application and utility software.

Computer software is defined as a series of instructions that tell the computer hardware how to process data.

Computer software is sometimes called computer program.

There are two main categories: system software and application software. Application, utility software and their installation can not work alone without operating system.

1.1 Operating system (OS)

Operating system is a large and powerful program that controls and manages computer hardware and application software. It is the most important computer program.

Operating system software runs and manages all the operations of the computer. All electronic devices use operating systems to work, for example; laptop computers, tablet, desktop computers, smartphone, router, etc.

The operating system that runs a laptop or desktop computer is commonly called **Desktop Operati ng System (DOS)**. This includes; **Microsoft Windows** *(with versions like* ***Windows 10*** *and* ***Windows***

8, **MacOS** (from Apple and is formerly **OS X**), Chrome OS (designed by Google) and **Linux (e.g. Ubuntu, Fedora)**.

Mobile operating system runs on smartphones, PDAs, Tablet PCs and other mobile devices. Examples include **Android** (manufactured by Google Inc.) and **iOS** (manufactured by Apple) etc.

Server operating system or server OS is installed and runs on servers e.g. web servers examples of server OS are: Windows Server, Linux, and FreeBSD (Free Berkeley Software Distribution).

1.2 Functions of operating system

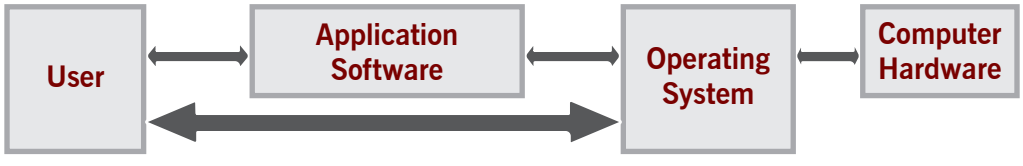
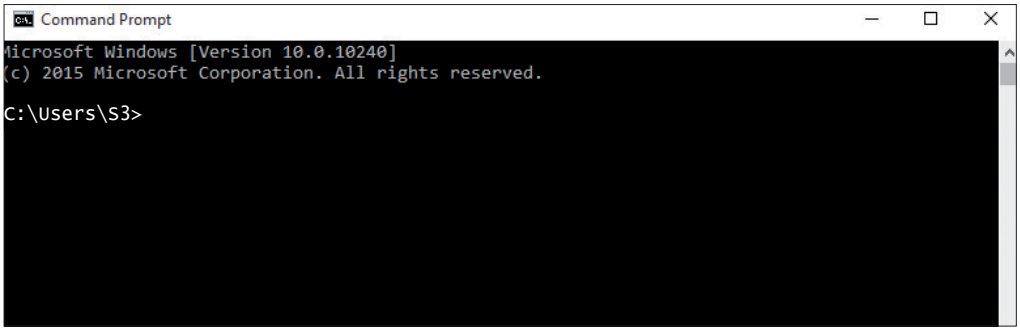


Figure 1.1: How instructions flow between operating system, hardware and applications.

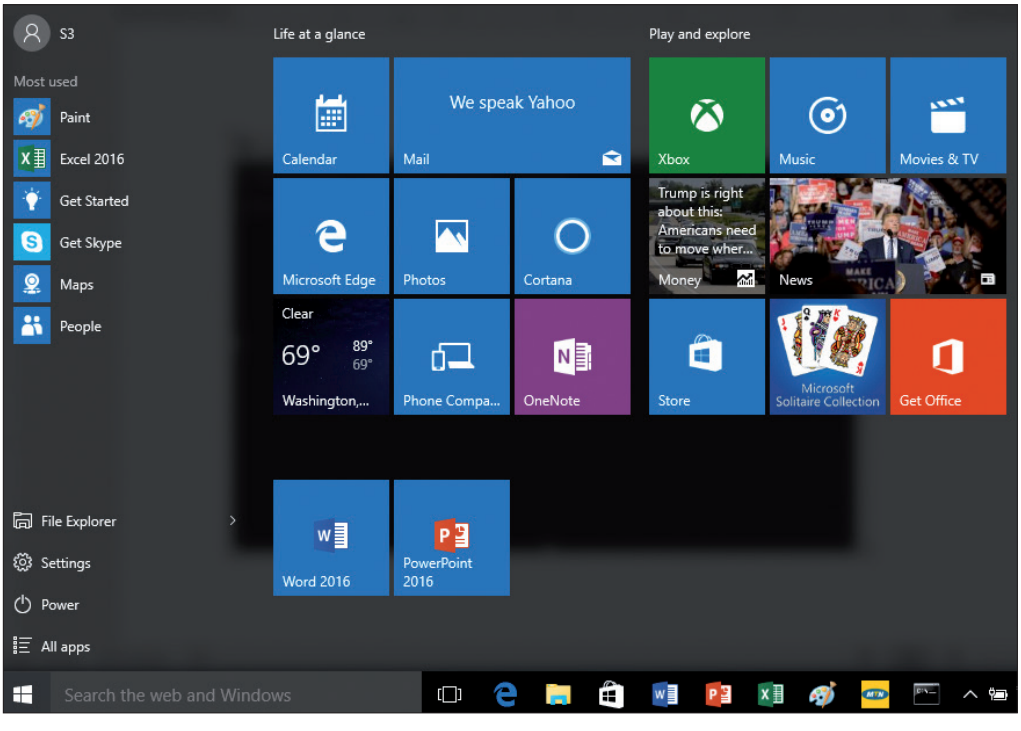
When the **user** runs an **application**, the program sends requests to the **operating system** and the operating system commands the **hardware** to work as required by the user. Most of the work done by the operating system is hidden from the user, meaning the user does not need all the details going on but just sees the results.

1. **Booting:** The operating system is **responsible for completing booting process of the computer**. Booting is starting or restarting the computer. **Cold** boot starts the computer that has been turned off completely whereas **warm** boot restarts the computer's operating system.
2. **The operating system provides an appropriate User interface**. The *interface* enables the user to interact with the computer software and hardware. The user interface can be **Command-line interface** (CLI) or **Graphical user interface** (GUI). With CLI, the user interacts with OS by typing in commands at the command prompt to perform specific tasks. Examples include Disk operating system (DOS) such as MS.DOS (Microsoft Disk Operating System).



Picture 1.1: Command Line Interface

With GUI, the user interacts with OS by using a mouse to access windows, icons and menus e.g. Microsoft Windows (8 or 10).



Picture 1.2: Graphical User Interface (with images or icons representing computer commands)

3. **Operating system manages resource allocation to various programs**. The operating system loads programs in computer's primary memory, **runs** them and allocates them run-time, memory space, processor time, input/output devices and instructions to use.
4. **Memory management**: The OS organises how the primary memory is used by different programs through partitioning. **Partitioning** is

the dividing of the primary memory to run different programs in different partitions or sections of the hard disk. When the size of the primary memory or RAM is not enough, the OS borrows a space from the hard disk and adds it to the primary memory or RAM. This memory is called **Virtual memory** or **Virtual RAM**. It enables the OS to run *programs which require more memory than available RAM* in the system, but it is much slower.

5. **Manages user's files**. The OS manipulates how files are created, stored and retrieved using file system. When you store a file on a disk, it is stored in pieces and when you open it, the OS organises those pieces together and opens your file. OS also handles tasks related to cutting, copying and deleting files and folders.

> **Note: File system** is a method used by the operating system to name, store and organise files on a disk. For example Windows uses NTFS (New Technology File System).
>
> Mac OS operating system uses a file system called HFS Plus or HFS+. HFS is written as Hierarchical File System. Linux has many file systems such as Ext 2, Ext 3, Ext 4, XFS, etc.

6. **Operating system controls input/output peripherals**. The operating system manages reading from the input peripheral devices and writing to all peripheral devices. It controls access to all peripherals through small programs called **device drivers**. A **device driver** is a program that controls how a specific device works with specific operating system. Examples are: Printer driver, network driver and graphics driver.
7. **Operating system manages files**: Operating System supervises the creation, storage, updating and deletion of files to various storage devices e.g. hard disk, flash disk, etc.
8. **Operating system manages backup storage (secondary storage** or **auxiliary storage**). Operating system locates and retrieves files needed by user from backup storage and monitors how they are used.
9. **Operating system manages security and access rights of computer users.** In this case, the operating system monitors the creation of passwords, user names or account names on a computer. It also keeps record of who accesses the computer, the activities done and the resources used. In managing system

security, the operating system guarantees that resources are used only for programs and users with appropriate authorisation.

10. **Operating system handles errors as they happen.** When the computer is used, without user intervention or knowledge. It can suggest to the user what to do to correct errors through error messages.

    There are several different types of operating systems and choice of which operating system to use depends mainly on; cost of buying the OS, hardware requirements to run the OS and user experience. The OS comes with two important components i.e. the **Shell** (which provide interface between the user and the operating system itself) and the **Kernel** (which provide interface between hardware and applications). You can install OS using different options among which are; **fresh** installation (done on a new computer or if the existing OS is damaged and cannot work); **multi-boot** installation (done when you install two or more different copies of OS on different parts of hard disk) and **upgrading** (done when you replace old version of OS with a new copy of OS e.g. replacing windows 7 with windows 10).

Activity 1.1

1. Explain briefly the meaning of 'operating system' in the computer system.
2. Identify the operating system(s) that is installed in your school computers.
3. Discuss any five functions performed by the operating system in a computer.
4. Give an example of operating system that can be installed on each of the following devices:
   a) PDA
   b) Laptop computer
5. With clear examples discuss the following terms in computer system:
   a) File system
   b) User interface

1.3 Types of license for software

A **software license** is a legally binding agreement that specifies the terms of use for a software. It also defines the rights of the software producer and that of the end-user.

There are two types of licenses for software:

- Open source software
- Proprietary software

1.3.1 Open Source License (General Public License or GPL)

Open source software is a computer program in which the *source code* is available to the general public for use or modification from its original design and free of charge.

Open source license is a license that allows the software to be freely used, modified and shared. This software license is widely used for free and guarantees end-users the freedom to run, study, share and modify software.

1.3.2 Proprietary license

Proprietary software is owned by an individual or company that developed it. The source code is kept almost secret, so you cannot modify it.

This means that the software is under *restrictive copyright* and the source code is hidden from users. Anybody cannot copy or change proprietary software unless permission is sought from owners. Most software today is proprietary.

Proprietary license is a software license in which the software publisher/owner grants a license to **use** one or more copies of software, but the **ownership** of those copies remains with the software publisher. The user must pay for the license before permission is given to use the software.

Note: Copyright refers to the legal right of the owner of intellectual property. It is the right to copy meaning that the original creators of the products and anyone they give authorisation to are the only ones with exclusive rights to reproduce t he work.

1.4 Download software

Download software means the transfer/copy of a software through the Internet from the remote computer (server) to a local machine or computer.

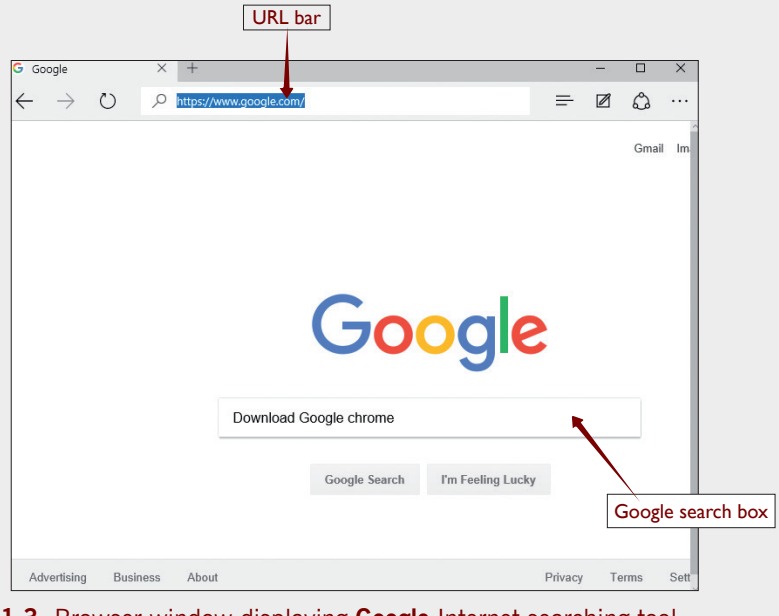
Downloaded software installation files (executable files) are commonly used for program installations.

Activity 1.2

Using a browser installed on your computer, download **Google Chrome** installation file from Internet onto your computer.

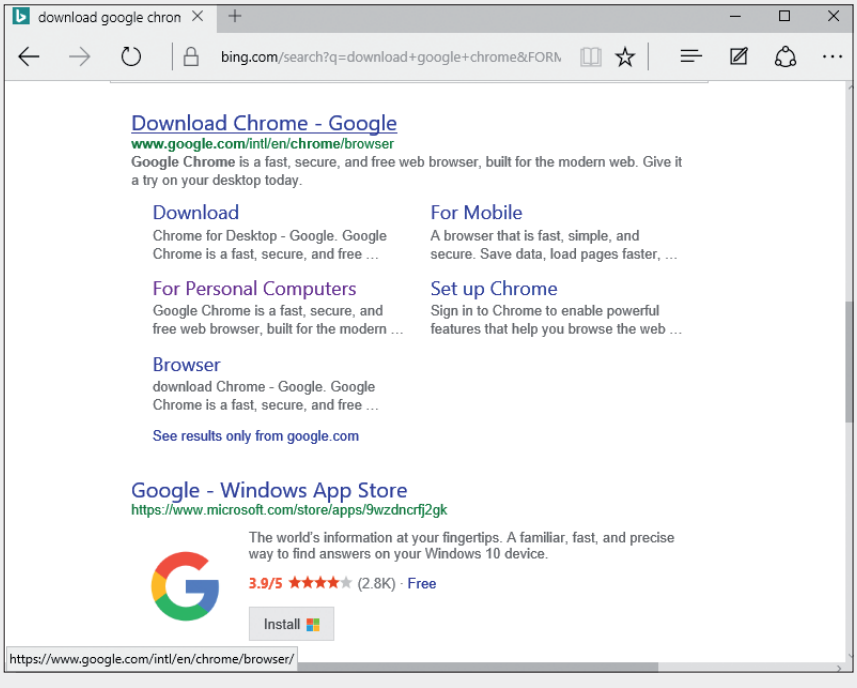
Step 1: Open your **Browser** on the computer.

Step 2: Use the search engine and type "**download Google Chrome**" installation file in the search book.



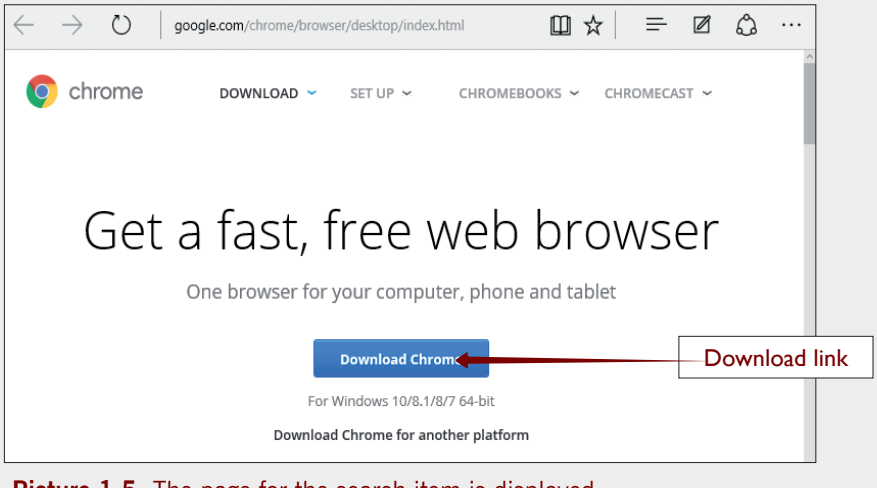
Picture 1.3: Browser window displaying **Google** Internet searching tool

Step 3: Press Enter key (Return key) on your keyboard. Doing this will start the search for the specified item. After a short time, the search results display. **Scroll** to find the best result.



Picture 1.4: The browser displays search results

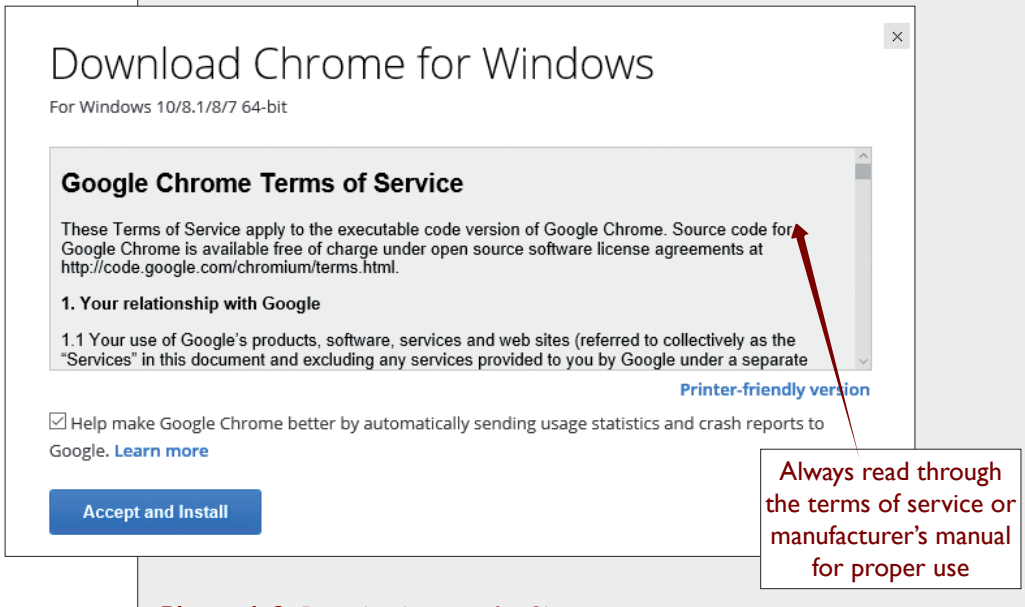
Step 4: Click the search result you think is best for you. This will take you to the items page. Now click "for Personal Computers" the result will be as shown in the picture below.



Picture 1.5: The page for the search item is displayed

Step 5: Click the **"Download Chrome"** button.

Note: If you download chrome, it automatically installs itself and so you may not see the downloaded file, but an already working program.



Picture 1.6: Download screen for Chrome

Step 6: Open your downloaded file(s). Do this by clicking on the file's name bar at the bottom of the browser or by navigating to the computer's default download location, which is a folder called "**Downloads**".

Note: By default, all downloaded software and files are kept in the folder called Downloads on your computer from where they are transferred to another location of user's choice.

Some programs take long to download and to install and others strictly require Internet connection to complete installation.

Activity 1.3

Create a folder on your desktop using your first name and use it to save all the downloads.

Using installed browser, download the following software installation files.

a) Avast antivirus
b) Mozilla Firefox
c) VLC media player
d) Adobe reader
e) Chess game
f) Skype

1.5 Installation of software

The term ***Software Installation*** means, the process of copying installation files of a given program onto hard disk in a format that allows the computer to run the program. It means putting a computer program on a computer and ready for use.

You should always read the manufacturer's installation manual to correctly install programs. This manual describes all the procedures and the necessary system requirements for successful installation.

System requirements for installing software

- Processor speed (the higher the speed the better)
- RAM size
- Hard disk space
- Graphics card

E.g. to install Windows 10, the minimum requirements usually include:

Processor	1 Gigahertz (GHZ) or faster processor or SoC (System on Chip or integrated circuit known as a chip).
RAM	1 Gigabyte (GB) for 32–bit or 2GB for 64-bit
Hard disk space	16GB for 32-bit OS or 20GB for 64-bit OS
Graphics Card	DirectX 9 or later with WDDM (Windows Display Driver Model) 1.0 driver
WDDM	is a graphic driver architecture for video card drivers running Microsoft Windows.

1.5.1 Installation of Operating system

Operating system is installed in a separate section of hard disk referred to as *disk partition*. The hard disk is usually divided into multiple sections and each section or partition can operate independently of the other. Dividing hard disk into partitions is called **disk partitioning.**

Before you partition a disk, save or backup important files onto another disk because disk partitioning erases all the data on the disk and prepares it for new data using a particular file system such as FAT (File Allocation Table) or NTFS.

The hard disk is usually partitioned when installing operating system. To partition your hard disk, insert in the optical drive a bootable DVD containing a desired operating system e.g. Windows 8 or Windows 10.

Note: While installing the OS, determine the type of *file system* you should use. ***File system*** *is a method used by Operating system to keep track of files stored on computer.* File systems commonly used by operating systems include: FAT32 and NTFS. Modern operating systems such as Windows 10 mainly use NTFS (New Technology File System). Consider the type of file system best supported by OS or application software you want to use.

Since an Operating system has to take control of all other programs you will use, it must be installed first before other programs.

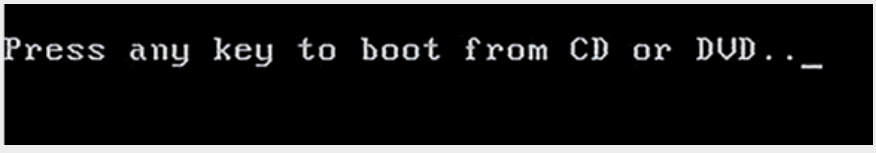
Activity 1.4

Provided with Windows 10 installation DVD or flash disk containing Windows 10 installation files, perform a fresh installation of Windows 10 on your computer.

Step 1: Backup all your data on an external storage device such as a flash drive or external hard drive. This is because clean installation deletes everything on your computer's hard drive.

Step 2: Start your computer and then connect the bootable **USB flash drive** or insert the bootable Windows 10 **DVD** on the PC where you want to install Windows 10.

Step 3: Restart your PC, and then **press any key to boot** from the USB flash drive or the DVD. Press the key after seeing the message as shown below.

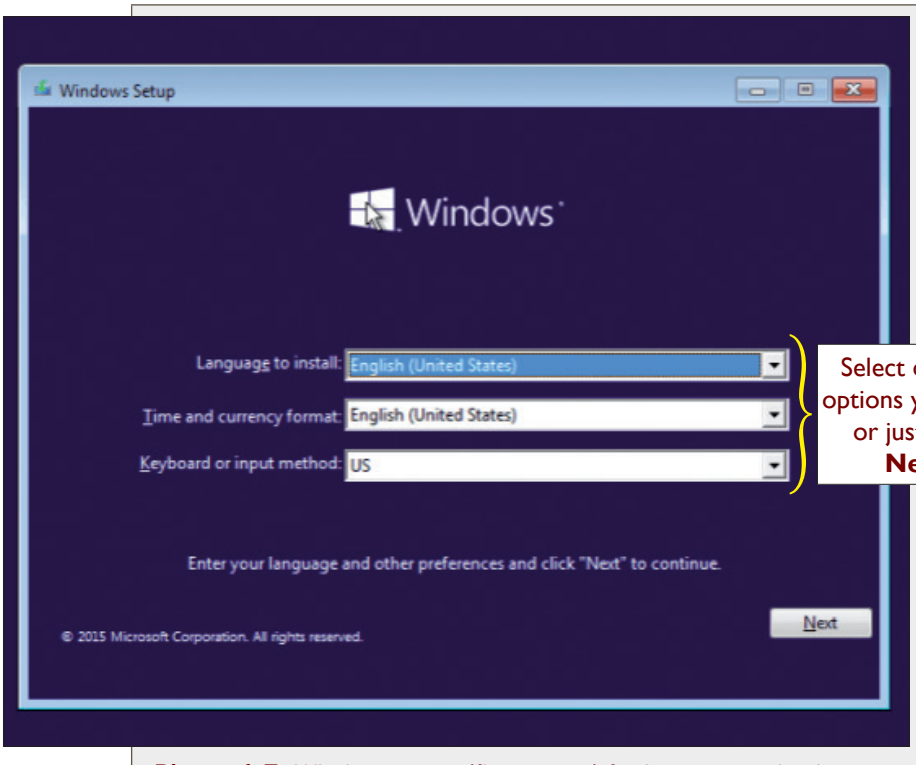


If you restart your PC and your current version of Windows starts, then open a **boot menu** or change the **boot order** in your computer's **BIOS** or **UEFI** (Unified Extensible Firmware Interface) settings so that your computer boots from the media.

> **Note:** To open a boot menu or change the boot order, press a combination of keys (such as F2, F8, F9, F10, F12, Delete, or Esc) as soon as you turn on your PC. However, the key (s) you press depends on the manufacturer of your computer's motherboard and it is usually displayed immediately the computer starts. Check it out.

Once you get the **boot menu**, select the best **boot order** such as **Optical disk drive** then press enter key.

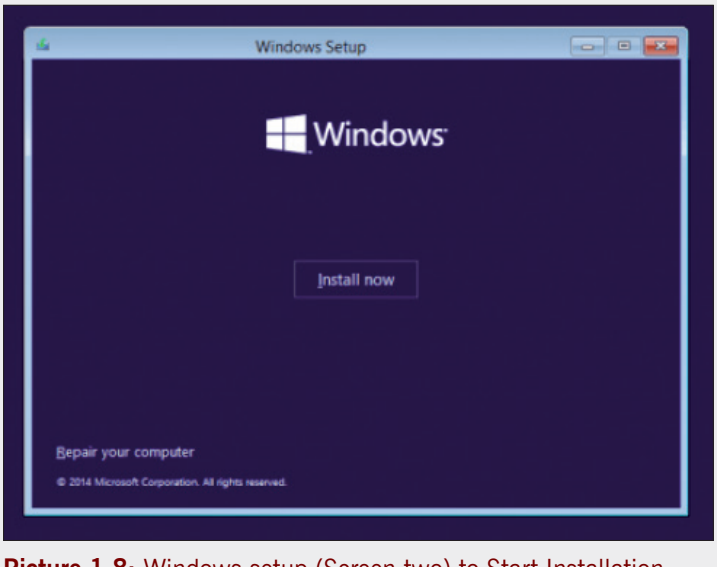
Step 4: On the first screen for Windows Setup, select your **language**, **time**, **keyboard** preferences and then click on **Next** button on lower right.



Picture 1.7: Windows setup (first screen) for Language selection

Step 5: In the next screen, click on **"Install Now"** to install Windows.

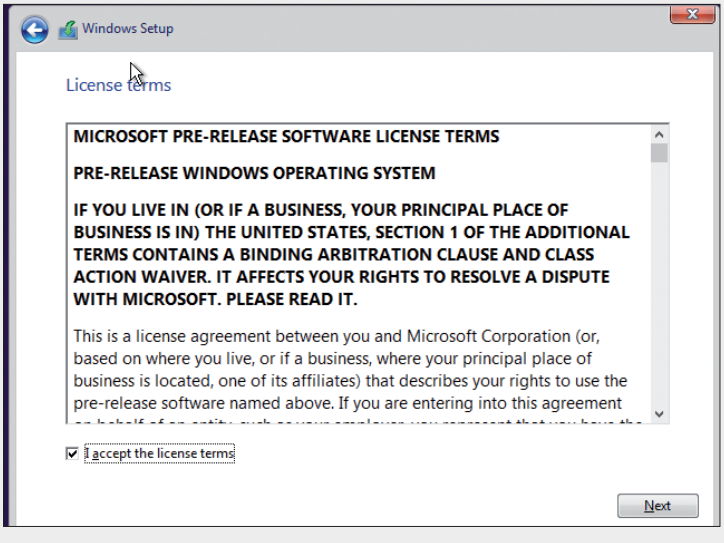
The new OS Windows 10 will start its installation. **Make sure you don't turn off your PC.**



Picture 1.8: Windows setup (Screen two) to Start Installation

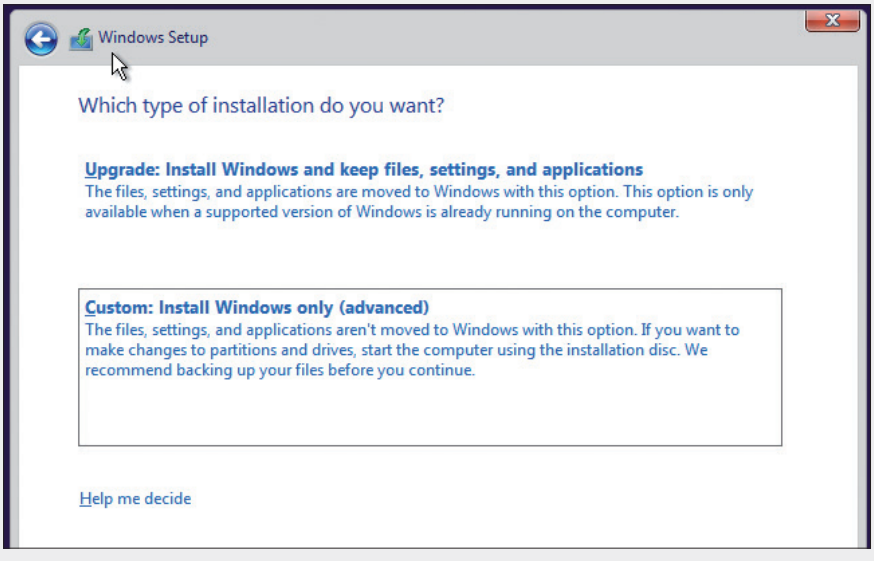
Step 6: In the next screen, you will be asked to provide a **25-character product key** in the space provided. After entering it, click **Next**. However, if you don't have a product key at the moment, click on **Skip** button so you will enter the product key later.

Step 7: The next screen is the License Agreement Window. If you have time, read through and then check the option labelled "**I accept the License terms**". afterwards click **Next** button.



Picture 1.9: Windows setup (Screen three) for accepting license terms

Step 8: In the next screen, you will see two options. To perform a clean installation, select **Custom.**



Picture 1.10: Windows setup (screen four) for selecting Installation type

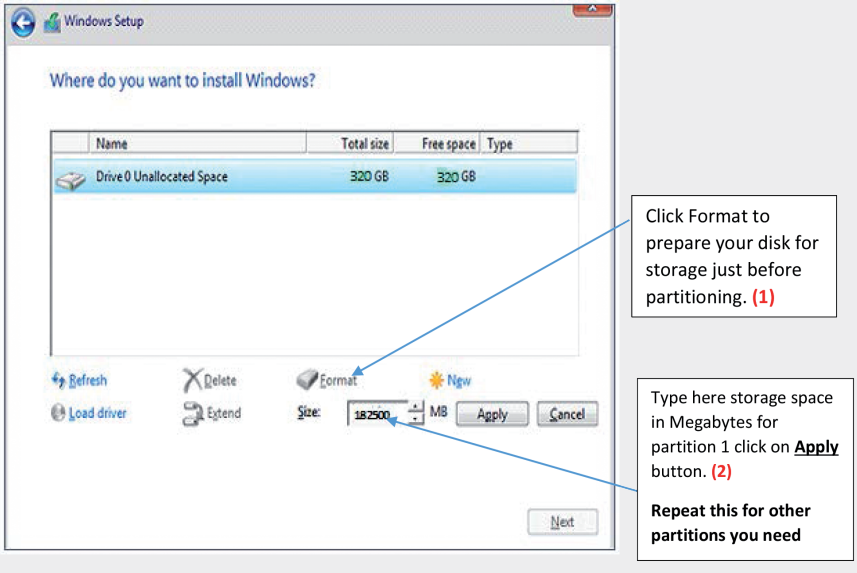
Note: **Custom** is selected to make fresh installation.

Step 9: Select the drive on which to install Windows 10. You may need to format the drive for clean installation. Select the drive and click on Format at the bottom of the window. In case you have just installed a new hard disk, you need to create a new partition to install Windows.

To create a partition

- Select the hard drive and click on "**New**" button
- Allocate the space you want depending on the capacity of your hard disk.
- Click "**Apply**" to complete the process.

  Note: The system additionally creates a partition with name "**System Reserved**" to ensure that the system works fine. Its size usually is 100MB.

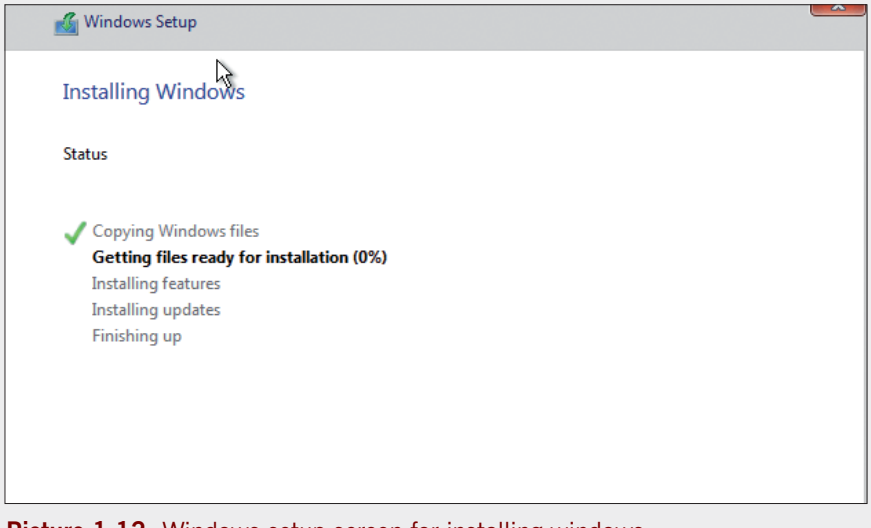


Picture 1.11: Windows Setup screen for partitioning a hard disk

Step 10: Select **partition** where you want to install Windows 10 and click **Next** button.

At this point, the installation of Windows will start. It will take about 25 minutes to complete the installation process.

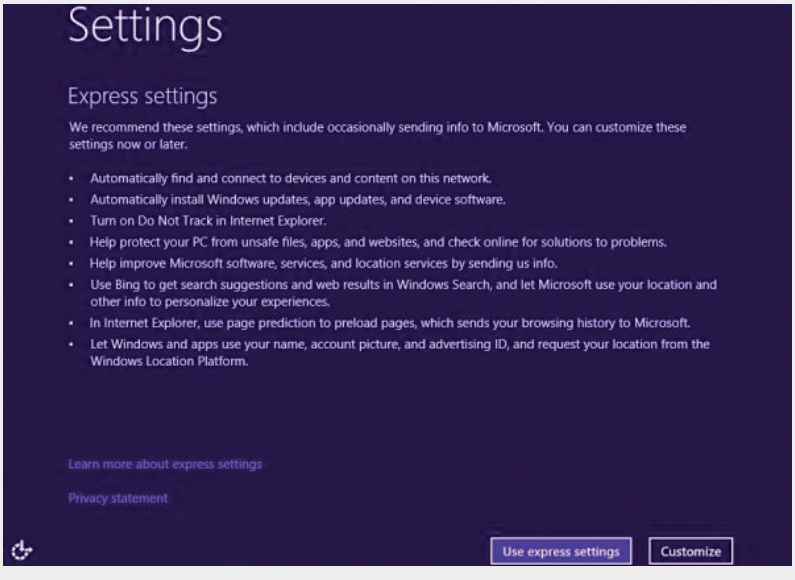
During the installation, your system may reboot two or three times but don't press any key, leave everything to work automatically.



Picture 1.12: Windows setup screen for installing windows

Step 11: Once the **installation is completed**, a blue colour screen displays.

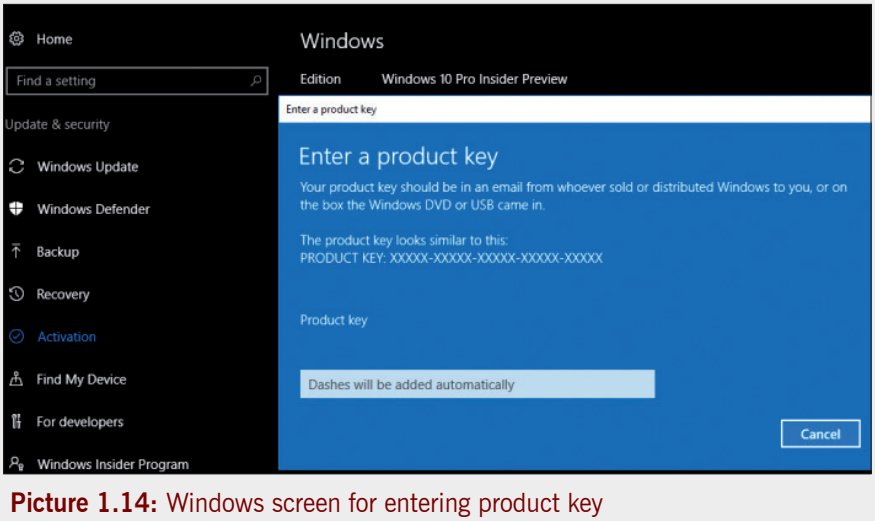
Click on "**Use Custom Settings**" button if you want to go with default settings. You can also click on **"Customize"** button if you want to customise settings.



Picture 1.13: Windows setting screen

Follow on-screen instructions and a few minutes Windows 10 will be ready for use.

Note: If you did not enter the 25 character windows key above, then go to **Settings** -> **Update** & **Security** -> **Activation**. Enter the key to activate the windows.



Picture 1.14: Windows screen for entering product key

1.5.2 Install Microsoft (MS) Office 2016 on selected computer(s)

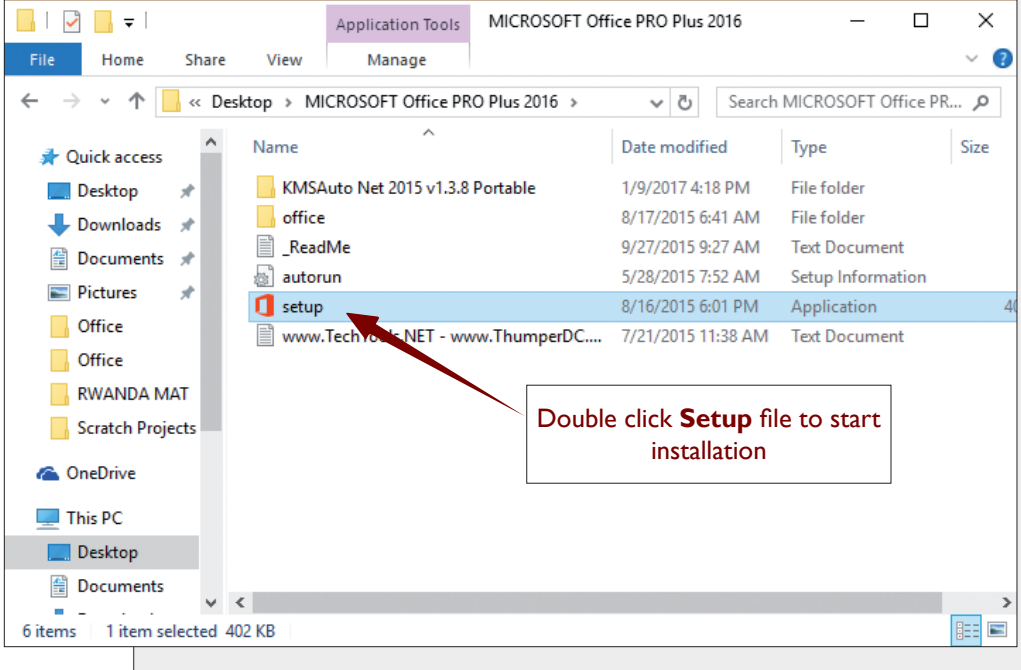
Activity 1.5

You are provided with Office 2016 Installation DVD. Install this application on your computer. Follow the steps below.

Step 1: Obtain MS Office installation on a DVD, flash disk, external hard disk (or download Installation file from the Internet.)

Step 2: Insert the disc in the optical drive (e.g. DVD Drive)

The installation disc automatically launches *setup* wizard. (If the setup wizard doesn't start automatically, open the disk drive or folder for Office 2016 and double-click **Setup** file. See the picture below.



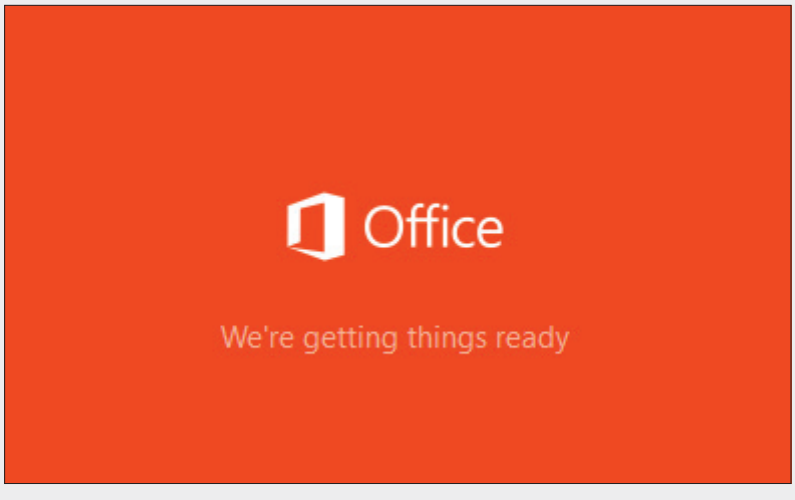
Picture 1.15: File Explorer (Windows Explorer) showing Microsoft Office 2016 folder

When the setup file is double-clicked, it displays the Office screen as shown in Picture 1.16.

Remember:

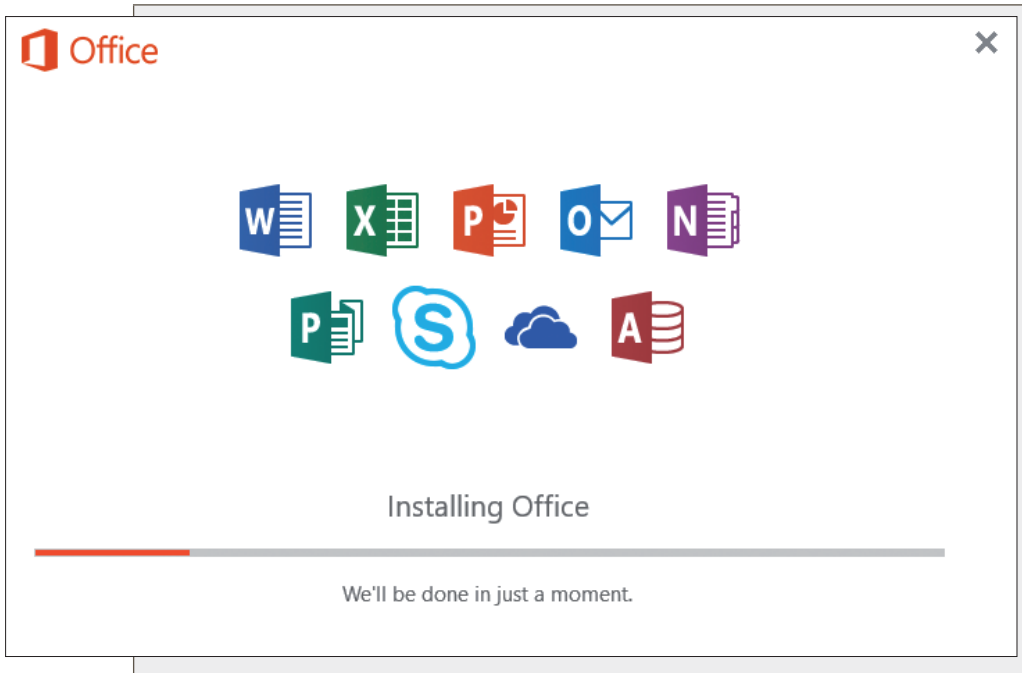
To install application software successfully you must use an Administrator account, without which installation cannot take place. Other types of accounts such as standard or limited accounts and Guest accounts do not have the privilege to install or uninstall software.

If you normally use limited accounts for doing other practical activities, this time you should use an administrator account to install Microsoft Office 2016 and other applications.



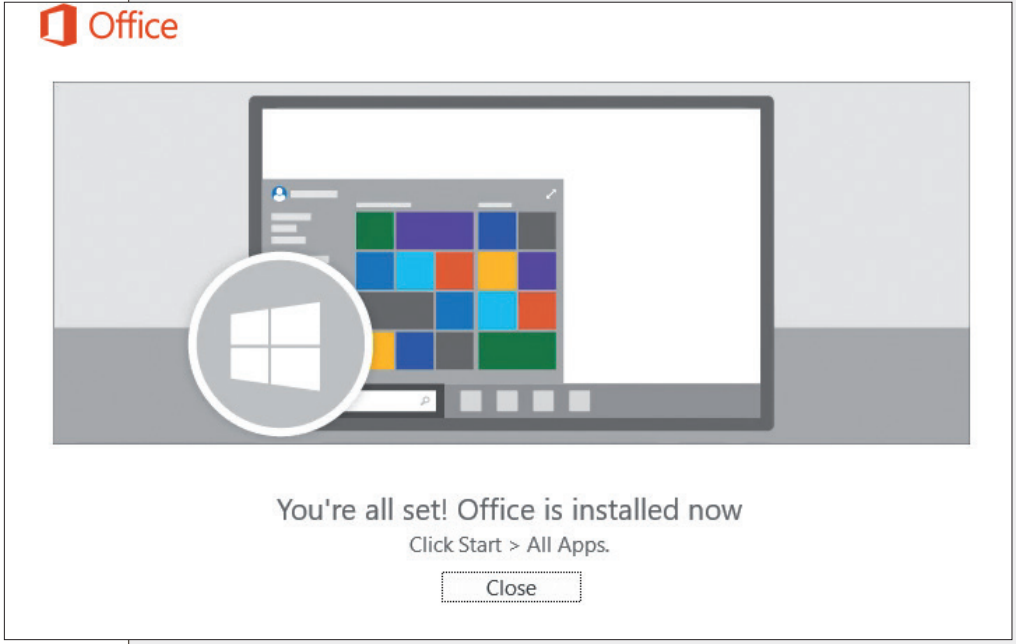
Picture 1.16: Office screen

After a short time, the Office installation screen appears to show the status of installation process as shown in picture 1.17.



Picture 1.17: Office 2016 installation status

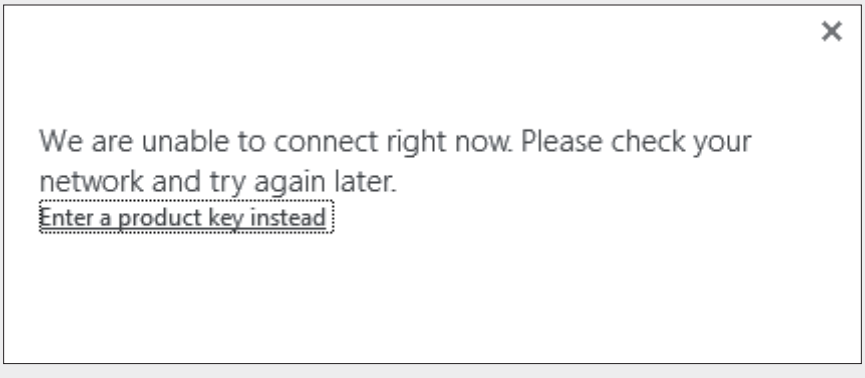
Step 3: Wait as Office installs to complete the installation process. Click **Close** after the installation is complete (see picture 1.18).



Picture 1.18: Office complete installation screen

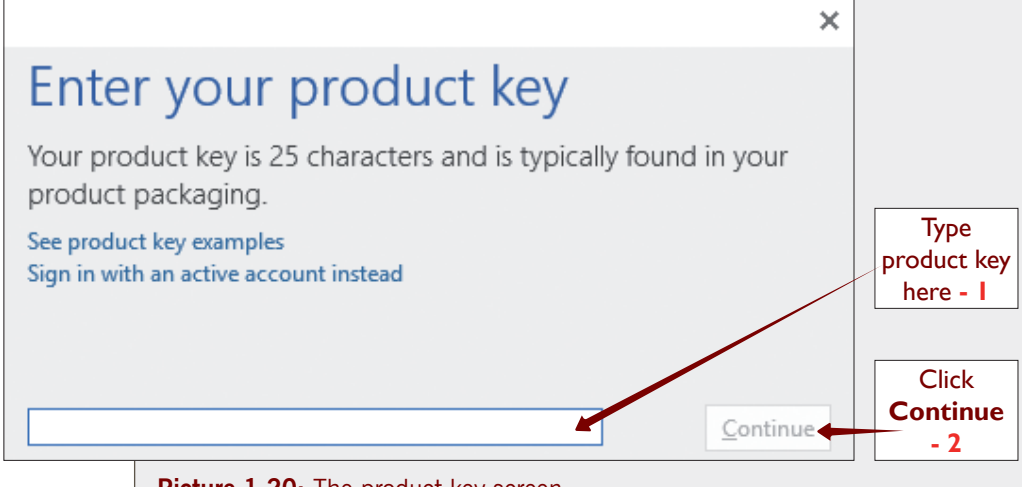
Step 4: Open an office application such as Word 2016. The message as shown in picture 1.20 may display on top of Office (Word) 2016 *Open back stage* screen. In case you purchased a licensed product, close it and will not show again, start using office normally.

If you purchased a non-licensed product, and you have the product key, click on "Enter a product key instead" (see picture 1.20).



Picture 1.19: Office connection Error screen

The *Product key* screen displays as shown below. Type in your product key which must be 25 characters and then click on **continue**.



Picture 1.20: The product key screen

MS Office 2016 may not require a product key once you purchase a licensed copy.

> **Note: Product key** is a specific software-based key for a computer program and certifies that the copy of the program is original. If you do not have product key, you may fail to use the software installed normally or if the product key is required before installation you may fail to install the software. The location of your product key depends on how you got a copy of the software.

Step 5: Afterwards Office installs; click **close** after installation is complete.

Step 6: If the activation wizard displays, click "*I want to activate the software over the Internet"* and then follow prompts.

1.5.3 How to install application software (installing skype)

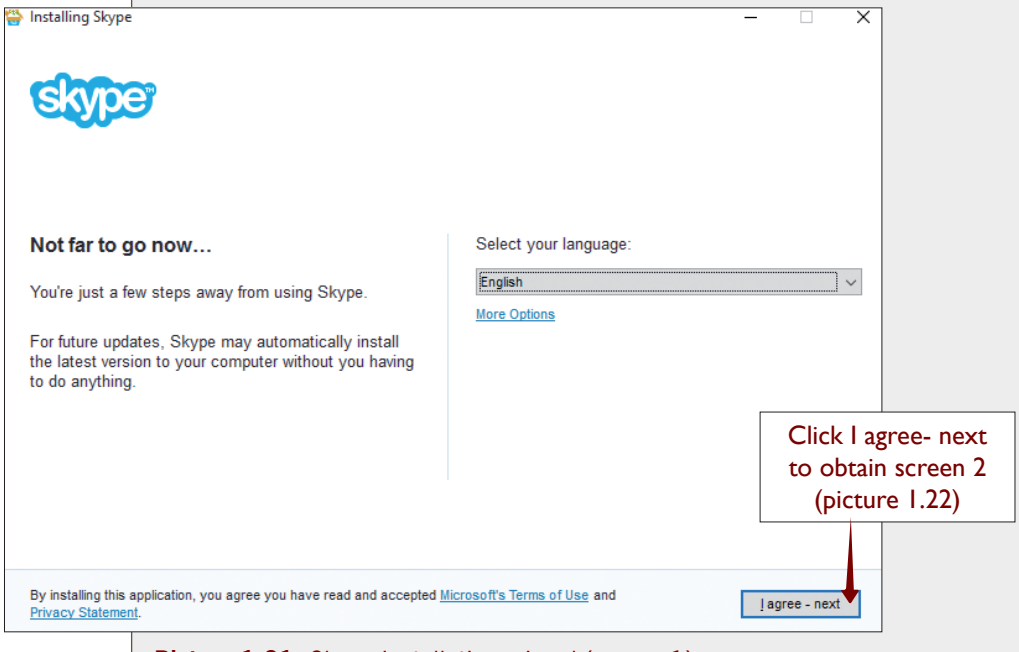
Procedure

Step 1: Obtain a disc that contains the software to be installed. If you earlier downloaded the software, then check for the software from the folder where you save on the desktop.

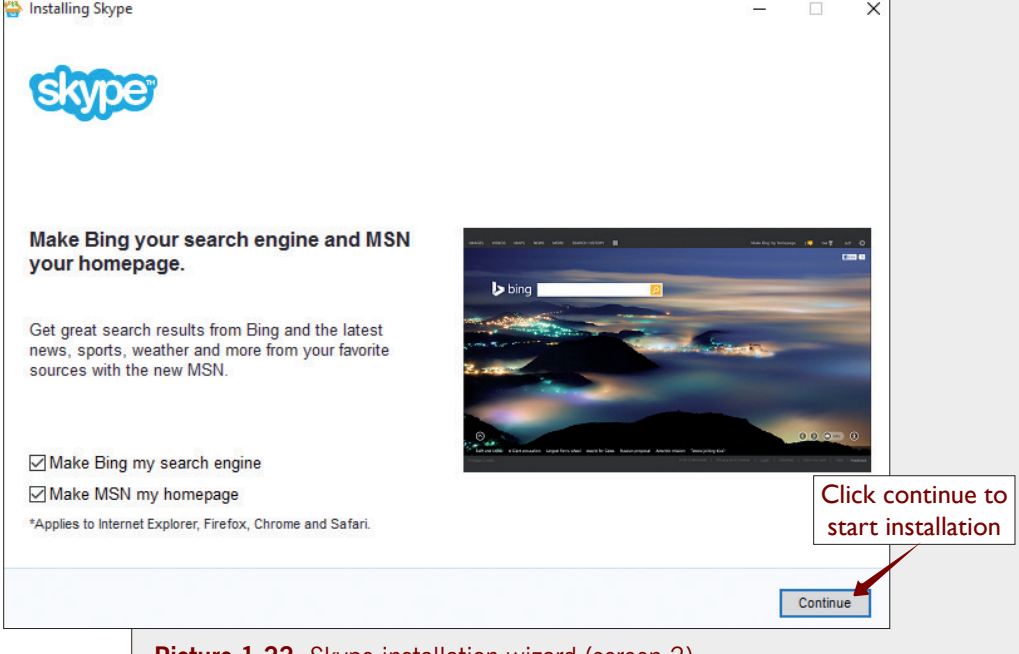
Step 2: Insert the disc in the disk drive.

Step 3: Open the disc. Open the folder containg installation files.

Step 4: Double click on the Setup file for Skype to install. The wizard for installation starts as shown in picture 1.21.

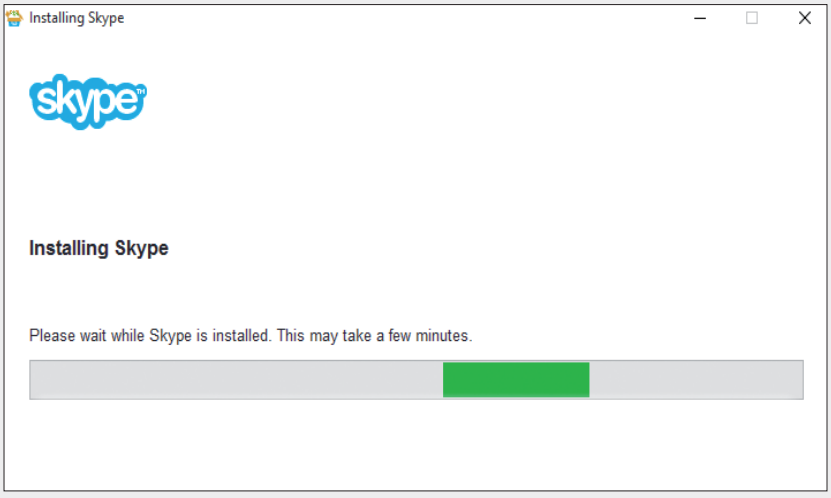


Picture 1.21: Skype installation wizard (screen 1)



Picture 1.22: Skype installation wizard (screen 2)

Note: Many Application programs require internet connections. So ensure Internet is available for proper and complete installation.



Picture 1.23: Installation screen for skype

If you are using the latest version of Windows 10, Skype is already installed on it. Just sign in with skype name, email or phone.

Step 5: Repeat step 4 above and install the rest of the software you downloaded that includes: Adobe Acrobat Reader, Chess game, Avast antivirus and Nero burning software.

Activity 1.6

Locate the software you downloaded in activity 1.3. Perform software installation of each of the installation files for;

a) Avast antivirus
b) Mozila firefox
c) VLC media player
d) Adobe (Acrobat) reader
e) Nero burning software

1.5.4 Install Antivirus

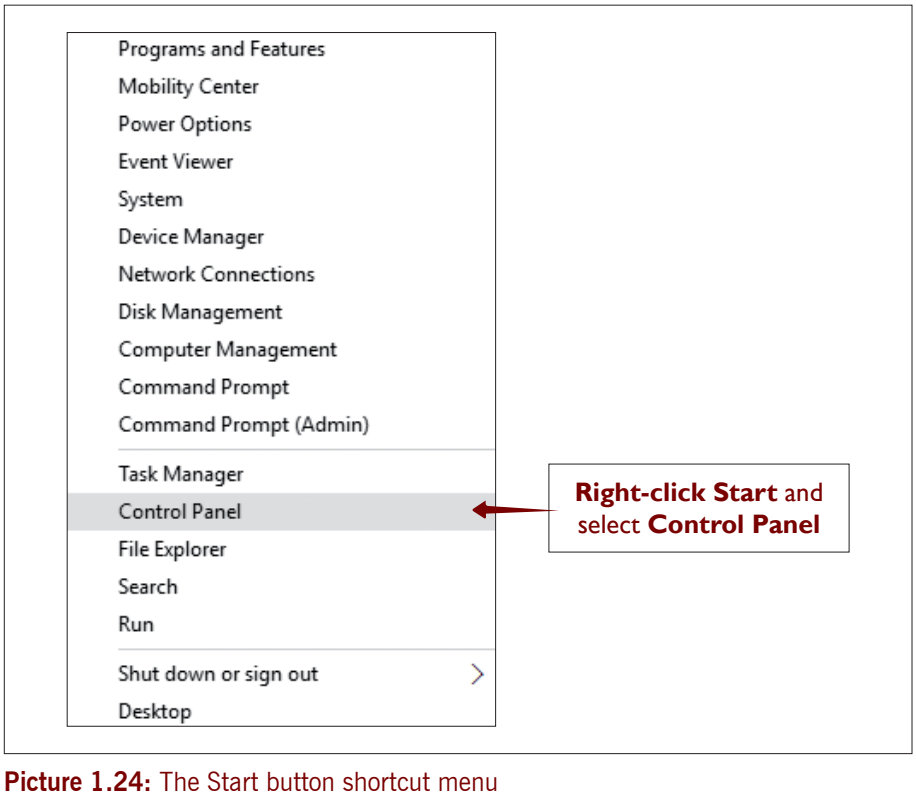
This is a utility program used for scanning computer viruses and removing them from the computer.

Viruses can corrupt computer data on hard disk, delete most important operating system files and can make the system to crash. Always install updated antivirus software and ensure you scan your system regularly with the program. You can download and install the antivirus you want depending on user experience or information from other users like Norton, Kaspersky, AVG, McAfee, Avast, etc. Similar steps are used to download and install different antiviruses.

Uninstall application software

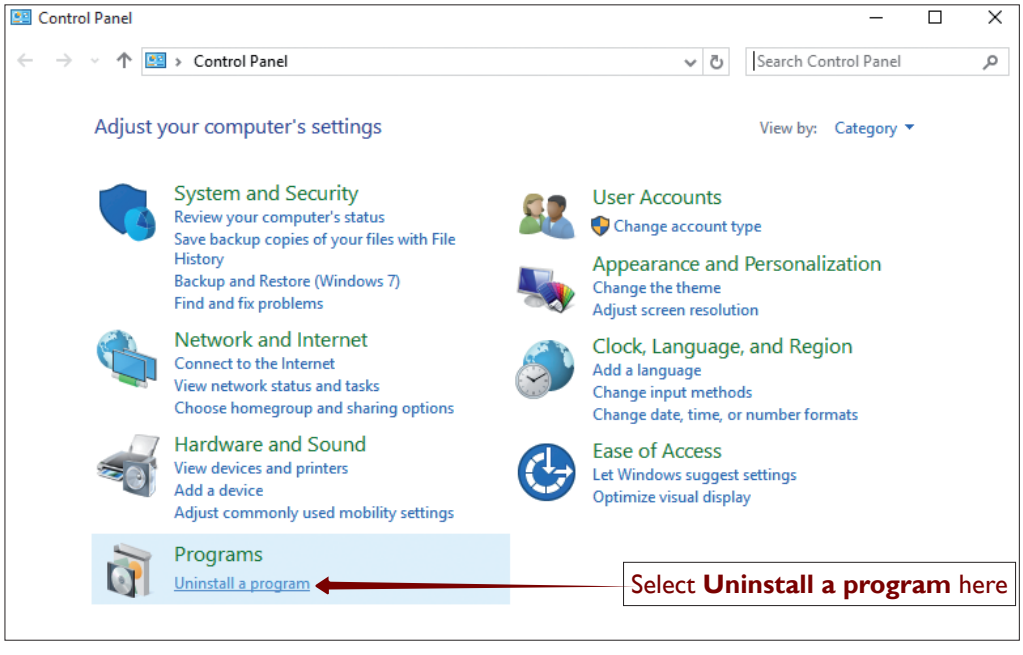
Take the following steps to uninstall (**Google Chrome**) an application software.

Step 1: Right click the **start** button and select **Control Panel.** (Or type "Control panel" in the Search box at the start and press enter).



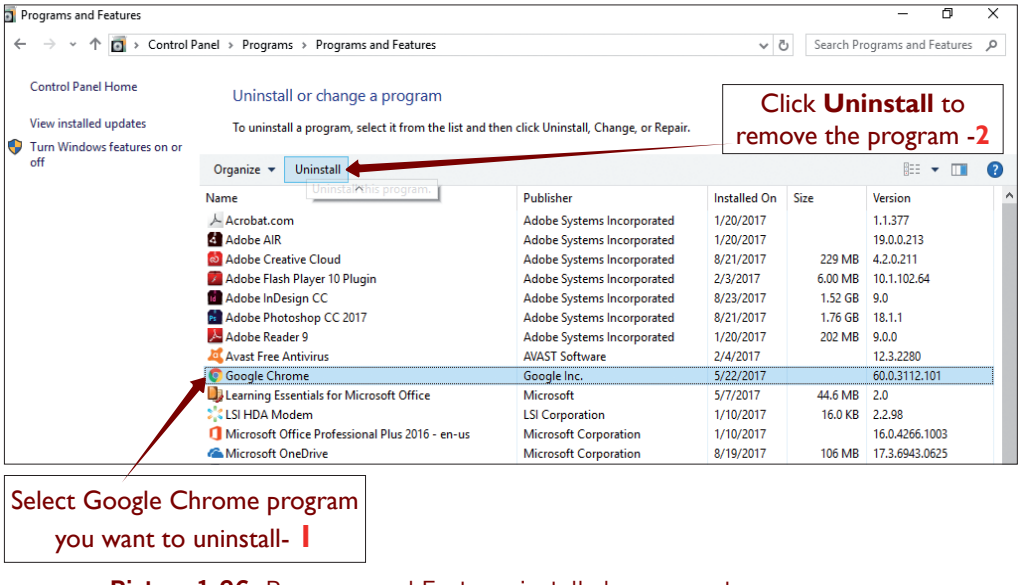
Picture 1.24: The Start button shortcut menu

Step 2: In the **control panel window** that displays (as shown in picture 1.25) select **Uninstall a program** under Programs option.



Picture 1.25: The Control Panel window

Step 3: In the **Programs and Features** screen, select **Google Chrome** (you can select another program you are sure you do not need and uninstall it). Then click on **Uninstall** tab above programs list.



Picture 1.26: Programs and Features installed on computer

Step 4: Wait for the **Windows Installer** (as shown in picture 1.27) to gather all the features of (Google Chrome) program and remove them. Lastly close **Control Panel**.

Picture 1.27: Windows Installer prepares to uninstall the program selected

Note: After uninstalling some applications such as MS Office, it requires to restart the computer to completely remove all the features. When you see a message prompting you to restart, please accept it.

1.6 Software add-on

This is a piece of software that adds a specific feature or capability to an existing software application. A software add-on cannot be run independently, it is just a software extension.

Examples of common add-ons are *Adobe Flash, QuickTime* and *Silverlight*.

Role of add-ons

- **Interface change**: The application can be dynamically extended to include new features which have friendly interface suitable for different users.
- **Adding features**: More features are added to the browser (program) to increase its usability.

Download and install add-ons

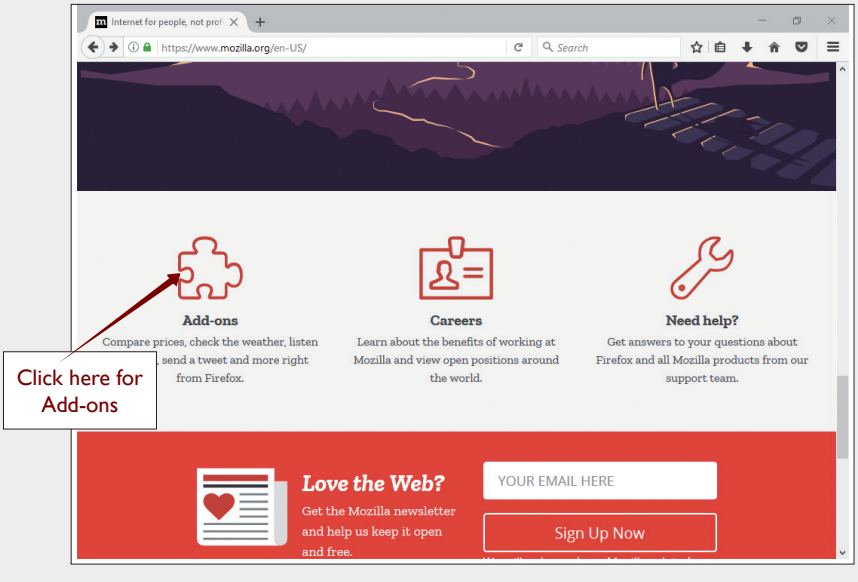
Activity 1.7

Using Mozilla firefox

Carryout a download to add various software extensions to your browser.

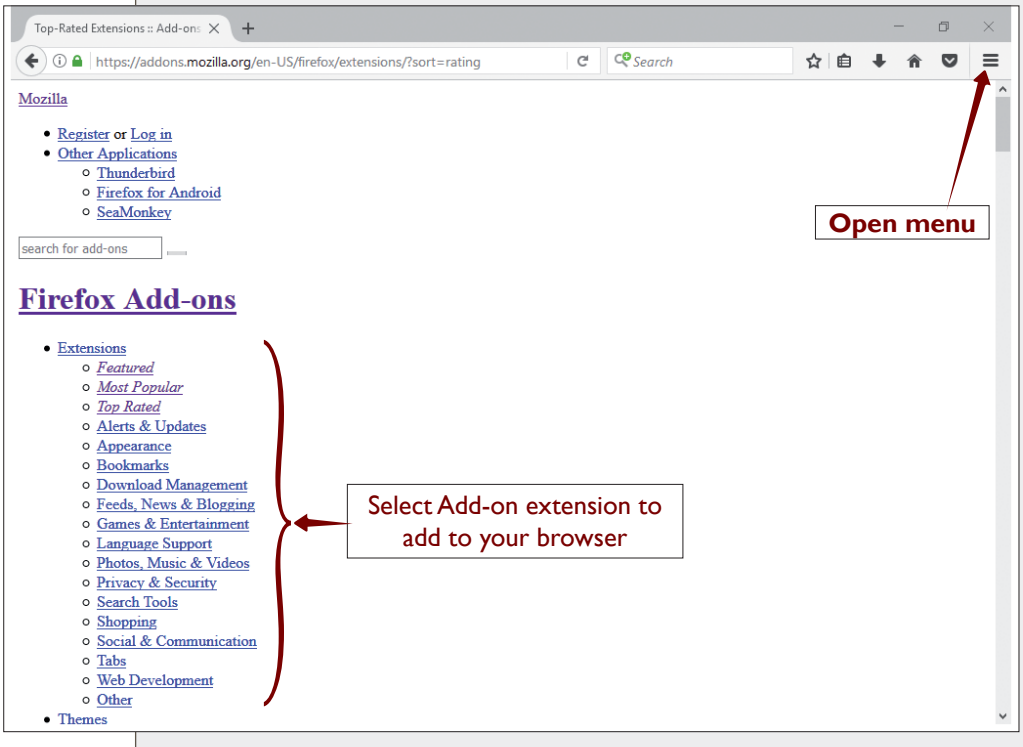
Step 1: Go to the Mozilla home page. You can use *www.mozilla.org.*

Step 2: Click **Add-ons** (First scroll down the page).



Picture 1.28: The Mozilla website

Step 3: On the new page that displays, go to the add-on or extension you want to add.



Picture 1.29: A list of some Firefox extensions

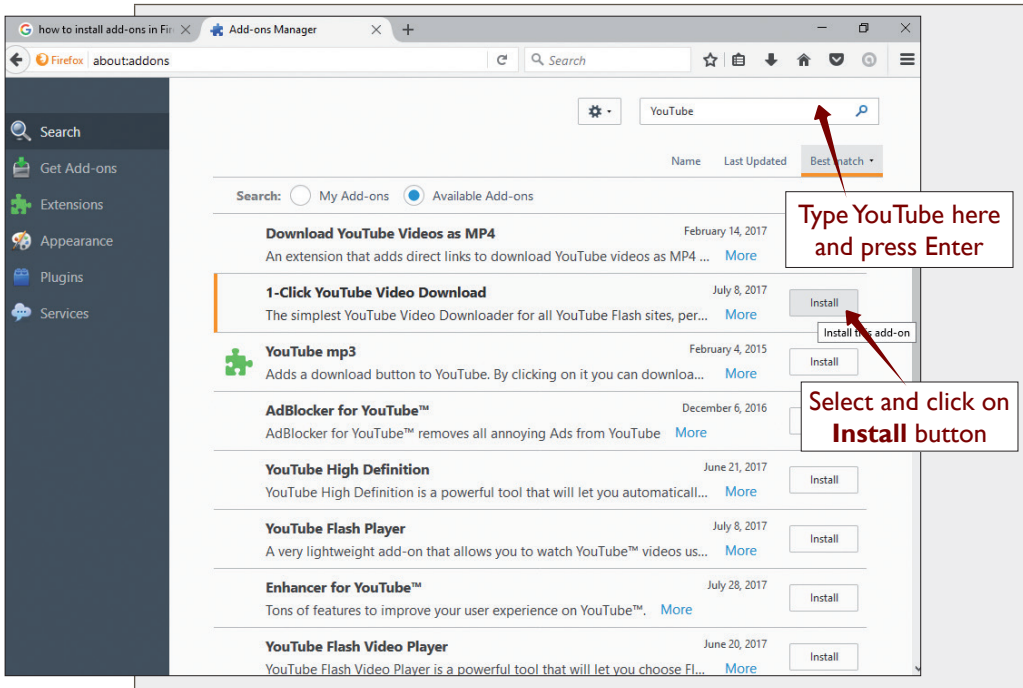
Step 4: Click the **add-on** you want to download. This automatically installs on your computer.

Download Helper

This is a tool used to extract videos and image files from websites and save them to your hard drive. As you are surfing the web **Download Helper** can detect that it can do something for you, the toolbar icon highlights and a menu allows you to **download** files by simply clicking an item.

Download file (Video) using add-ons/download helper

Step 5: In the new tab for **Add-ons Manager**, click in the Search box at the upper right hand corner of the window. Type in the word **YouTube** and press enter key.



Picture 1.30: Firefox window displaying the Add-ons Manager tab active

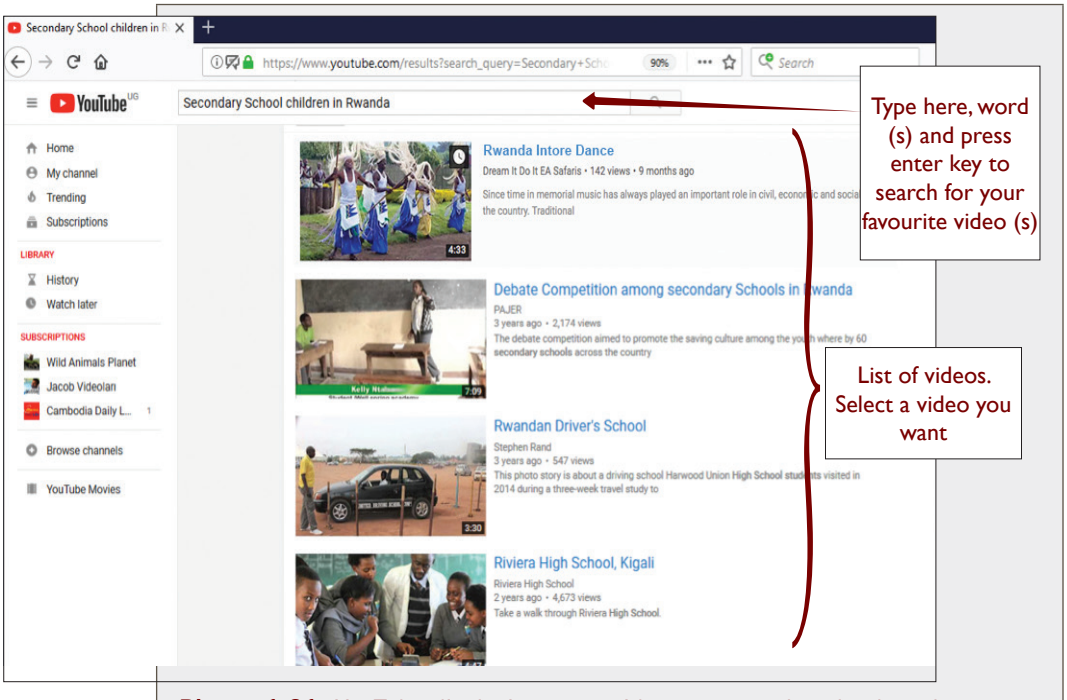
Step 6: Click the **Install** button next to the result "**1-click YouTube Video Download**".

Step 7: Once the installation is complete, wait for a few seconds and then restart Firefox.

Step 8: Type in the Address bar **"www.YouTube.com".** Locate your favourite video and click on it.

Step 9: If "I click YouTube video download" is used, to download a video on YouTube, there is a red button under **Active Video download**.

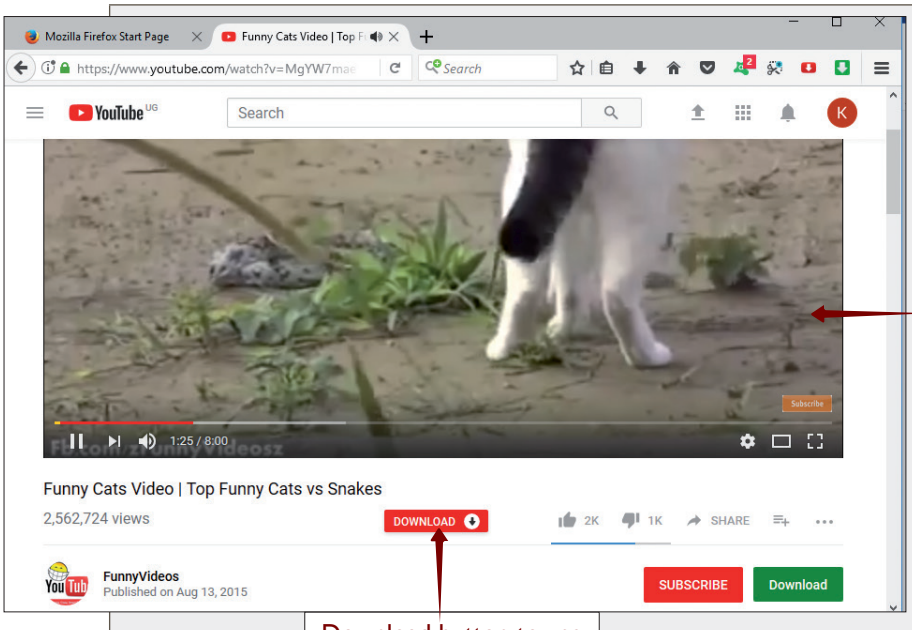
If Download Helper is used and there is an active video on any website, the icon is active to let you download it, see pictures 1.31 and 1.32.



Picture 1.31: YouTube displaying some videos you can download or play

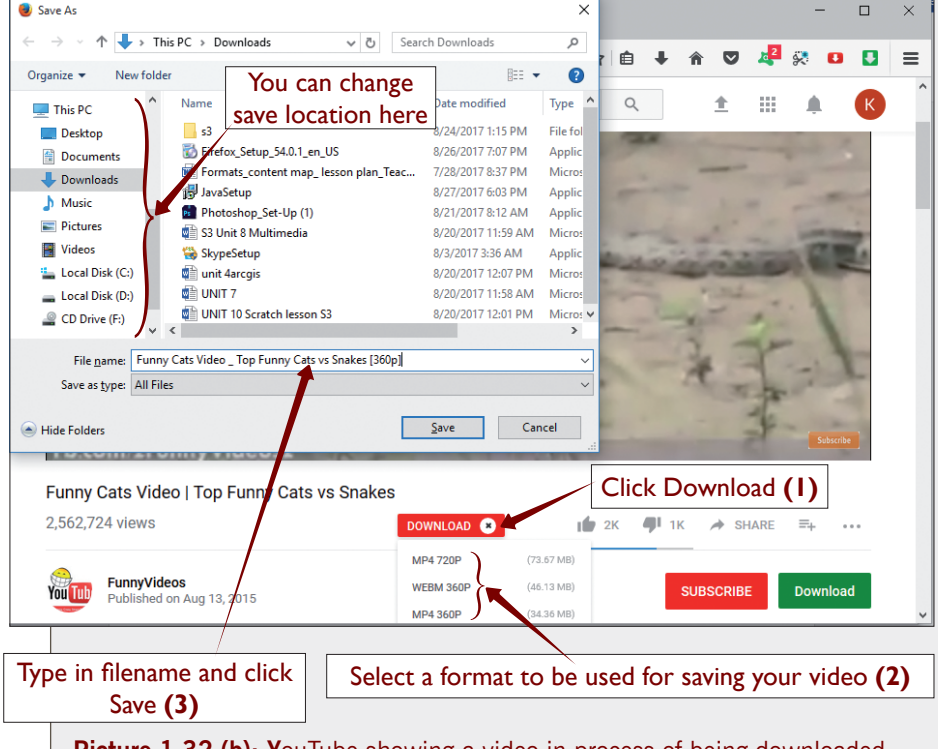
Copy the URL for your favourite video.

Step 11: From **Save as** dialog box, select location to save your video and click Save continue to download the page.



Picture 1.32 (a): YouTube showing active video that can be downloaded

Click the Download button below the active video and the options it brings, select a suitable format. The save as dialog box displays.



Picture 1.32 (b): YouTube showing a video in process of being downloaded

Step 12: Once the download is complete, watch the downloaded video at any time you want, using location specified.

> **Note:** YouTube has been designed for users who only watch and view videos on their website. In case you want to download and save the video to your computer, you may have to select from a variety of online downloader programs or use YouTube downloader page to download the video.

> **Note: Ad blocker**
>
> This is software extension that reduces the number of unwanted, uncalled-for pop up ads which appear on the user's display in a browser. **Ad** is short for ***Advertisement***. Pop up ads usually appear unexpectedly.
>
> *Ad block Plus* is the most popular ad blocker for Firefox, opera, chrome, safari and internet explorer. It blocks banners, pop-ups, tracking and some malware.
>
> **Why should you remove ads?**
>
> There are many reasons why people choose to remove ads. Some of the most frequent arguments are:
>
> - People do not want to be manipulated by online advertising.
> - Advertising is annoying in most cases.
> - Advertising often uses heavy graphics which slows the page loading.
> - Online advertising imposes a security risk for the Internet user, as the third-party banner ads may introduce security breaches to the site.

How to disable or remove browser plug-ins and add-ons

Internet Explorer, Firefox, and Google Chrome each allow for the use of **plug-ins** and **add-ons**, which are scripts that supplement the functionality of the browser.

For - Mozilla Firefox

In the menu bar, select **Tools** > **add-ons** or click the **Open menu** button on the upper right page and select **add-ons**.

1. In the **Add-ons Manager** Screen, find the add-on from the list of currently loaded add-ons on the right.
2. Select it and click on the **Disable** button at the bottom right. Windows users may also be able to uninstall add-on files through the **Control panel**.

Activity 1.8

Download and install the following add-ons:

a) Media player for YouTube
b) Mail Notifier
c) Screen Capture

End of Unit 1 Assessment

Theory Questions

1. a) Define the term *Software Installation*.
   b) Briefly describe the steps for installing an operating system.
   c) Explain the role of operating systems.
2. Apart from fresh installation, explain other choices that are available for installing operating system on computer.
3. Explain the following terms:
   a) File System
   b) Booting
   c) Disk partitioning
   d) Microsoft Office
4. Use Internet facility to research and then discuss the role of open source applications over proprietary software.
5. Open your browser and download the following applications:
   a) *Microsoft Office*
   b) Chess master
   c) *A shampoo* burning software
   d) PDF reader
   e) Ludo game
   f) Kerspersky Antivirus
   g) Adobe Photoshop

6. Install the following programs you downloaded on to your computer:
   a) Ashampoo burning software
   b) Adobe Photoshop
   c) Chess game
   d) PDF reader
   e) Mail Notifier (add-on)
7. Uninstall the following software from your computer:
   a) Acrobat Reader
   b) Media player for Youtube
   c) Screen capture

APPLICATION SOFTWARE

Word Processing

Unit 2

Table of Contents and Mail Merge

Key Unit Competence

Generate a table of contents and use one document to have multiple copies for different recipients.

2.1 Table of Contents (TOC)

A Table of Contents is a piece of information used by readers to quickly find or locate what they are looking for in a book, magazine or any piece of literature.

Activity 2.1

Creating Table of Contents

Follow the following steps carefully to create a Table of Contents:

Step 1: Start MS Word and then create a new document in which you need to add Table of Contents. You will save the document as **My-TOC**.

Now use Microsoft Word and type the following text as it appears; then you will use it to create Table of Contents and Lists of Tables and figures in activity 2.2 and 2.3.

The text bellow will be used in learning how to create table of contents:

Information and Communication Technology Syllabus

ICT Syllabus in Secondary Schools contains a number of items of study. One of the interesting items in the syllabus is about software. When a teacher plans to have an ICT lesson from the Computer Laboratory, all learners smile (like a smiley face shown on the right) because they are going to use computers practically. There is some information about software as shown below:

Computer Software

Definition of computer software

Computer software is defined as a series of instructions that tell the computer hardware how to process data. Computer software is sometimes called computer program. It is divided into two main categories;

- System software
- Application software.

About three quarters of what learners study is application software. As shown in the figure on the right.

System software

These are computer programs that control the operation of a computer and its hardware devices. System software act as an interface between the user, application software and computer hardware. Modern computers are complex machines having many running parts all of which need system software to keep running. Systems software also provide general functionality for other programs to use, tools to speed up the computer, tools to develop new software and programs to keep the user safe from attacks.

System software is divided into:

- **Operating system**: For example, Windows 8, Windows 10, Linux and many others.
- **Utility programs**: For example, Antivirus, Disk defragmenter and others.
- **Translator software:** For example, Assembler, Interpreters and compilers.

- **Programming languages:** For example, machine code, Assembly and Java.

The table below summarises system software

Category of system software	Some examples	
Operating system	Windows 10, Ubuntu, Linux, Mac OS	
Utility Software	Antivirus, Backup, Disk defragmenter, Screen saver, uninstaller	
Translators (Language translators)	Assemblers, Interpreter, Compilers	
Programming languages	Low Level languages	Machine code, Assembly,
	High level languages	Java, SQL, Mercury, Visual Basic

Application software

These are programs that help end-users to accomplish specific tasks using a computer. These programs define what a computer can be used for. Most application programs are available as packaged software that can be bought and installed on your computer. The common categories of application software include:

Word processing software

Word processing software is the key to learning other application programs. On the right is a 7-point star for Microsoft word.

Spreadsheets software

Management of figures is best learnt from lower level with spreadsheets software. This knowledge is important in business calculations. We give Microsoft excel a six-point star as shown on the right.

Presentation software

It is important that learners can convey information to particular audience in an organised way using a computer program. We can now give Microsoft PowerPoint a 5-point star.

Other applications are equally good and learning the first three (above) gives a learner a good foundation for understanding other professional applications as given faster.

- Graphics and Multimedia software.
- Computer Aided Design (CAD) software.
- Database Management Systems.
- Desktop Publishing.
- Project Management.
- Geographic Information Systems.
- Education software.
- Entertainment software and many others.

The table below summarises Application software

Application software commonly used in schools	Examples
Word processors	Microsoft Word, Abi-Word, Open Office Writer
Spreadsheets software	Microsoft Excel, Open Office Calc
Presentation software	Microsoft PowerPoint, Open Office Impress
Geographic Information System (GIS)	ArcGIS
Graphics and Multimedia	Microsoft Paint, Adobe Photoshop
Web Browsing software	Microsoft Edge, Mozilla Firefox, Google Chrome

Step 2: Apply Heading Styles to the text that you want to include on the Table of Contents (MS Word will use these styles to build the TOC automatically).

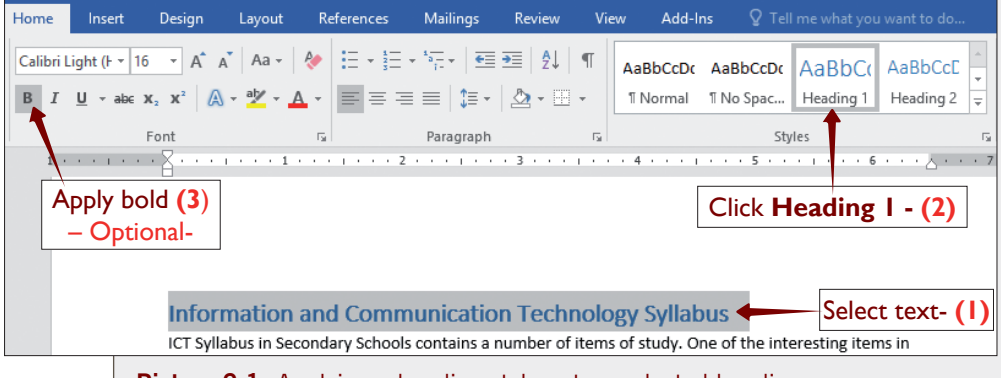
Note: The objects you see in text were wrapped. To wrap them and appear like that, you have to do the following:

- Click on **shape** (the drawing tools automatically display under Format tab).
- Click on Wrap Text in the Arrange group on the Format Tab.
- In the Wrap text menu, select Tight (you can also test other options to see how they work).

- Move the picture or shape to the right until all the text appears on the left of the shape.
- Release the mouse button. Justify your paragraph or block of text in case of need by clicking the **Justify** tool located under the **Paragraph** group found under the **Home** tab.

Procedure to apply heading styles

- Select text you want to be included in *Table of Contents*
  In our activity select the heading "*Information and Communication Technology Syllabus"* and apply Heading1 style. Do this by selecting **Heading1** style from the **Styles** group on the **Home** tab. Repeat action above for heading "Computer Software".



Picture 2.1: Applying a heading style onto a selected heading

Bold your title. Repeat the procedure on subsequent titles using **heading 2** in styles group and **bold** command in the font group on the **Home** tab:

The titles to apply **heading 2** in the text are:

- Definition of computer software
- System software
- Application software

Apply heading 3 style to text headings below:

- Operating system
- Utility programs
- Translator software
- Programming languages

- Word processing software
- Spreadsheets software
- Presentation software

Repeat this step for every text heading you think should be in your TOC.

At this stage insert page numbers. Align right page numbers in the footer using 1, 2, 3 number format.

Step 3: Generate an automatic **Table of Contents** for the document at the beginning of your document.

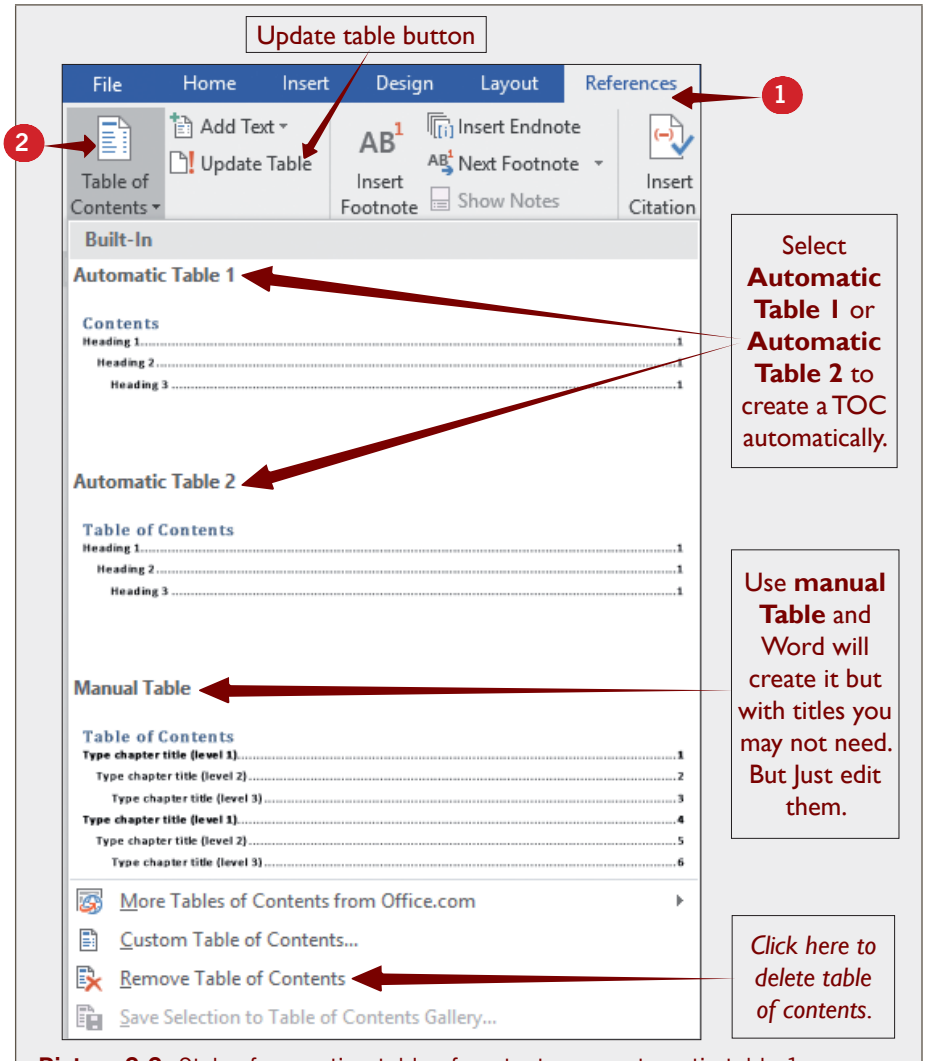
To create Table of contents, do the following below:

Creating table of Contents

- Click where you want to insert the Table of contents (usually at the beginning of the document).
- Click **References tab** > **Table of Contents**, and then choose **Automatic Table 1** style from the list (See picture 2.2).

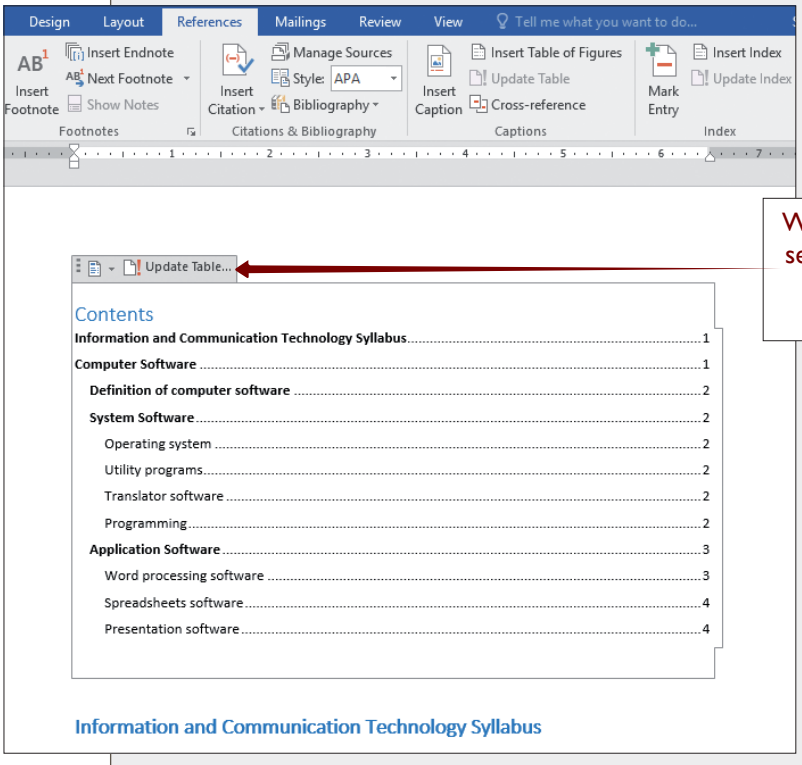
Note*:* If you use a Manual Table of Contents style, Word won't use your headings to create a TOC and won't update it automatically. If you opt for manual method, then everything has to be done manually.

When created, you can format or customise your TOC by changing font, number of heading levels, etc. A TOC can also be created in any other location in your document but it is most suitable at the beginning of your document.



Picture 2.2: Styles for creating table of contents e.g. automatic table 1

The Table of contents that results from activity 2.1 is shown in picture 2.3.



Picture 2.3: Document showing Table of Contents at the beginning of the document

Activity 2.2

Open My-TOC file and perform the following activities:

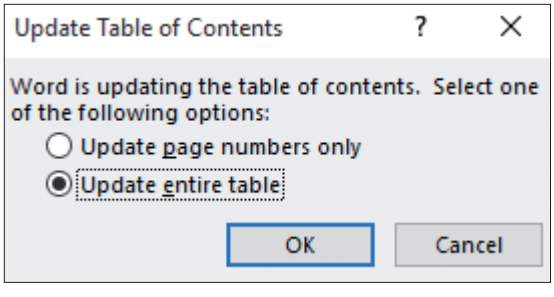
a) Insert a page break at the end of the document.
b) Type the heading 'Computer Hardware'.
c) Generate a list of computer hardware available in your computer laboratory on the following categories:
   - Input Hardware
   - Output hardware
   - Processing hardware
   - Storage hardware
d) Apply heading 1 style on the new heading and heading 2 style on the sub headings.
e) **Update your Table of Contents** (follow the steps given).

Update Table of Contents

If you add or remove some headings or information from the TOC in your document, you can update quickly using the following procedure:

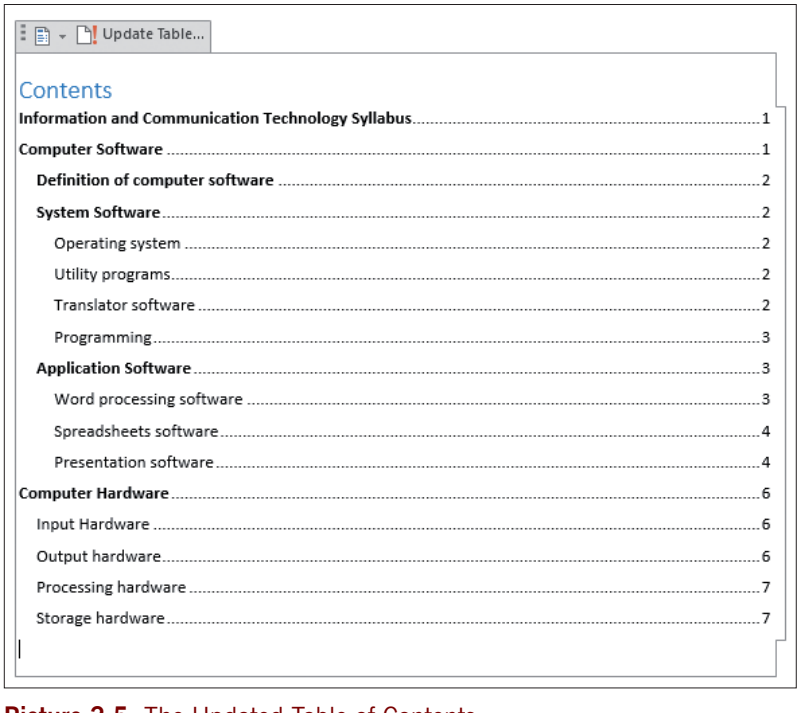
Step 1: On the **References** tab, in the *Table of Contents* group, click **Update Table** (See **picture 2.2**). You can also click "Update Table" button in the selected Table of Contents (See **picture 2.3**).

Step 2: In the Update Table of Contents dialog box that displays, select "**Update entire table**". The new table of contents displays.



Picture 2.4: The Update Table of Contents dialog box

When the TOC as shown in picture 2.3 is updated, the new Table of contents reflecting changes/updates you have made may appear as shown below.



Picture 2.5: The Updated Table of Contents

Delete Table of Contents

Step 1: On the **References** tab, in the *Table of Contents* group, click *Table of Contents*.

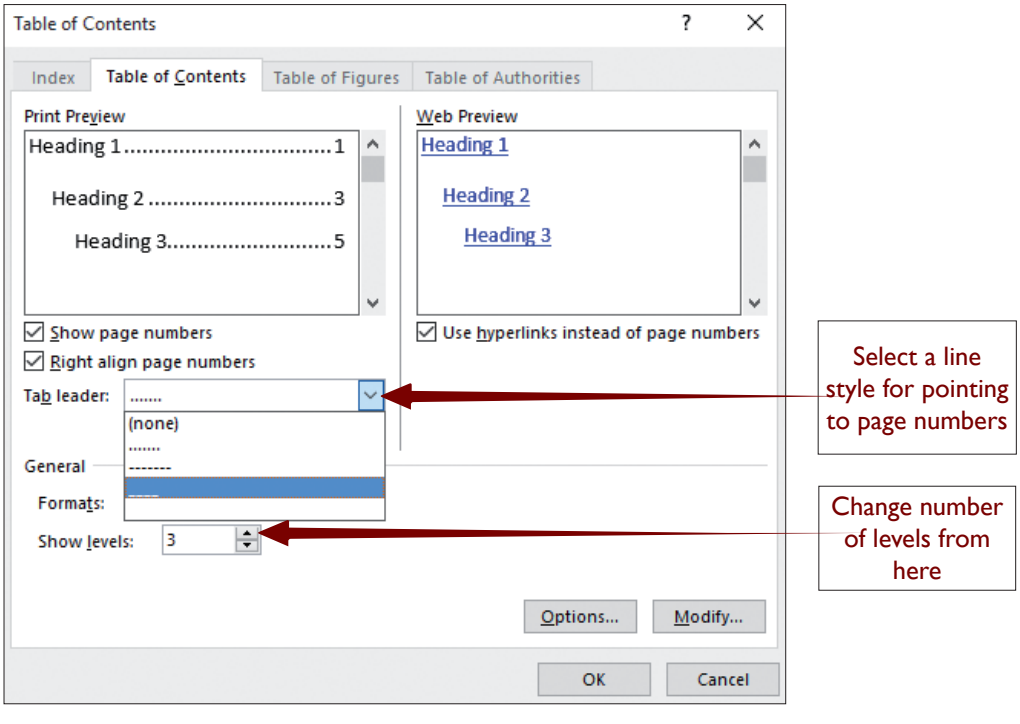
Step 2: From the Table of Contents menu click **Remove Table of Contents** (See **picture 2.2)**. The table of contents automatically disappears from its original location.

Customise Table of Contents

Step 1: On the **Table of Contents** menu, select **Custom Table of Contents**. The Table of Contents dialog box displays as shown below.

Step 2: Select the tab leader you need, number of levels and other options.

Step 3: Click on **OK** to save changes you need in the TOC.



Picture 2.6: Table of Contents dialog box

2.2 List of tables and list of figures

List of tables and figures is used to keep information organised and provide easy access to a specific element needed in the document, for example a table or particular figure such as a drawing or photo, etc.

Creating a list of tables and list of figures

Activity 2.3

Open **My-TOC** document. Just below the Table of Contents:

a) Create a list of tables in the document.
b) Create a list of figures in the document.
c) Save the document as **List of Figures**.

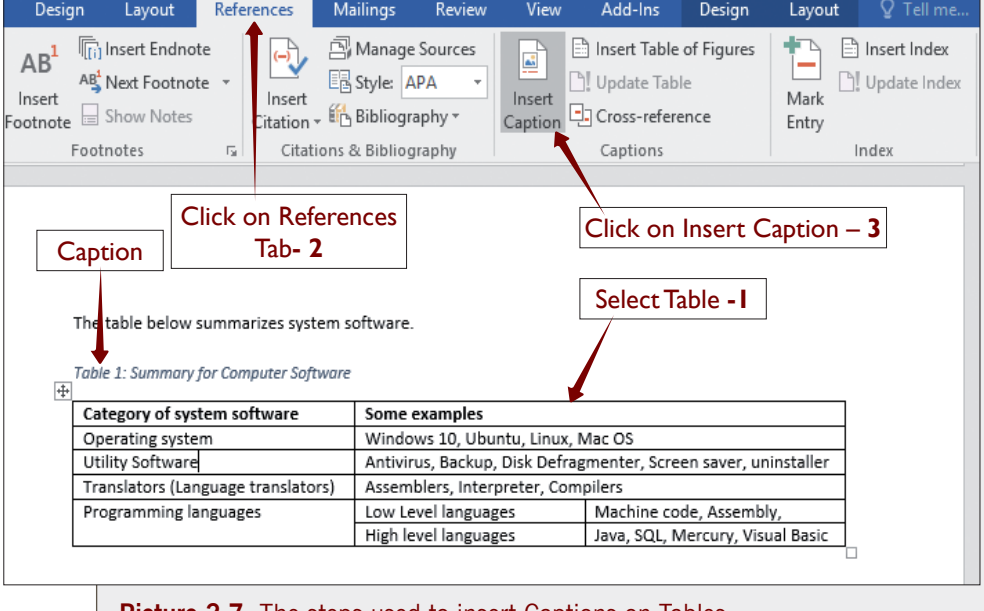
Follow the procedure below to generate a list of Tables (Table of Figures);

a) Creating a List of Tables

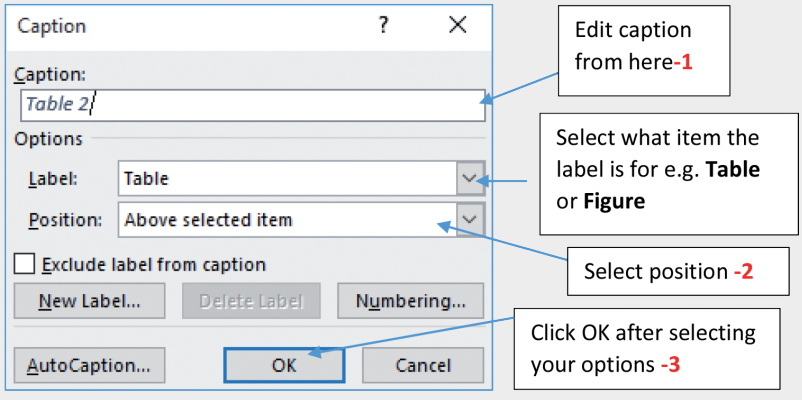
Step 1: Add Captions to every Table in the document using procedure given below:

- First select a Table on to which you need a caption.
- Click "**Insert Caption**" command on **References** tab. (See picture 2.7 below).
- Edit table caption and click **OK**. (See picture 2.8).

Repeat the procedure for all the tables in the document.



Picture 2.7: The steps used to insert Captions on Tables



Picture 2.8: Caption dialog box

Repeat step 1 for all other tables in the document.

Use the following text for Table 1 and 2 as table captions:

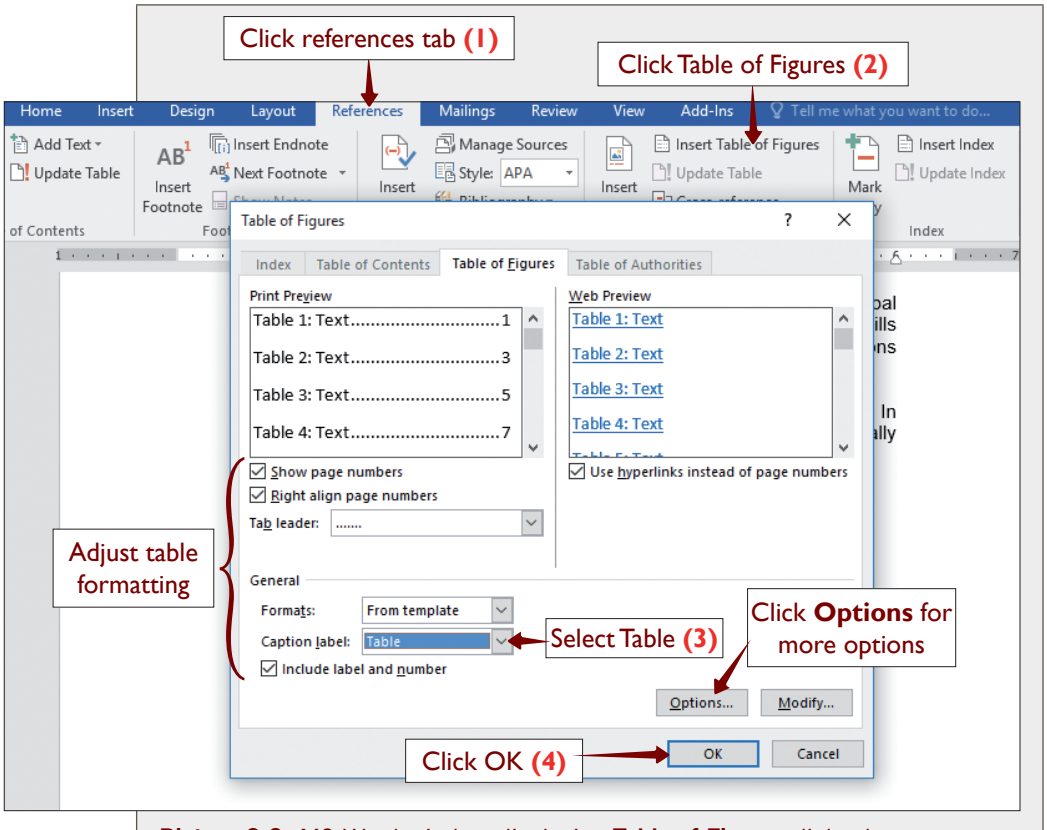
Table 1: Summary of system software

Table 2: Summary Table for application software

Step 2: Click where you want to insert the Table of Figures.

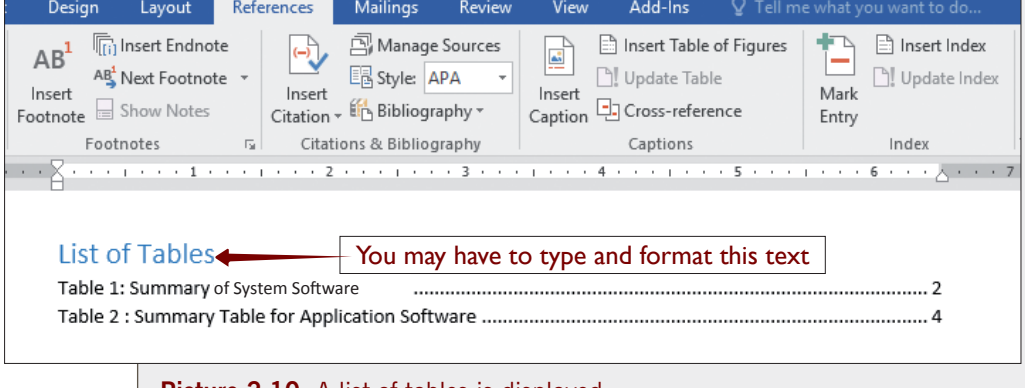
Step 3: On **References** Tab in the **Captions** group, click on **Insert Table of Figures** to build the table.

Step 4: In the Table of figures dialog box (as displayed in picture 2.9), select the caption label as "Table" and click **OK**.



Picture 2.9: MS Word window displaying **Table of Figures** dialog box

The resulting list of tables is shown in picture 2.10.



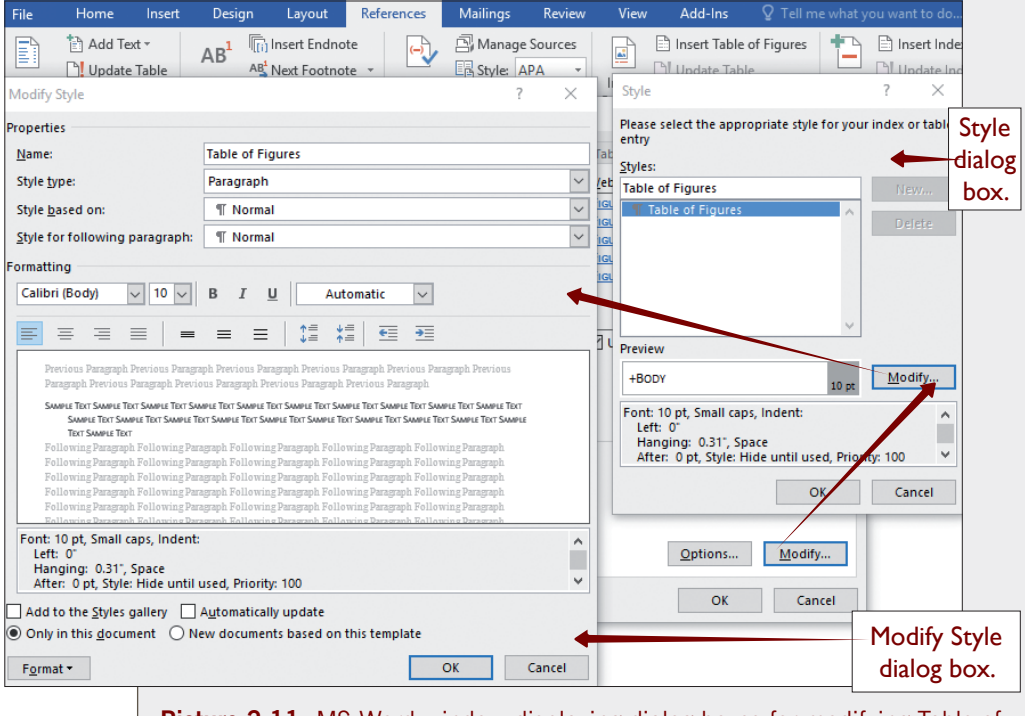
Picture 2.10: A list of tables is displayed

The resulting list of tables appears as shown below.

Optional steps you may take before clicking OK

Step 5: Adjust Table's formatting such as setting whether to show page numbers or changing the style of tab leader. You can use a preset style from "**Formats**" drop down menu. In case you want to customise the style, leave it set to "From Template".

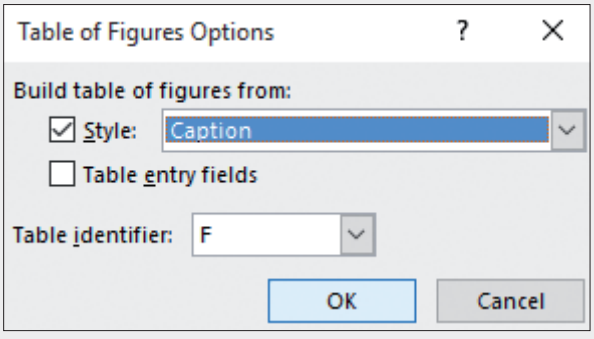
Step 6: Click "**Modify**" and click again "**Modify**" in the style dialog box to customise the style of the table. You can change the table's font, size and other settings in the two dialog boxes. Then click OK.



Picture 2.11: MS Word window displaying dialog boxes for modifying Table of Figures

Step 7: Click "**Options**" in the Table of Figures dialog box.

Check '**Style'** and select style used for your figure labels to build table based on text style rather than data taken on insert caption. If you used insert caption you can skip this step.



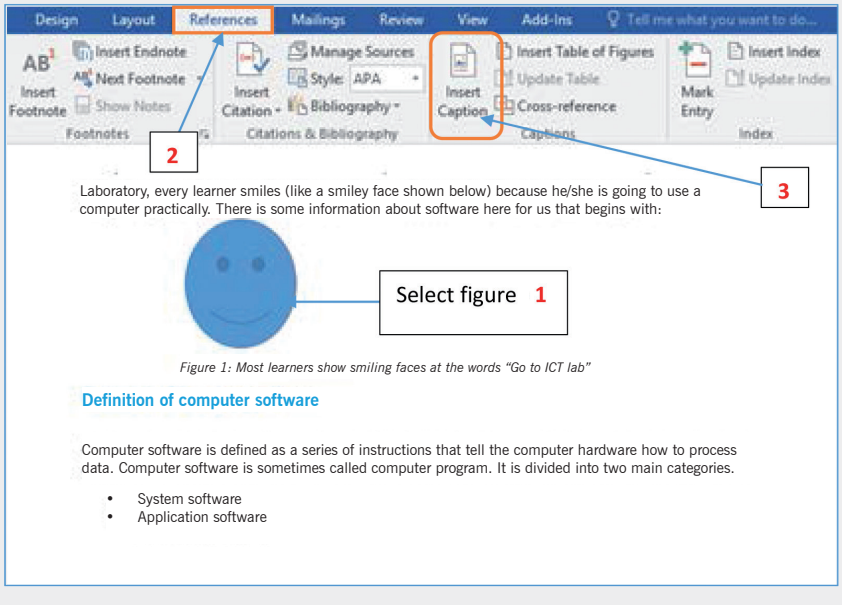
Picture 2.12: Table of Figures Options dialog box

Using the **modify style** dialog box, if font size is 12, bold and underline styles are used on our list of tables, and a table leader is also changed, the list of tables will appear as shown below.

Picture 2.13: The modified List of Tables

b) Creating a List of Figures

Step 1: Repeat steps 1 in (a) above (creating a List of Tables). In this case add captions for all the figures. See procedure in the picture below (picture 2.14).



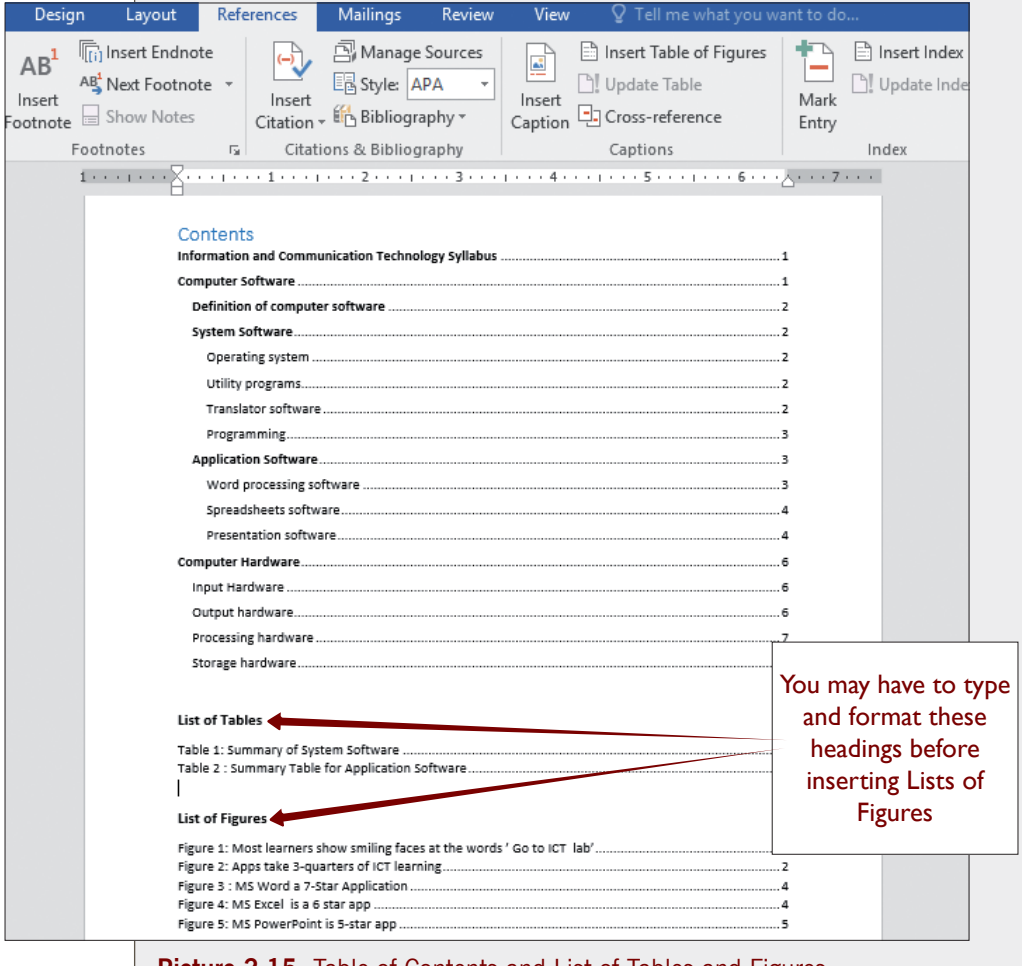
Picture 2.14: The steps for inserting captions for figures

Step 2: Repeat step 2 of part (a) i.e. (step 2 in creating a List of Tables).

Step 3: Repeat step 3, however in the Table of Figures dialog box, select **Figure**.

Step 4: Click OK.

The resulting table of figures may appear as shown in picture 2.15.



Picture 2.15: Table of Contents and List of Tables and Figures

2.3 Mail merge

A mail merge is the process that produces personalised letters by combining a database of names and addresses with a formal letter created in a word processor.

Activity 2.4

a) Create the letter below in Microsoft Word, that will invite parents to their meeting at GS Bumbogo School. Save the letter as "Parents Meeting". Follow other instructions after this letter.

GS BUMBOGO
RWANDA

22nd May 2018

The Parent of .....
Class .....
Status .....

Dear Sir/Madam,

RE: PARENTS' MEETING SCHEDULED FOR FRIDAY 27TH JULY 2018

You are cordially invited to attend the Parents' meeting without fail. The meeting will start at exactly 9:00am in the Main Hall with thanksgiving prayers to be led by Reverend Alexander Gahima. The agenda for the meeting shall be given to you on arrival.

Issues to discuss are very crucial for the well-being of your child at school. Endeavor to come with fees balance amounting to <<Fees Balance>>. Or else your child shall be sent back home for the same.

Yours faithfully,

HEAD TEACHER

c.c. Parents' & Teachers' Chairman
c.c. BOG Chairman

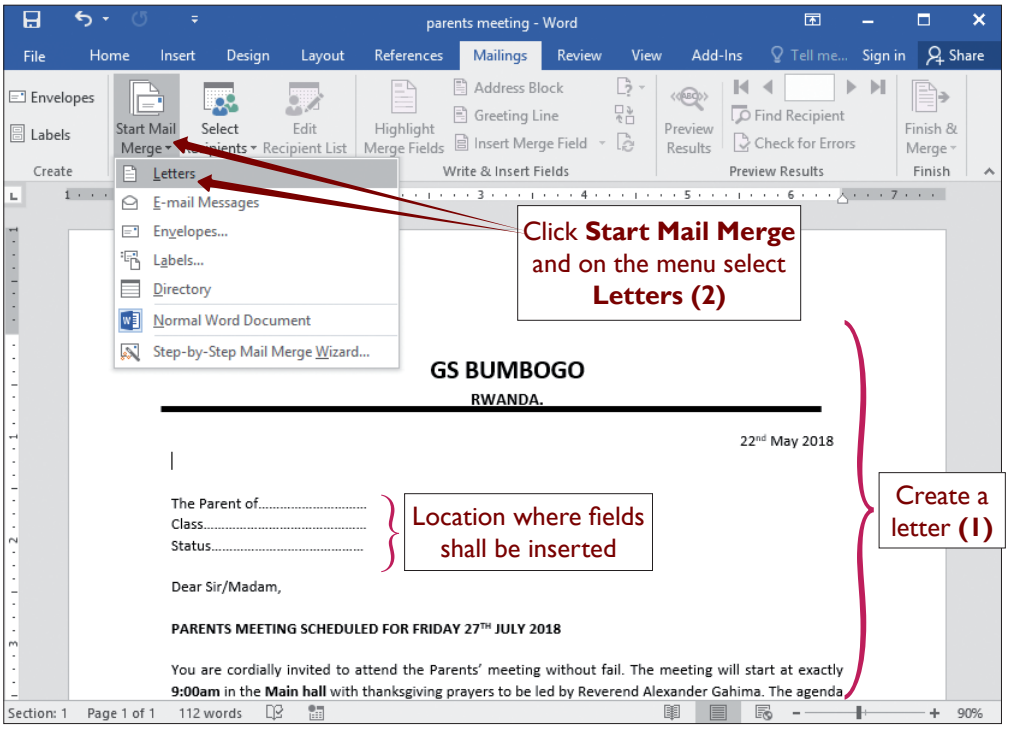
b) Use mail merge feature to generate letters for the following parents in the table below.

Name	Class	Status	Fees Balance (Francs)
Gatete Alexander	S3	Boarding	15,000
Mugisha Francis	S2	Day	8,500
Kwizera Isabella	S4	Boarding	14,500

Table 2.1: Address information about Parents (Recipients)

Creating a mail merge document

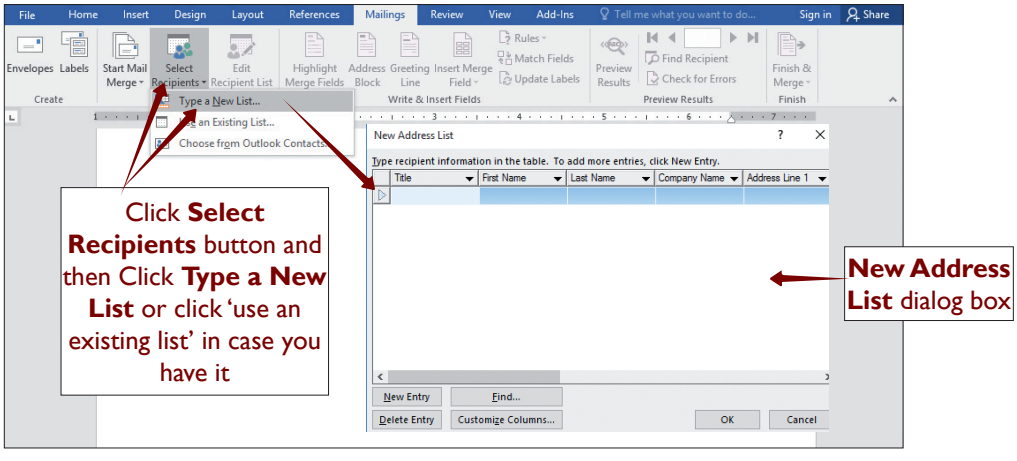
Step 1: **Create a letter** which you will send to various persons; similar to the one shown on screen in picture 2.16, save it as '*parents meeting*'.



Picture 2.16: Word document showing an invitation letter to parents

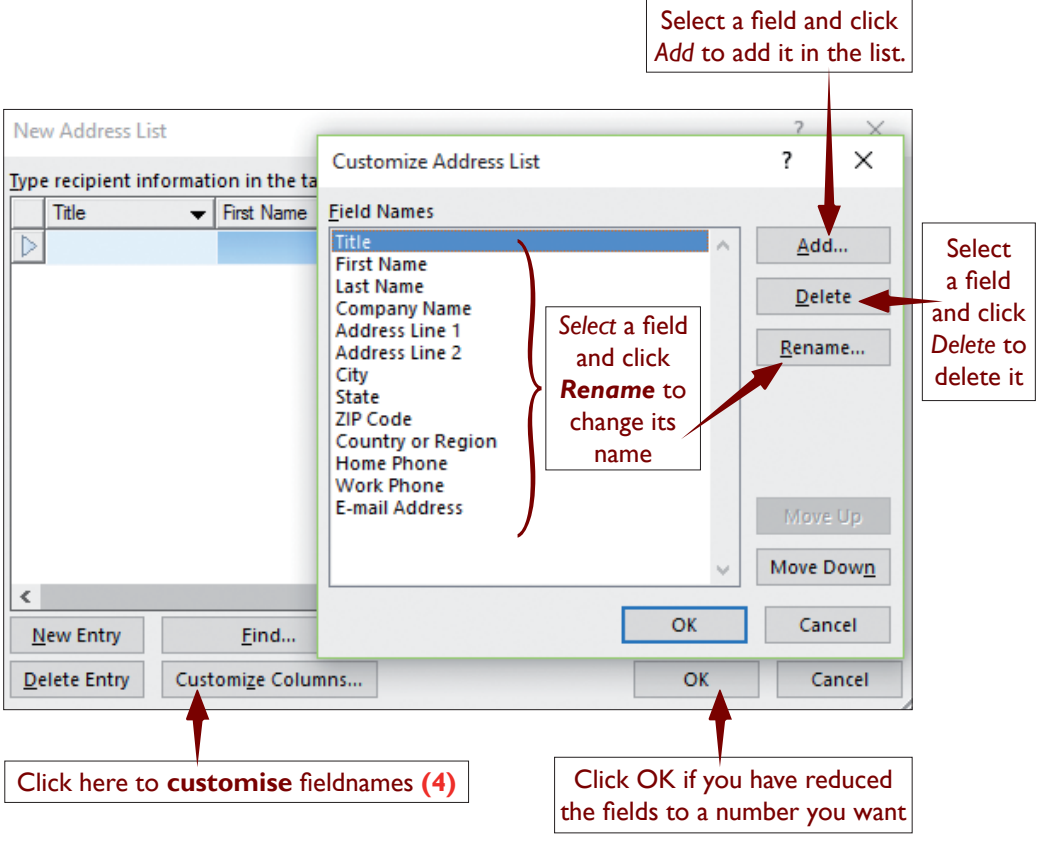
Step 2: On the **Mailings** Tab, click the **Start Mail Merge** button and then select **Letters** in the menu.

Step 3: Click on the **Select Recipients** button which is next and in the list that appears select **Type a New List.** The New Address List box appears.



Picture 2.17: "Select Recipients" menu on Mailings tab and the "New Address List" dialog box

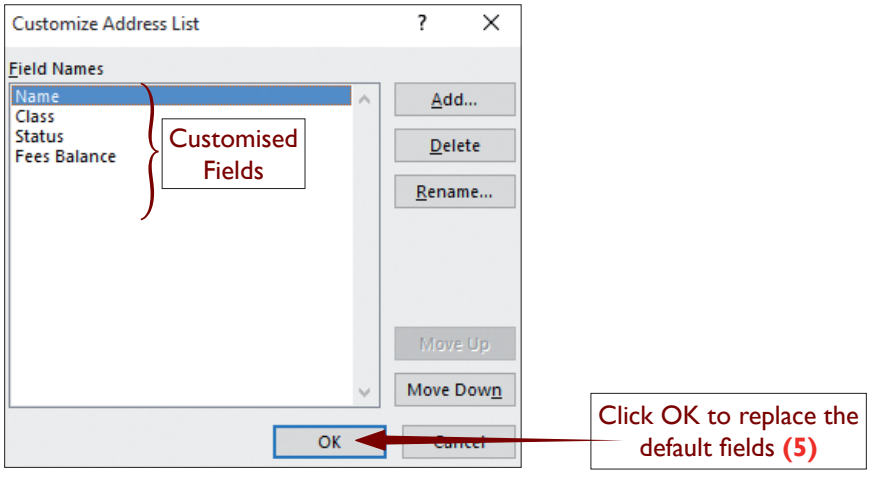
Step 4: In the New Address List, click **Customise Columns.** The Customise Address List appears to enable you customise the fields. (See picture 2.18).



Picture 2.18: The **Customise Address List** dialog box displayed on top of, **'New Address List'** dialog box

Note: You do not need all the fields that come with the program, so you can customise them by clicking on the *Customise Columns* as shown in picture 2.18.

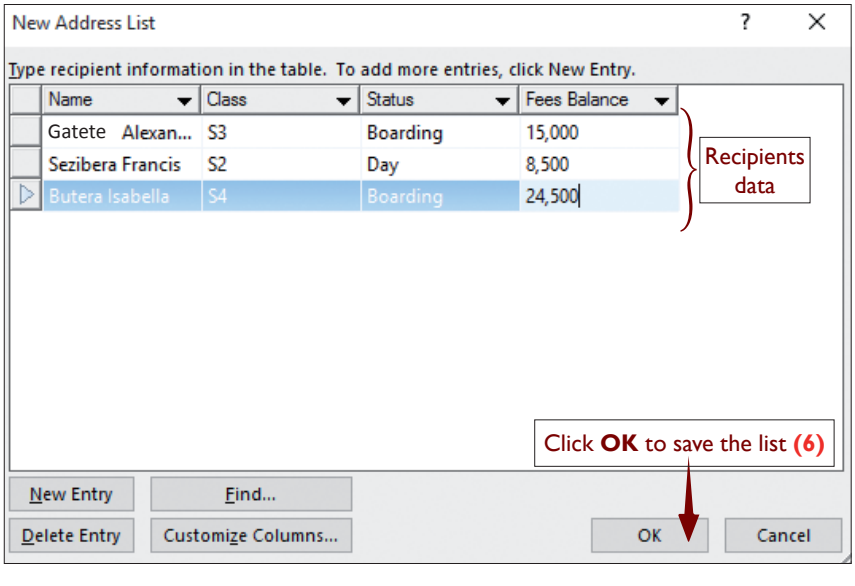
Referring to the data in table 2.1, the customised fields could appear as shown in picture 2.19:



Picture 2.19: The **Customise Address List** dialog box showing the customised columns to be used

Step 5: After customising your fields, click **OK**. Then start entering in your data i.e. Recipients list.

Step 6: Click **OK** after entering Recipients list. You will be prompted to save the file (the Data source).



Picture 2.20: The New Address List dialog box showing Recipients data you may need

Step 7: The **Save Address List** dialog box will display to enable you save the *data file*. Type in the **file name** as "parents" and select suitable location, then click Save button.

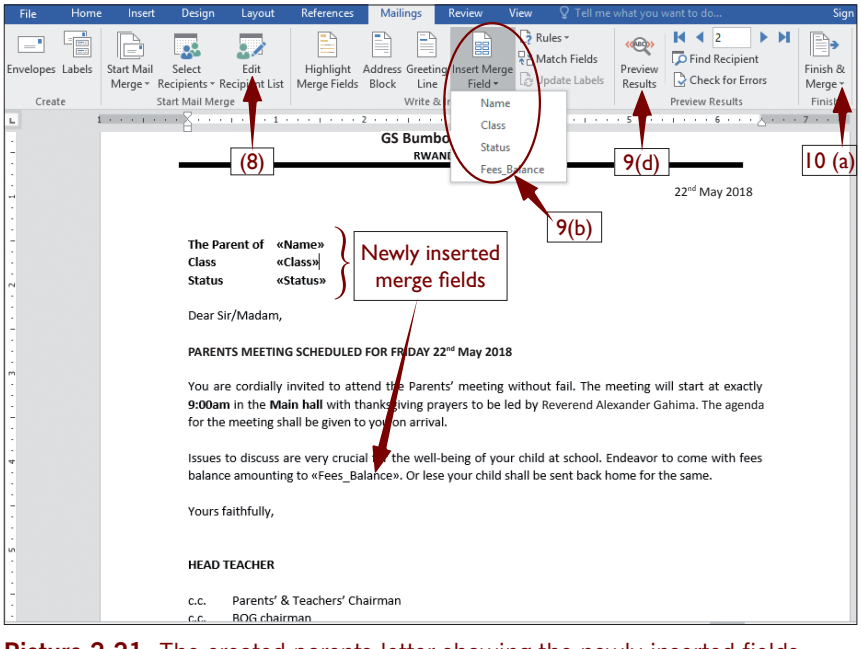
Step 8: Click on **Edit Recipients** list on the Mailings tab, in case you want to edit some Recipients (or you can ignore this step). See picture 2.21.

Step 9: a) Click a location in the main document (Letter) where you want to insert the first merge field.

b) Click on the **Insert Merge Field** button, a drop down list of fields used will appear, click on the appropriate field to be inserted in the cursor position.

c) Repeat the above step until all fields in the data file are inserted in the document (Letter) in appropriate positions.

d) Preview results using the **Preview Results** group buttons.



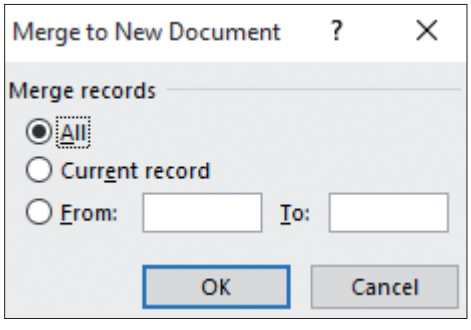
Picture 2.21: The created parents letter showing the newly inserted fields

Step 10: See picture 2.21:

a) Click on **Finish & Merge** button in the **Finish** group; select **Send Email** Messages—to send merged documents as Emails; or select **Print Documents**—to send merged documents directly to the printer to be

printed or select **'Edit individual documents'** to edit and print copies after merging them.

b) Now select **Edit individual documents**, the **Merge to New Document** dialog box will display. Select **All** and click **OK**.



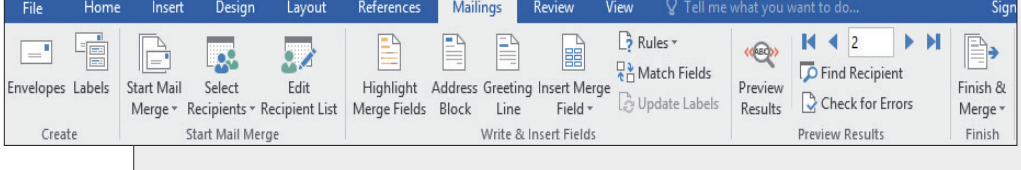
Picture 2.22: The **Merge to New Document** dialog box form where you select records to merge

c) The merged document will appear with a temporary name (**Letters1**); Save the document using a new name or location.

d) Print your document when you need.

Activity 2.5

1. Open Microsoft Word and make mailings tab active. Study your screen and then compare it with buttons you see in picture 2.23.



Picture 2.23: The Ribbon showing Mailings tab buttons

2. Using picture 2.23 above; identify the buttons used to perform the following activities:
   a) To delete or add more names and addresses.
   b) Display items you create using mail merge.
   c) To see the letters before you merge.
   d) To insert merge fields at the cursor position.
   e) To send merged letters as mail or print them directly on the printer.

3. Mr. Gatete is a Secretary of Biscuit Trading Company Ltd. His company intends to invite its shareholders for the Annual General Meeting (AGM) this year.
   The content of the letter is to be similar to all shareholders except for each shareholder's personal details and titles.

   Mr. Gatete has prepared the letter **below** to be sent to various shareholders.

BISCUIT TRADING COMPANY LIMITED
P.O. BOX 1777, KIGALI

06/05/2018

TO: [title] [shareholder's name]
P.O. Box [address]
Tel: [telephone contact]

Dear Sir/Madam,

RE: ANNUAL GENERAL MEETING SCHEDULED FOR FRIDAY 24TH MAY 2018

You are cordially invited to attend the AGM without fail on the date indicated above starting at 10:00am. In this meeting we shall elect new office bearers. You are expected to pay a non-refundable amount of [fee] RFs to cater for elections. Agenda for the meeting is attached here on.

Yours faithfully,

GATETE JOHN
COMPANY SECRETARY

c.c. Managing Director

Title	Shareholder's name	Telephone contact	Address	Fee (RFs)
Mr. Dr.	Ngabo P.	0998674006	590, Kigali	18,000
Mr. Rev.	Ingabire S	0417560437	320, Karongi	16,000
Rev. Dr.	Bugingo B.	0768054354	3101, Rubavu	15,000
Mrs.	Gatete F.	0429086543	7012, Rwamagana	14,000
Mr. Br.	Mugisha C.	0237980565	769, Gicumbi	15,000

Table 2.2: List of shareholders to receive letters

Required

a) Type the letter as it appears and save it as **Biscuit letter.** Include a Header as your name.

b) Use mail merge features in Microsoft word to create the table above, save it in your folder as **shareholders**.

c) Link the table to the letter and generate letters for various shareholders. Save the new generated file as **Biscuit-Data**.

Activity 2.6

1. Ms. Mutesi Mary is the head of ICT in Maranyundo Academy. She is organising an ICT learners' seminar at her school. She intends to send letters to ICT teachers of various schools requesting for their learners to attend this seminar in September 2018. The content for the letter is the same for all schools except School names, ICT teachers and other details.
   A copy of the letter to be sent to schools.

   a) Type the letter and save it as **ICT seminar**.

MARANYUNDO ACADEMY
P.O. BOX 234567, RWAMAGANA.

15-JULY-2018

TO: <ICT Teacher's Name>
ICT Department
<School's Name>
<School Address>

Dear <Title>,

RE: INVITATION TO ATTEND ICT SEMINAR AT SCHOOL ON 29th SEPT 2018

The school through its ICT department has organised the ICT seminar at the school on the day indicated above. The seminar will be learner centred and will be attended by many influential ICT academicians and experts from RDB/ICT, REB and University of Rwanda (UR).

The seminar is aimed at enabling our learners understand current global concerns in relation to ICT and at the same time equipping them with ICT skills and knowledge for enabling them to sit for the coming National Examinations in November this year.

The participation fee for each learner from your school is <*Participation Fee*>Francs only. In addition, learners must come with their own refreshments or can individually order for food from our school canteen at <*Ordering Fee*>Rwanda Francs**.**

We shall be very grateful for your positive response.

Yours faithfully,

MUTESI MARY
HEAD ICT DEPARTMENT

c.c. Headmaster

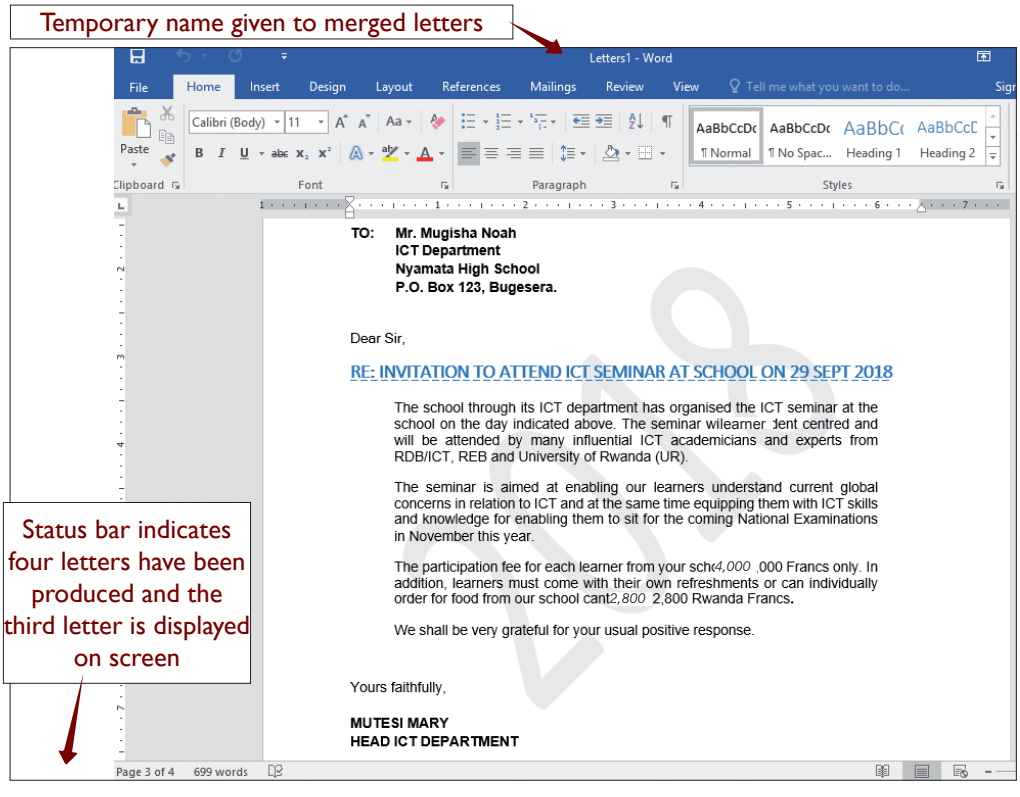
Title	School Name	School Address	ICT Teacher's Name	Fee	Lunch
Madam	Kigali Parents School	P.O. Box 3020, Kigali, Rwanda.	Ms. Mutoni Peace	3,000	2,000
Sir	Kagarama SS	P.O. Box 1010, Kigali.	Mr. Ngabo Desire	3,500	2,500
Sir	Nyamata High School	P.O. Box 123, Bugesera.	Mr. Mugisha Noah	4,000	2,800
Madam	FAWE Girls SS	P.O. Box 9090, Kigali.	Mrs. Mutesi Desia	4,500	2,000

Table 2.3: *Details required from different schools*

Required

(i) Indent the body of the letter left and right by "**0.5**".
(ii) Apply single line spacing on each paragraph of the body.
(iii) Put a spacing of **12pt before and after** each paragraph.
(iv) Apply a bold **Heading1 style** to the subject for the letter with font size of "**15.5"** and dashed underline.
(v) Insert a text watermark of **2018** and save the changes.
(vi) Using a mail merge feature create the table above and save it as "**ICT-Schools"** in your folder**.**
(vii) Use a suitable word processing feature to merge the table to the letter (ICT-seminar) in order to generate individual letters to be sent to various schools.
(viii) Save the resulting file in your folder as "**ICT-Letters"**.

Suggested answers for each of the letters required in Activity 2.6 is displayed in picture 2.24 below.



Picture 2.24: Appearance of Mr. Mugisha Noah's letter, one of the four letters produced in the activity

2.4 Organise, print and view shortcuts

Before you print your document, you should preview your document and specify which pages you want to print.

Activity 2.7

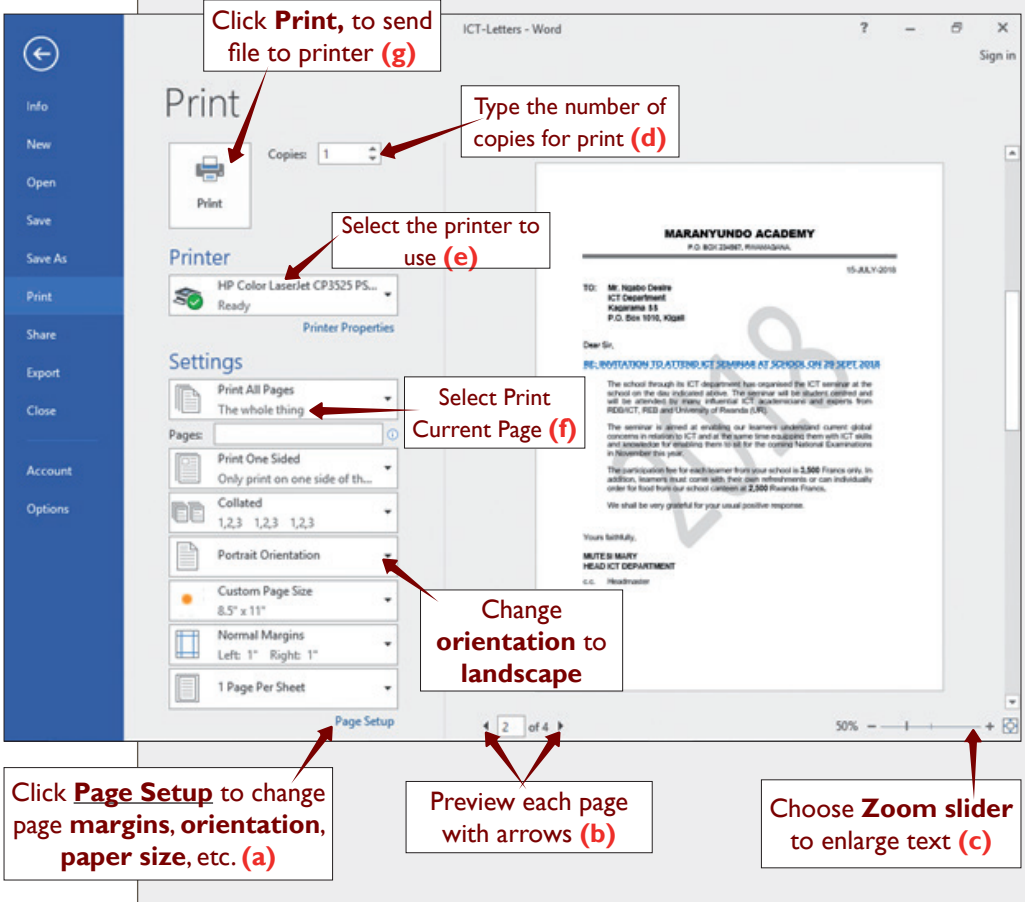
Open **ICT-Letters** file you created, organise and print one copy of the letter for Mr. Ngabo Desire and 2 copies of the letter for Mrs. Mutesi Desia.

Follow the procedure given below to print the required document.

Steps to preview your document

1. On the **File** menu/tab click **Print**.
2. To preview each page, click the **forward** and **backward** arrows at the bottom of the page.

3. If the text is too small to read, use the **Zoom Slider** at the bottom of the page to enlarge it.
4. Enter the number of **copies**, to print. (see picture 2.25).
5. Under **Printer**, select a printer to use (in case you frequently change printers).
6. Under **Settings**, select options you need i.e. select **Print Current Page**.
7. Click on **Print** button to produce a hardcopy of the document. (See the picture shown below).

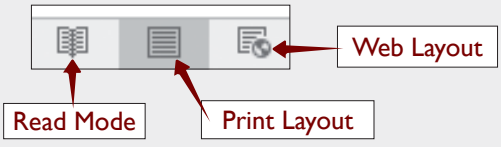


Picture 2.25: All in one place, you can see how your document will look like when printed, set your print options and print the file with the print dialog box for Word 2016

> **Note:** Before you click on Print, ensure that the printer you select is connected to your computer and switched on.

View Shortcuts

In case you need to use *view shortcuts* to see your document in different ways, click a desired view button on the lower right of the document. See picture 2.26.



Picture 2.26: View shortcuts

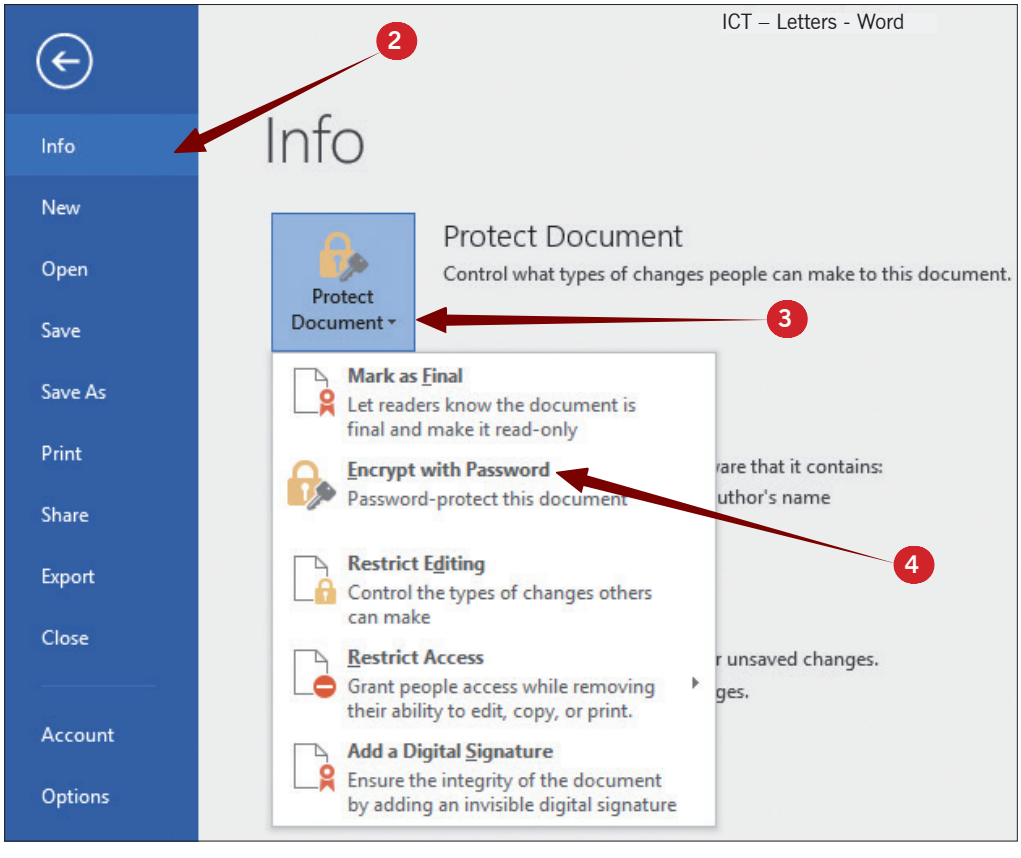
2.5 Protect your document

Use passwords to prevent other people from opening or modifying your documents. However, if you use a password and forget it, Word processors like Microsoft Word cannot retrieve the forgotten passwords. There are two methods to protect a document with password.

Steps to protect your document with a password

Method 1

1. Create or open an existing document. Click the **File** tab. The **Backstage** view opens.
2. In the Backstage view, click **Info** (see picture 2.27).
3. Click **Protect Document**. See picture below for **Protect Document** options.

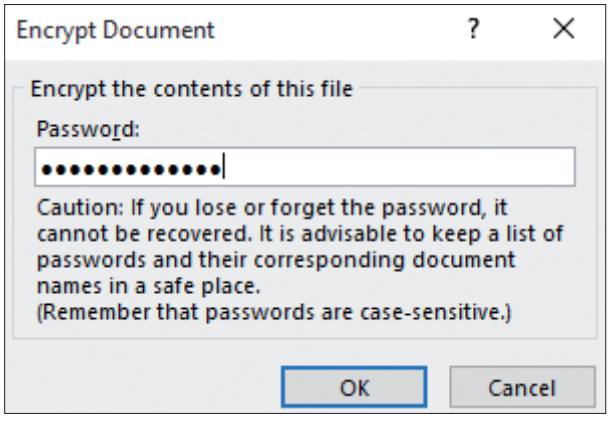


Picture 2.27: Part of Backstage view for Office Word 2016 showing **Info** options for protecting a document

Meaning of various options

- **Mark as Final**: make the document read-only.
- **Encrypt with Password:** set a password for the document.
- **Restrict Editing:** control what types of changes that can be made to the document.
- **Restrict Permission by People:** use a Windows Live ID to restrict permissions.
- **Add a Digital Signature:** add a visible or invisible digital signature.

4. Click **'Encrypt with Password'.**
5. In the **Encrypt Document dialog box** that displays (as shown on picture 2.28), type in the desired password for your document and click **OK**.

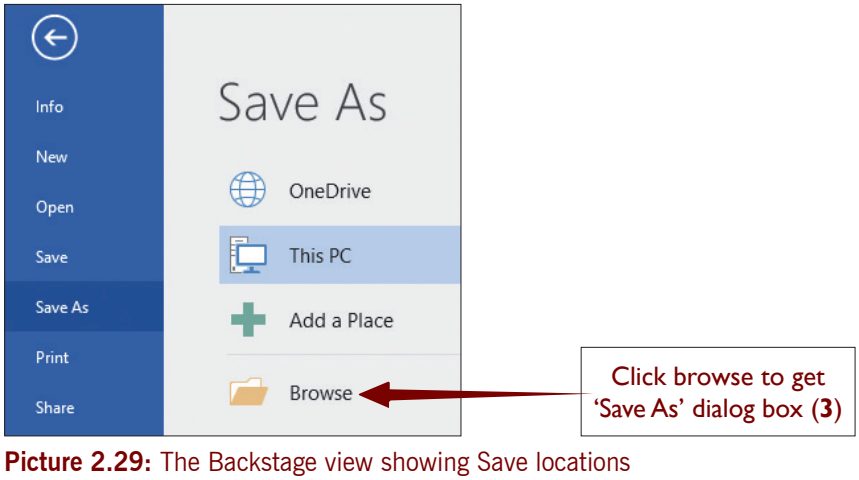


Picture 2.28: Encrypt Document dialog box

6. Retype the password again in the dialog box to confirm it and click **OK**.
   Now, you have protected your document with a password.

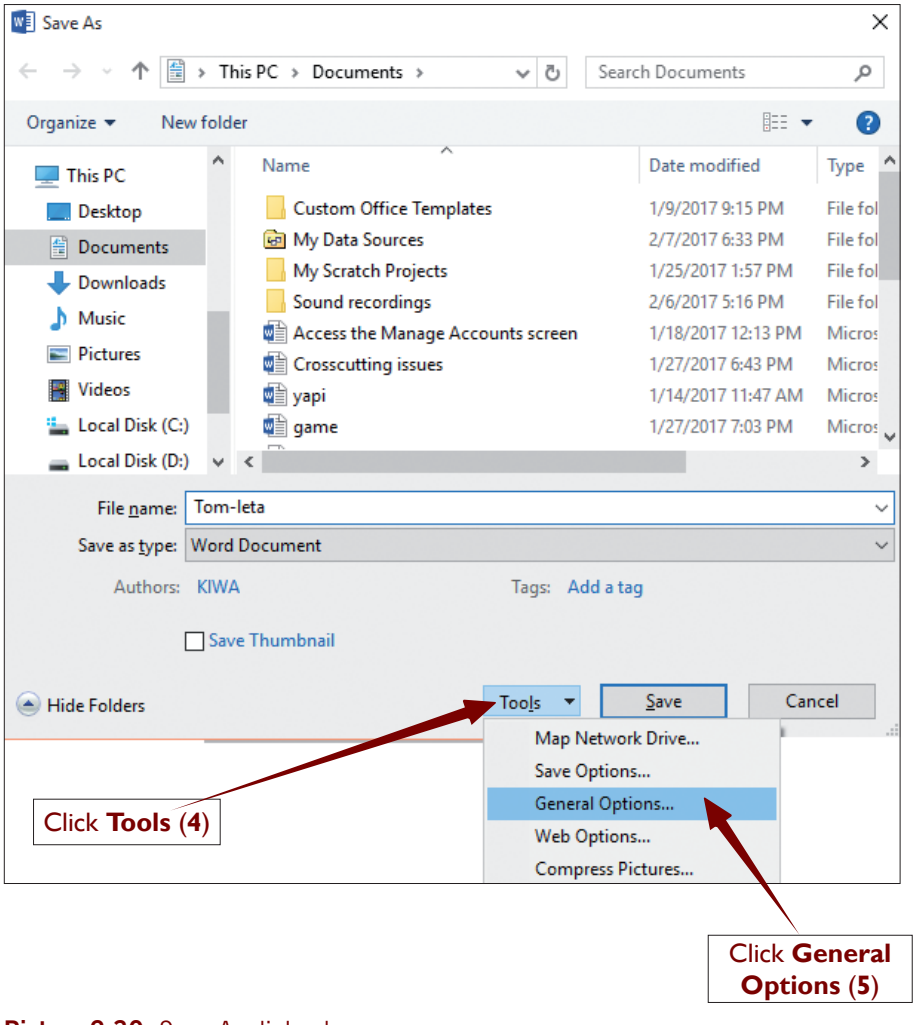
Method 2

1. Create or open an existing document for which you want to apply a password.
2. Click **File** Tab; on the backstage view that displays, click **Save As**.
3. The Save As backstage view displays Save locations, click **Browse.** See picture 2.29.

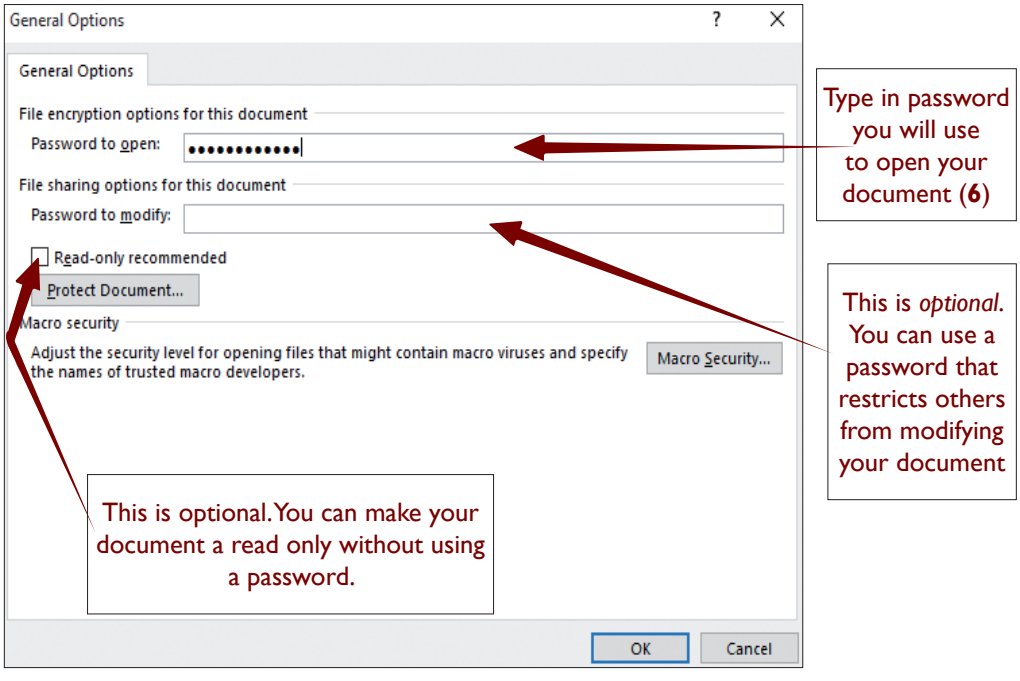


Picture 2.29: The Backstage view showing Save locations

4. The **Save As** dialog box displays, click **Tools** drop down arrow (See picture 2.30)
5. Click **General Options** (See picture 2.30).
6. In the dialog box that appears, type in password to open the document. Retype the password and click **OK**.



Picture 2.30: Save As dialog box



Picture 2.31: General Options for creating a password in a document

End of Unit 2 Assessment

1. Use Microsoft Word, typeset the following document and save it as '**Certificate of Appreciation'.** This document is a certificate and should have a page border as shown.

Ecole Des Sciences De Byimana

Ruhango District,

Southern Province, Rwanda

ICT CLUB

Certificate of Appreciation

This is to certify and acknowledge that

……..

has worked hard for the ICT club of the school as a club

…….

for Academic year ……

Your efforts shall always be treasured.

"Science, conscience and Excellence"

_____ _____

Club Patron **Headmaster**

Other Instructions

a) Use 1.5 **line spacing** for your work and no space after each paragraph.

b) Make the following changes to the title:
   (i) Change the name of the school to Stencil bold font face, font size 26 and dark blue colour.
   (ii) Change the second line to font size 16 and bold.
   (iii) Change the third line to font size 14 and bold.

c) Leave enough space between "*Southern Province", Rwanda* and **ICT Club** to accommodate a suitable graphic (good image) that will work like your school badge.

d) Underline the heading, "Certificate of Appreciation" change it to size 20 and colour dark red. Apply a double strikethrough.

e) Use blue font colour for signatories in font size 15.

f) Apply dark red colour to page border.

g) Ensure that your work fits on one page of your document **Centre** all text. **Format** the rest of the text as you wish correctly.

h) The certificates are to be awarded to the following members. Create a data source and save it as ***'data file'***

Name	Post	Academic year
Gahima Micheal	Treasurer	2016/2017
Kwizera Francis	President	2015/2016
Mutesi Catherine	Vice President	2016/2017
Ingabire Scovia	Secretary	2017/2018
Gaju Paul	Spiritual Minister	2016/2017
Bugingo Isabella	Welfare Minister	2015/2016
Giramata Princess	Schools Relations Minister	2016/2017

Table 2.4: Details for every member who will receive certificates

i) Using a word processing facility, merge the fields above to the certificate (place fields in appropriate positions). Change the colour of the merged fields in red bold colour in your main document.

j) Merge the document and the certificate such that each member of the club in the data source has a complete certificate for printing.

k) Name the new file as **ICT certificates** with a **password** as, '**joint1001'**. Print a copy of the new document and close the file.

2. Explain the meaning of the word **Formal letter** and explain how it differs from the database of names and addresses?

3. Open a blank document and in it create the following items:
   a) Type two brief paragraphs about the **history** of your school. Add a suitable picture such as a clip after.
   b) Type five points about **why you joined your school**, the good about your school and the bad about your school. Insert one picture related to computers. Provide a suitable heading.
   c) Insert a new page in your document. Type a heading "**Science Teachers**". A brief information about science subjects such as physics, chemistry. Create a table with science teachers and the subjects they teach. Include a suitable picture on the page.
   d) Type a list of **Arts Teachers** in a table, with a suitable heading on a new page. Type a brief information about Arts subjects.
   e) Create a list of **Sports activities** in your school with brief information related to your school. Provide a suitable heading that should be on a new page. Insert two pictures related to sports listed.
   f) Insert a new page in your document and create a list of **favourite sports stars** in your country and on International level. Use two column table.
   g) Generate reason(s) why you should not change your school. Do this on a fresh page.
   h) Save your file as '**Love4-myschool'**.

Instructions

- Generate a Table of Contents for your document.
- Create a List of Tables for the document.
- Create a list of Figures you have added in your document.

APPLICATION SOFTWARE

Word Processing

Charts and Advanced Objects

Key unit competence

Present data graphically and use different objects in a document.

3.1 Charts

A chart is a diagram or object used to display numerical information in details. A chart can also be called a graph.

Data in a chart is represented by symbols, such as *bars* in a bar chart, *lines* in a line chart, or *slices* in a pie chart.

3.1.1 Role of charts

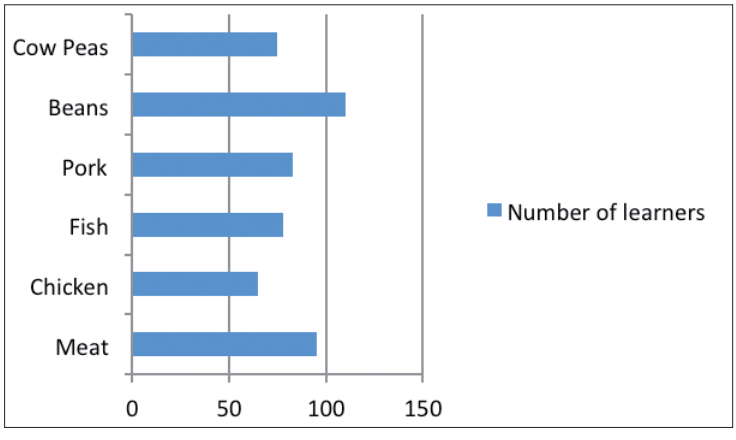
- Charts are used to summarise and display information in an easy manner to understand.
- Charts act as useful Tools for conveying financial information.
- They are used to make patterns and trends in numerical order much easier to see.
- Charts facilitate data analysis.

3.1.2 Types of charts

There are several types of charts used to display data. The most popular types include among others the following:

A. **Bar Chart (Bar graph)**
A bar chart is a graphic representation of data with horizontal bars or objects. Bar charts usually display horizontal bars or objects

going across the chart vertically, with the values displayed at the bottom of the chart.

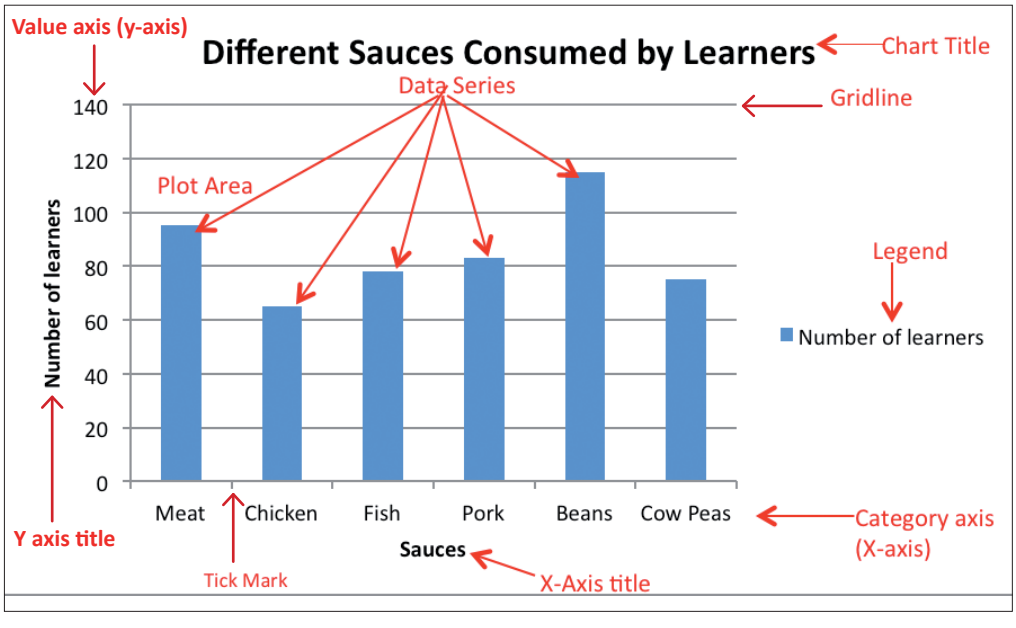


Picture 3.1: Bar Chart

B. **Column Chart**

A column chart is a graphic representation of data with vertical bars or objects. Column charts display vertical bars **(categories)** going across the chart horizontally (along the horizontal axis), with the **values** organised along the vertical axis (on the left side of the chart).

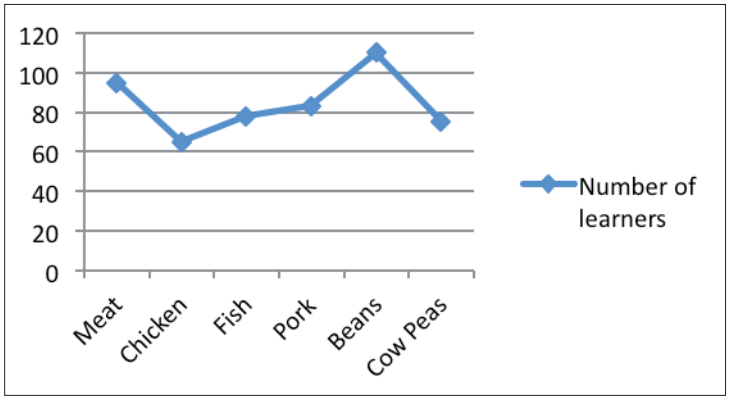
Chart Overview



Picture 3.2: Appearance of a column chart with major parts of a chart named

C. **Line Chart (Line Graph)**

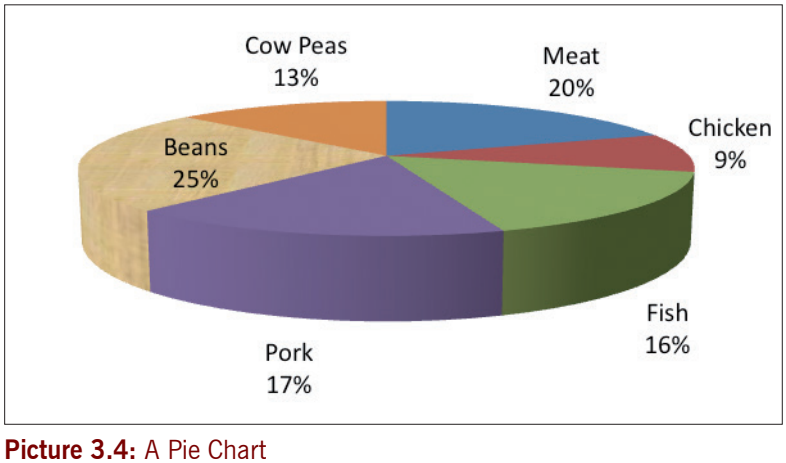
A line chart is a graphic representation of data plotted using a series of lines. Line charts display lines going across the chart horizontally, with the values axis being displayed on the vertical axis (left side of the chart).



Picture 3.3: Line Chart

D. **Pie Chart**

Pie chart is a circular chart sliced into sections; each section represents a percentage of the whole. Pie charts do not display horizontal and vertical axes as other charts.



Picture 3.4: A Pie Chart

3.2 To create a chart or graph

Use the steps given below to create a graph. All the charts already shown above were created using similar data as in the ones below. Use this data to create these charts as they are in Microsoft Word. Save the file as **'Common charts'**.

Favourite Food	Number of learners
Posho	75
Sweet potatoes	45
Cassava	58
Irish potatoes	77
Rice	115
Bananas	65

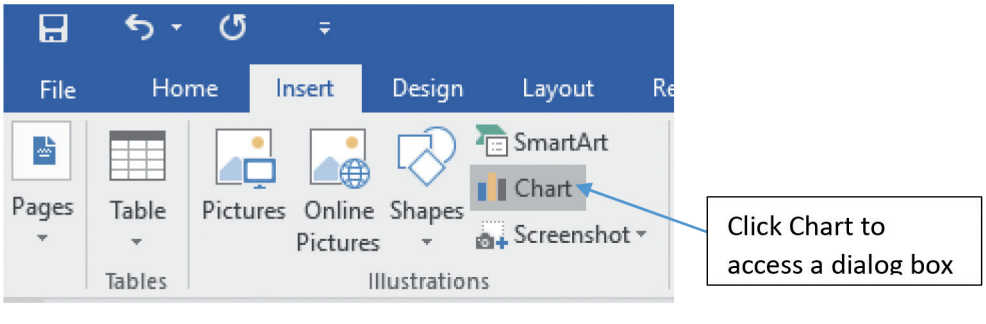
Table 3.1: Different foods enjoyed by different learners

Step 1: Prepare the data that you need to make the chart (this data can be on paper or in a book).

Step 2: Start Microsoft Word and then click where you want to place the chart.

> **Note:** First create table data in Microsoft Word, but this is an option you may ignore.

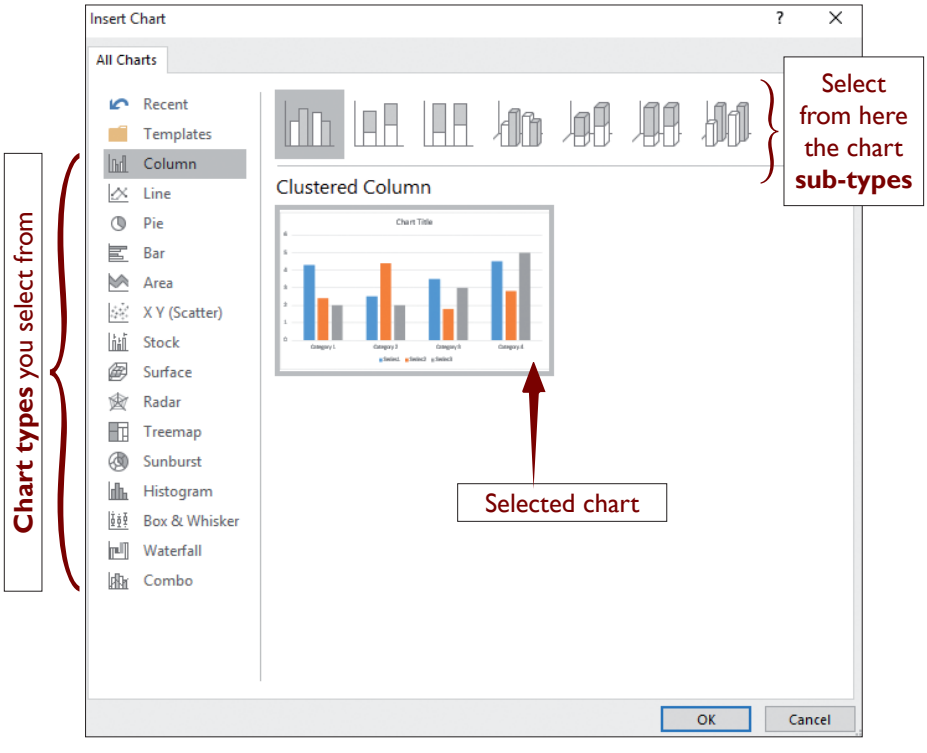
Step 3: On the **Insert** tab, in the **Illustrations** group click **Chart**.



Picture 3.5: The Insert tab showing Chart button

Step 4: In the **Insert Chart** dialog box (that displays as shown in picture 3.6), select the type of chart that you want on the left side, then select the chart sub type and finally click **OK**.

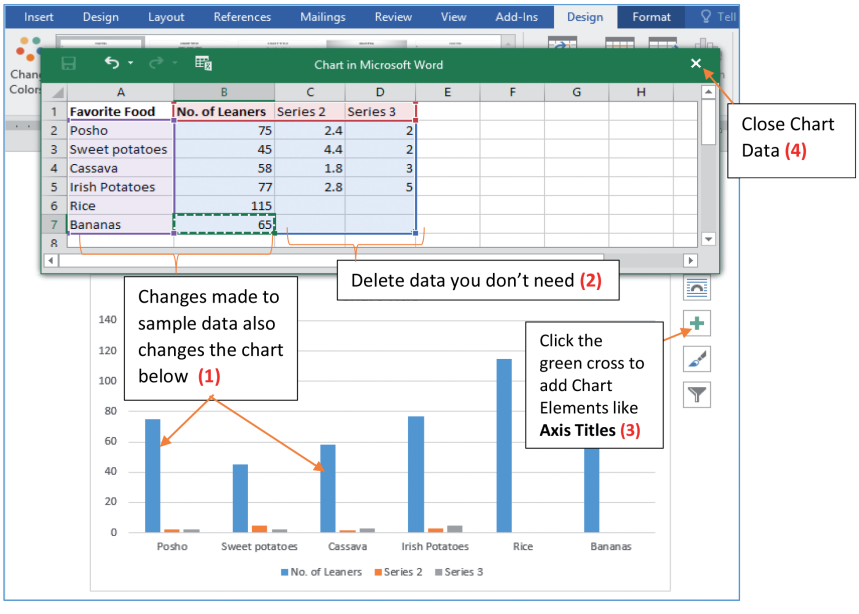
Step 5: The Chart remains selected and Chart Tools display (on Design, Layout and Format tabs). Use Chart Tools to modify your chart the way you want.



Picture 3.6: The Insert Chart dialog box. When you rest a mouse pointer over a chart type, screen tip displays its name

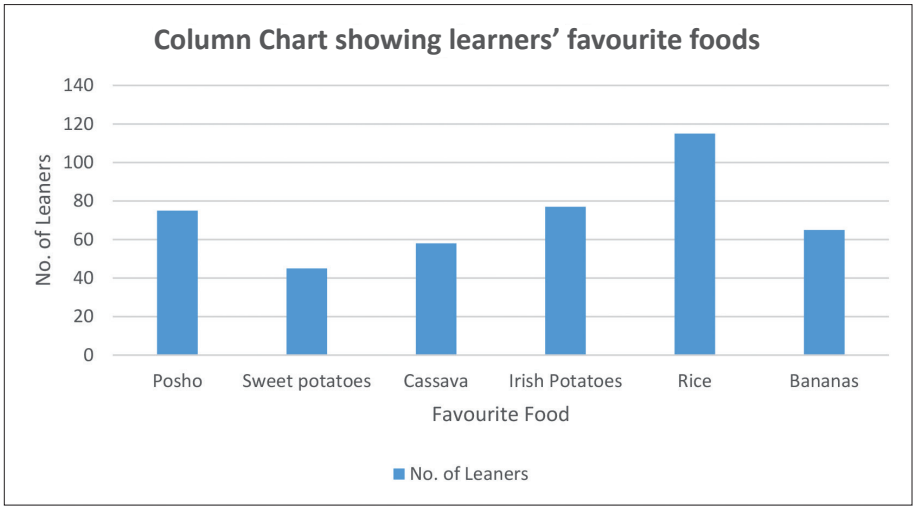
Step 6: Replace the sample data (edit data) by clicking on a cell and then typing the data that you want.

Note: To delete a column or row data, right click on column letter e.g. column D or row number e.g. row 5. Then select **delete**.



Picture 3.7: A newly inserted chart with a Data sheet above it

The resulting chart for our data in table 3.1 will appear as shown below



Picture 3.8: A column chart representing data in table 3.1

Activity 3.1

1. S.3 class has a total of 120 learners. The class teacher carried out a data survey to find out how many learners regularly eat meat, pork, chicken or fish at home. The data below in table 3.2 was collected.

Sauce	Number of learners
Meat	75
Chicken	45
Fish	58
Pork	77
Beans	115
Cow Peas	65

Table 3.2: Data collected about different sauces taken by S3 learners

Instructions

a) Open Microsoft Word and create the table 3.2 above as it appears.

b) Use the data given in table and create:

(i) A clustered bar chart on page 1 just below table

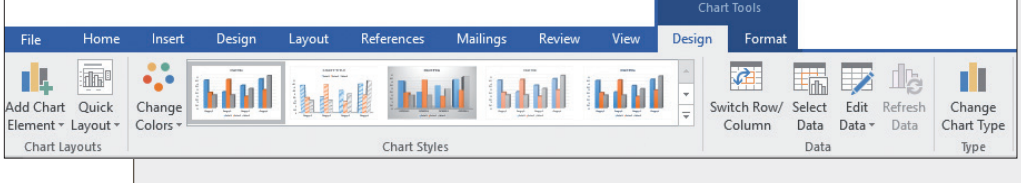
(ii) Pie Chart on page 2 (with data callouts).

c) Apply Chart Titles and Axis Titles in b (i) and b(ii) above.

d) Save changes to your file and save it as **'Sauces'**.

2. a) The picture below is displaying chart Tools. Use it to answer the questions that follow.

(i) Name the tab that is active. Identify **two** buttons displayed by this tab.



Picture 3.9: Ribbon displaying Chart Tools on Design tab

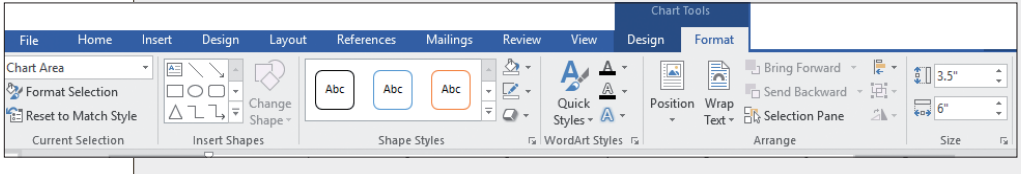
(ii) Identify how many tabs display **Chart Tools**. State the use of any one button on each tab.

b) Study the **Chart Tools** on the Design tab in picture 3.9. Identify the name of the button used to:
   (i) Change from one chart type to another
   (ii) Add titles to axes and add/remove legend.

c) Which type of chart might have been selected according to picture 3.9?

d) Which button on design tab can be used to quickly apply axis labels or titles?

3. a) Picture 3.10 below shows another set of Chart Tools. Study the picture. Which tab is displaying chat tools?



Picture 3.10: Ribbon displaying Chart Tools

b) Identify the button used to:
   (i) Increase or reduce chart width.
   (ii) Apply shape effects e.g 3-D Rotation.
   (iii) Apply a fill colour.
   (iv) Change the appearance of a selected area of chart.

3.3 Formatting an object and chart

Formatting an object and chart means to change the appearance of object and chart to look nice. A chart is an object in a document. A chart can be formatted to look attractive to the user. To format a chart, different features or buttons are used to make these changes. Most of the buttons are located on **format** tab under **Chart Tools** as shown in picture 3.9.

To format a chart

Step 1: Select a chart you want to format.

Step 2: Click **Format** tab under **Chart Tools** and select a formatting button you want. The changes immediately take effect. Example:

To apply Word Art styles on your Chart

a) Select a chart or chart element or a particular data series.
b) Click **Format** tab under **Chart Tools**.
c) In the **WordArt Styles** group, click **Quick Styles** and select a style you want (or use **Text fill** and or **Text outline** drop-down arrows and select desired colours you want). Refer to picture 3.8 or 3.9.

Alternatively perform (a) to (b) above and then use **Shape styles** group buttons/commands i.e. select from **Shape Fill** and **Shape Outline** drop-down lists.

Adjust chart size

a) Select a chart or object you want to resize.
b) Click **Format** tab under Chart Tools.
c) In the **Size** group type or scroll in to adjust the **Shape Height** and **Shape Width** of the chart (Refer to picture 3.9).

To format an object

Follow the same steps as those used to format a chart.

Activity 3.2

1. a) Open MS Word, create and display Table 3.3 on a 3-D clustered column chart. Save the file as '**House competitions**'.

House	Football (%)	Volleyball (%)	Netball (%)
Gatete	88	65	56
Ngabo	78	90	70
Gaju	45	85	75

Table 3.3: Performance results from Learners' House competitions in Riviera SS last year

b) Include a chart title and axis titles.
c) Copy the chart and paste it on page 2 and page 3.
d) Change the chart type on page 2 to a 3-D pie chart and use a suitable chart style. Apply style 3 of pie charts.
e) Change the chart on page 3 into a line graph.
f) Page your work and save changes.

Activity 3.3

The following table was prepared by Director of Studies of GS Nyarusange pertaining to extra lessons covered by 10 teachers for the 4th week of the term. Values are in minutes.

Name of teacher	Mon	Tue	Wed	Thu	Fri	Sat
Gatete Noah	40	20	80	45	65	90
Rukundo Micheal	100	120	20	45	20	80
Giramata Alex	30	20	15	50	30	120
Mugisha Ethan	50	30	40	60	20	50
Kwizera Olive	120	80	10	15	30	80
Mutesi Grace	70	90	20	20	30	90
Ngabo Pacifique	30	20	40	30	45	100
Mahoro Stanslas	40	15	30	40	50	110
Mutoni Carol	20	20	50	40	70	140
Keza Tania	15	90	100	50	80	180

Table 3.4: Teachers' extra lessons in minutes

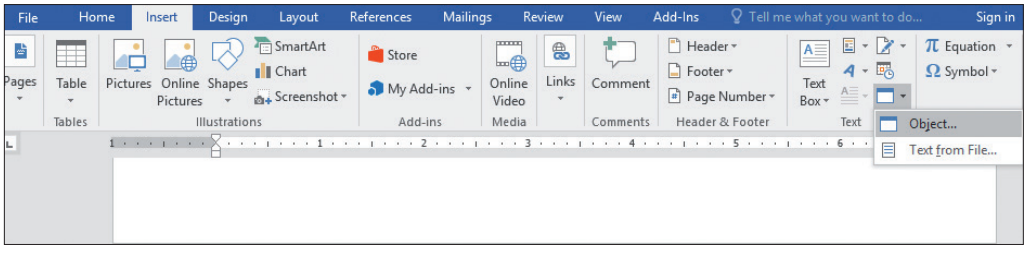
a) Typeset the table above as it appears in the new document and save it as '**Overtime**'.
b) Bold all column headings.
c) Centre all the figures in your table.
d) Sort the data as A-Z to the names of teachers.
e) Insert the heading at the top of your table as **"Teachers' Daily Overtime in GS Nyarusange"**.
f) Create a 3-D stacked **column graph** for all teachers for Mon, Tue and Wed. Place the graph on page 2.
g) Create a **line graph** for the first five teachers (in ascending order) for Mon to Sat. Place this chart on page 3.
h) Create a **pie chart** for Mon and Sat for all teachers. Place the chart on page 3 below the line graph above in (g).

3.4 Add objects from file

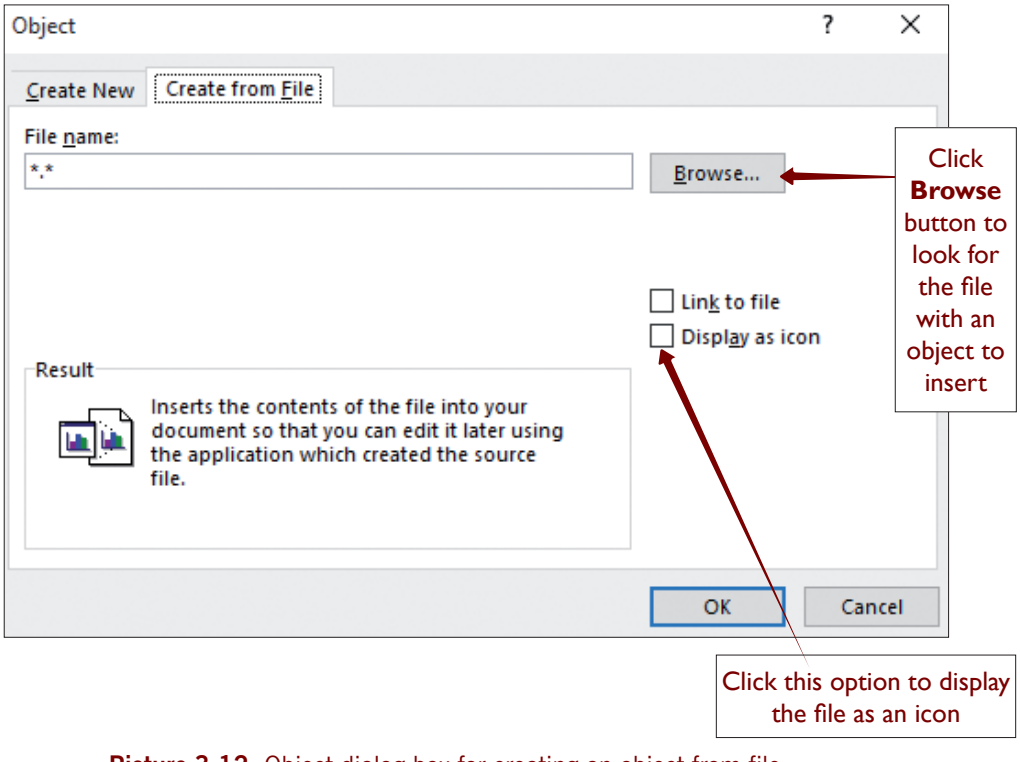
An object is something that you can see. In Word, processing objects can be inserted from other files already created, for example; documents, workbooks, presentations, PDF and so on.

3.4.1 To add object from file

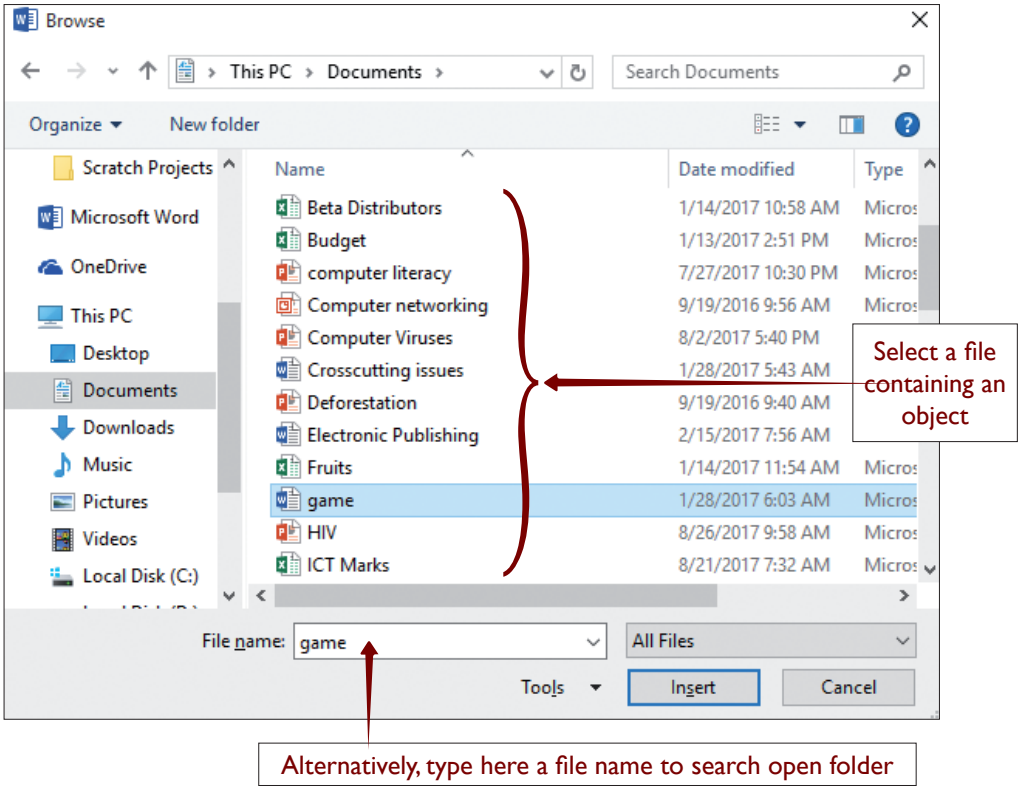
Step 1: On the **Insert** tab, click **Object** command from the **text** group.



Picture 3.11: Office ribbon displaying the **Object** command from the **Text** group on the **Insert** tab



Picture 3.12: Object dialog box for creating an object from file



Picture 3.13: Browse dialog box (for searching files containing objects)

3.5 Add objects

In word processing, you can add different types of objects created with other programs such as MS Excel, Presentation, and Equation applications in a document.

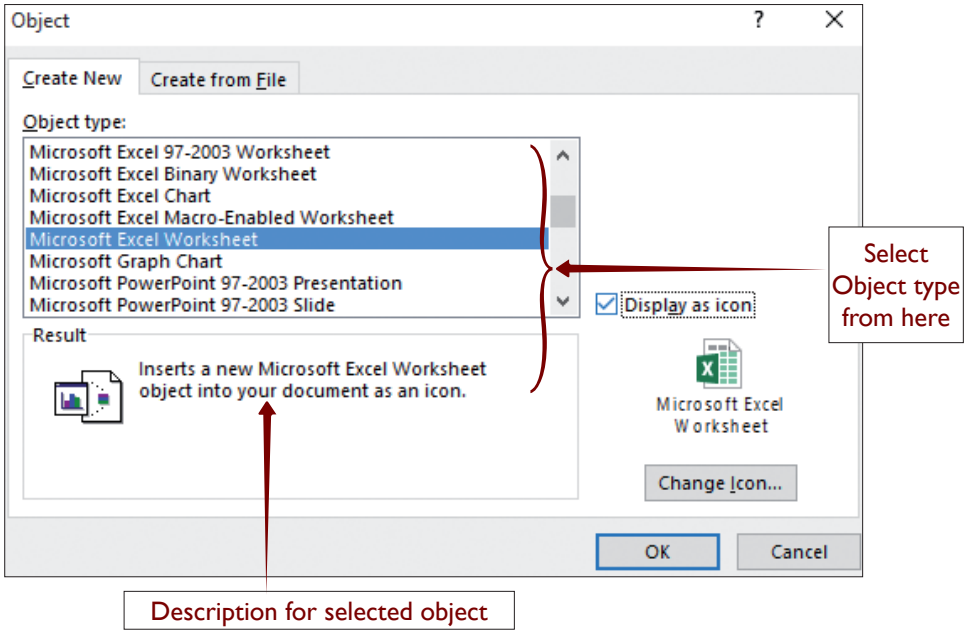
3.5.1 To add Microsoft Excel Worksheet as an object in a document (or another type of document)

Step 1: Create a new document or open an existing document where you want to insert an object.

Step 2: Click where you want to insert the object.

Step 3: On the **Insert** tab in the **Text** group, click **Object** button. The Object dialog box appears. See picture 3.12.

Step 4: In the **Object Type** list, scroll and select the type of object you want i.e. Microsoft Excel Worksheet. (You can display the object as an icon if desired by ticking the "**Display as Icon**" check box. See the picture 3.14.



Picture 3.14: Object dialog box for creating a new object in a document

End of Unit 3 Assessment

1. Data given in table 3.5 shows learners performance in 4 subjects. Use this data to generate on separate page(s):
   a) A 3-D Clustered column chart showing all the learners' performance in percentages. Change chart colours and the style you want.
   b) A stacked line chart for all learners.
   c) A pie chart representing the performance of learners in ICT. Use a desired chart style and colour.
   d) Apply page numbers in the Footer and your name and class in the Header.
   e) Save your file as your '**Name-Class'**.

Name	English	Math	ICT	Physics
Gahima Isaac	78	87	76	98
Teta Princess	90	90	98	55
Uwimana Isabella	85	65	54	76
Kwizera Steven	67	34	76	83
Gaju Sharon	33	12	84	42
Uwera Janet	56	45	91	61
Ngabo Vincent	21	87	43	54
Gisa John	54	54	65	84
Rugero Amos	83	32	83	95
Kundwa Grace	74	54	93	74

Table 3.5: Learners performance in 4 basic subjects

2. Type the following data in Microsoft Word and Save as '**Learning ICT'.**

Learning ICT in Rwanda

ICT syllabus for Rwanda is very interesting. There are many topics that were added for purposes of improving and enhancing the skills of learners. Thanks for our Government, a caring mother for all Rwandan children, taking charge of our future livelihood.

There are many topics and units that we learn on different levels gradually from lower secondary.

The following topics are learnt right from S1 to S3

- ICT Fundamentals
- Safety and security
- Word processing
- GIS
- Computer Network and Communication
- Scratch Programming for Juniors

At S.2 level Spreadsheet software is added to equip learners with basics of managing numerical data with a computer program.

At S3 level more topics are added to build learners with more skills in using graphics and multimedia presentation. They include:

- Presentation
- Graphics and Multimedia

Required

a) Justify your document and save it with a name, **'ICT in Rwanda'.**

b) Insert **Sauces** file you created in unit 3 as object- icon (you can open from here) at the end of the text you typed above.

c) Add a bitmap Image and Microsoft Excel Worksheet as objects at the beginning of your text.

d) Insert an equation as "$a = \sqrt{(b^2 + c^2)}$" below the image.

e) Save changes to your file.

APPLICATION SOFTWARE

GIS

Unit 4

ArcGIS

Key unit competence

Query a map using selections (attribute and location). Create a map layout and insert map elements. Use advanced symbology and labeling. Print, export and send a map.

4.1 Introduction

The most effective selection method one can use to select features in a layer is to select features using an attribute *query*.

4.2 Querying data/information (Query methods III)

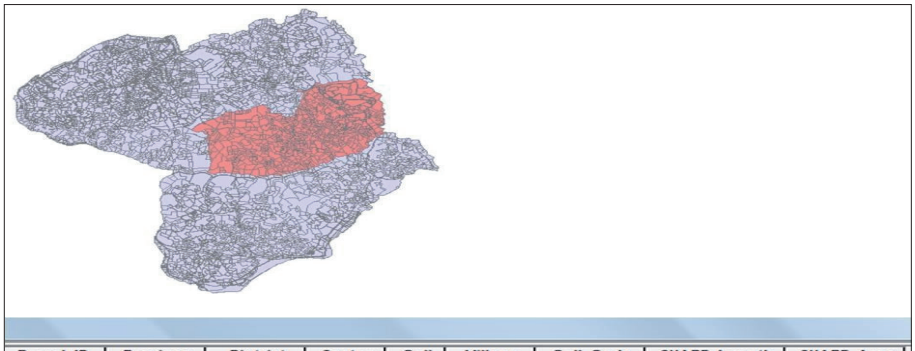
4.2.1 Selecting features by attribute

One of the selection methods you can use to select features in a layer is to select features using an attribute *query*.

Activity 4.1

Which parcels of Cyiri Cell belong to Birambo Village? The attribute query to use is from Picture 4.1;

- "Village": Name of attribute field.
- "=": Relationship between attribute field and value (operator).
- ''Birambo'': Name of value.

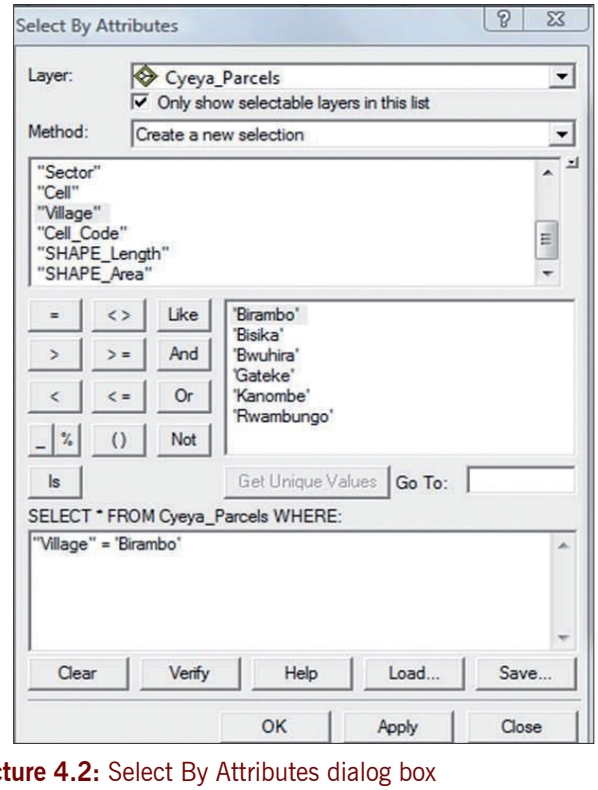


Parcel_ID	Province	District	Sector	Cell	Village	Cell_Code	SHAPE_Length	SHAPE_Area
6397	Northern	Gicumbi	Rukomo	Cyeya	Gateke	4051601	81.772442	414.259385
3162	Northern	Gicumbi	Rukomo	Cyeya	Bisika	4051601	181.140706	1702.729774
5984	Northern	Gicumbi	Rukomo	Cyeya	Bisika	4051601	66.219639	16.156501
3611	Northern	Gicumbi	Rukomo	Cyeya	Birambo	4051601	119.150429	823.552745
4938	Northern	Gicumbi	Rukomo	Cyeya	Kanombe	4051601	293.841299	4012.759897
4281	Northern	Gicumbi	Rukomo	Cyeya	Gateke	4051601	169.749169	1422.109569
3186	Northern	Gicumbi	Rukomo	Cyeya	Bisika	4051601	112.122306	691.758649
1945	Northern	Gicumbi	Rukomo	Cyeya	Rwambung	4051601	102.798991	624.697125
4821	Northern	Gicumbi	Rukomo	Cyeya	Kanombe	4051601	133.224285	1034.190503
66	Northern	Gicumbi	Rukomo	Cyeya	Bisika	4051601	144.08607	742.212571
4052	Northern	Gicumbi	Rukomo	Cyeya	Rwambung	4051601	415.824343	7325.100042
4413	Northern	Gicumbi	Rukomo	Cyeya	Gateke	4051601	182.35929	1535.737075
1839	Northern	Gicumbi	Rukomo	Cyeya	Rwambung	4051601	179.441461	1783.804091
882	Northern	Gicumbi	Rukomo	Cyeya	Bwuhira	4051601	131.485015	821.947844
899	Northern	Gicumbi	Rukomo	Cyeya	Bwuhira	4051601	253.235908	3319.540451
4282	Northern	Gicumbi	Rukomo	Cyeya	Gateke	4051601	68.514491	270.657611
1771	Northern	Gicumbi	Rukomo	Cyeya	Rwambung	4051601	170.193072	1901.666816

Picture 4.1: Attributes data in ArchMap

Method 1:

Step 1: Click Selection > Select By Attributes to open the Select By Attributes dialog box.



Picture 4.2: Select By Attributes dialog box

Step 2: Choose the layer to perform the selection against.

Step 3: Specify the selection method.

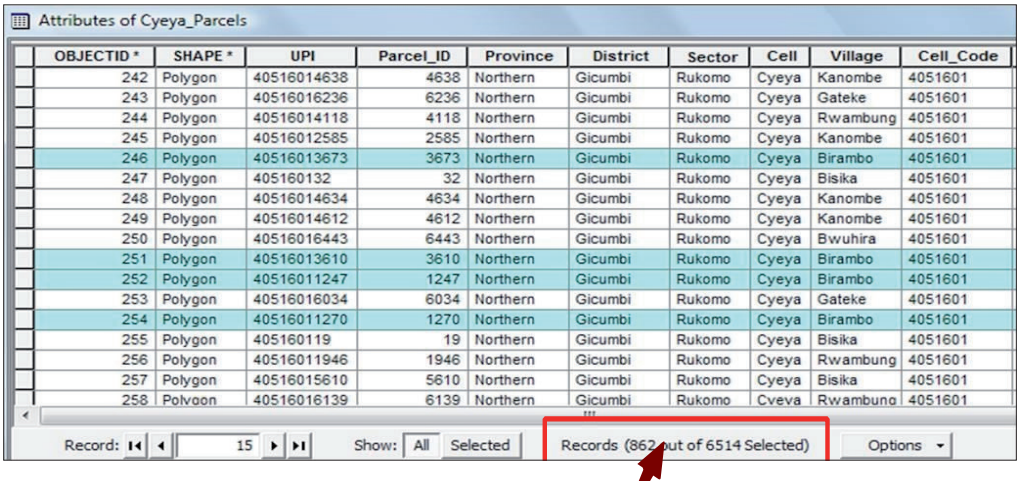
Step 4: Enter a query expression.

See Building a query expression for information on the syntax of a query.

Step 5: Validate your query expression by clicking **Verify**.

Step 6: Click **OK** or **Apply** to execute your selection expression and work with the selection results.

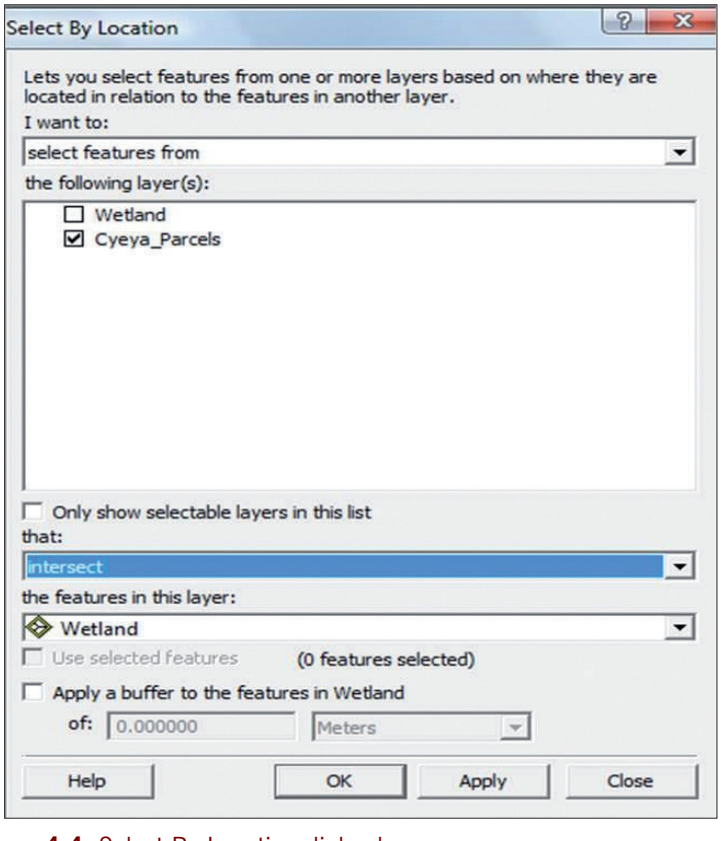
Step 7: Optionally, you can save your query expression for later reuse before closing this dialog box.



Picture 4.3: Attributes table

Method 2

Step 1: Click Selection > Select By location.



Picture 4.4: Select By Location dialog box

Step 2:

Constructing a location query

- Target layer: Parcels
- Spatial relationship: Intersect
- Source layer: Wetland

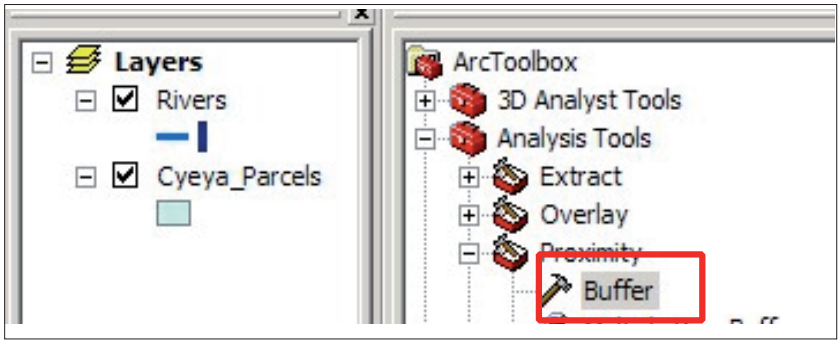
4.2.2 Select by location

Buffering features

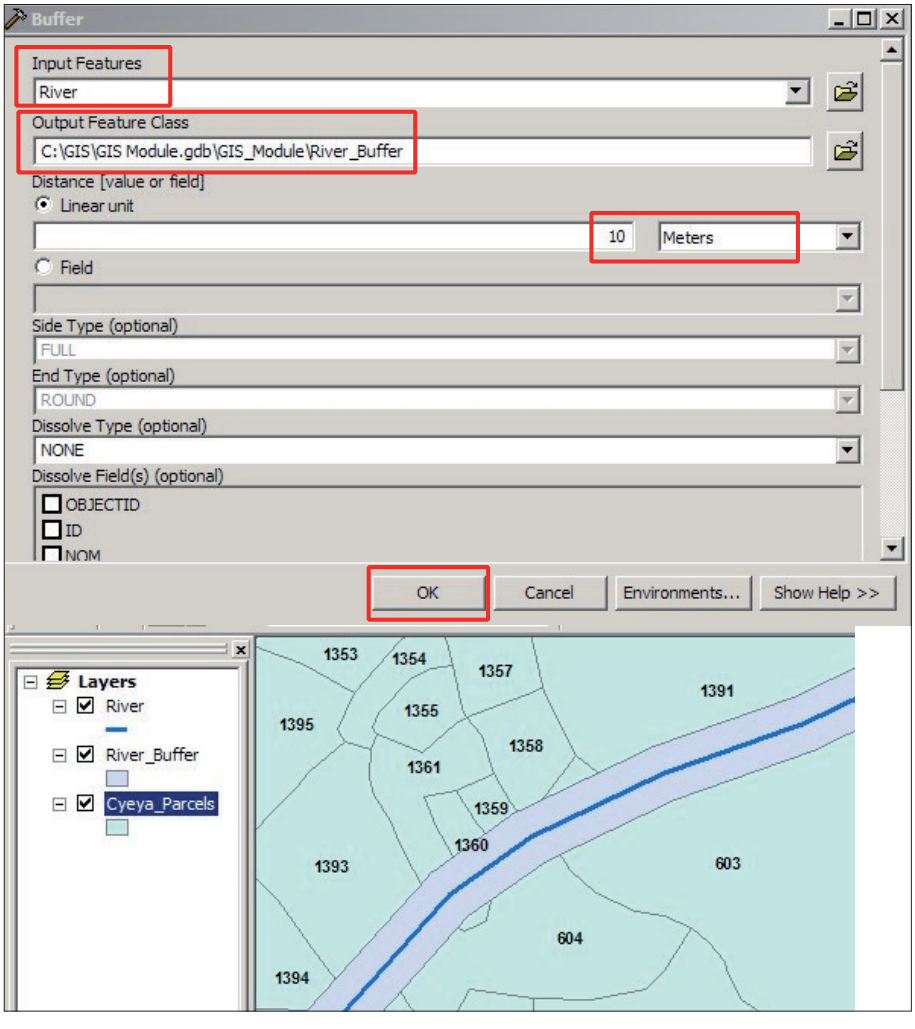
- What neighbourhood is affected by 10m river buffer?
- Open Arc catalogue.
- Analysis tool.
- Proximity.
- Buffer- a dialogue box is open.
- In the Input Feature put River.
- Output feature class—browse to your data storage and give the name.

- Linear Unit: 10 – select Meters.
- Leave other tabs as default.
- OK.

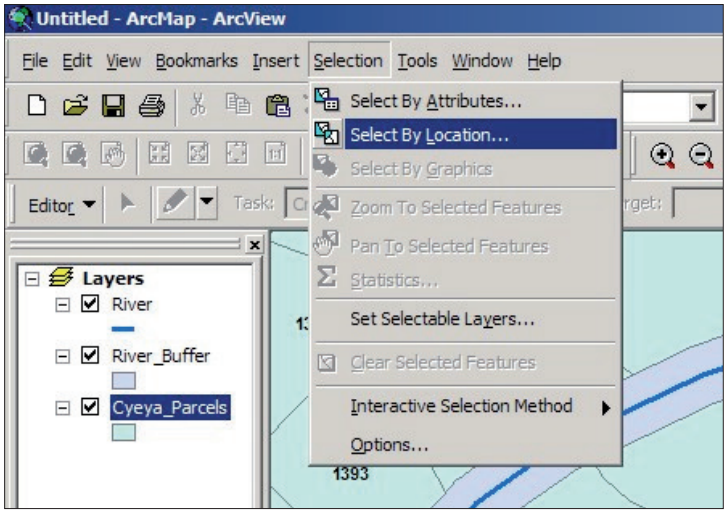
Step 1



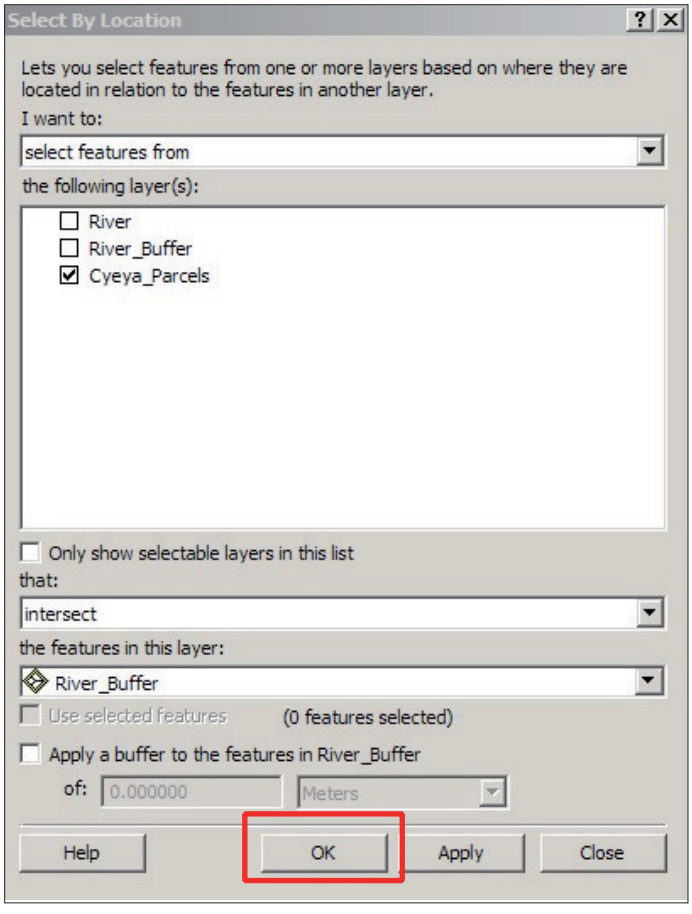
Picture 4.5: Accessing Buffer feature



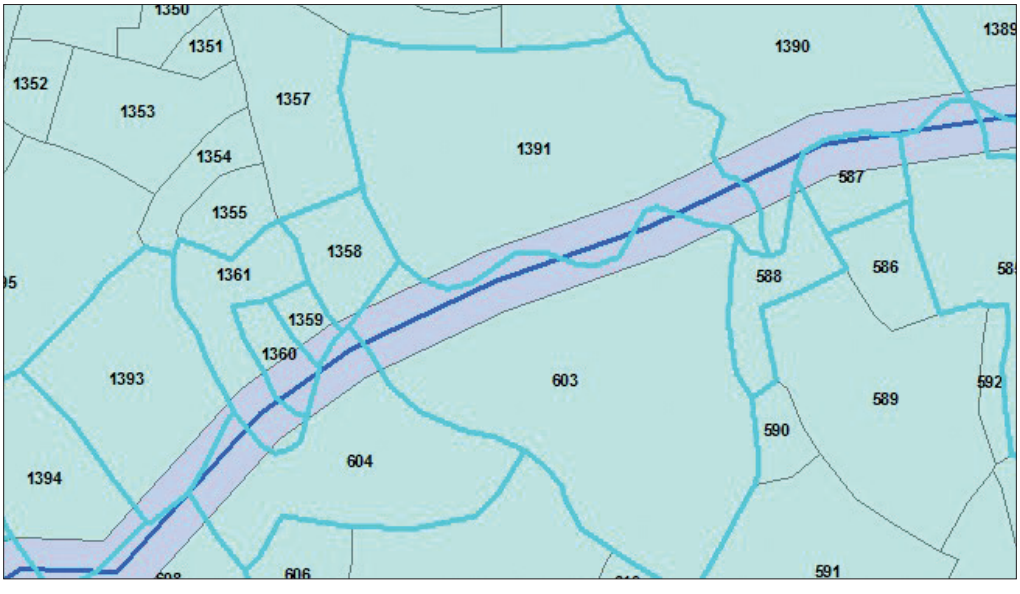
Picture 4.6: Buffer dialog box



Picture 4.7: Accessing Select by Location in ArchMap



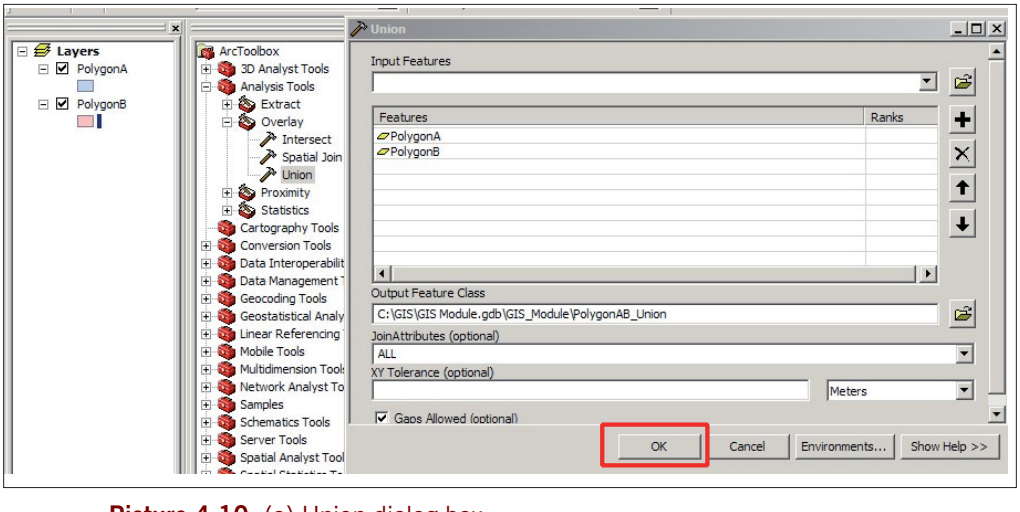
Picture 4.8: Select By Location dialog box



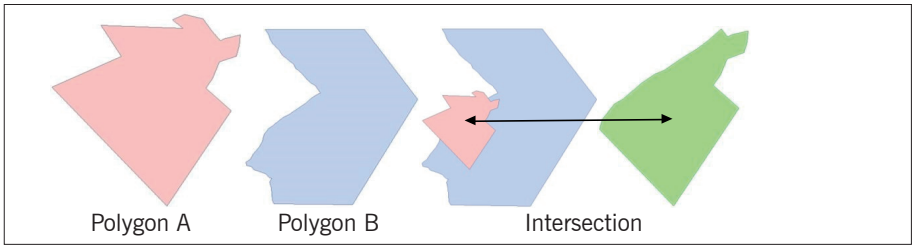
Picture 4.9: Cyeya - parcels - Target layer

Overlaying features

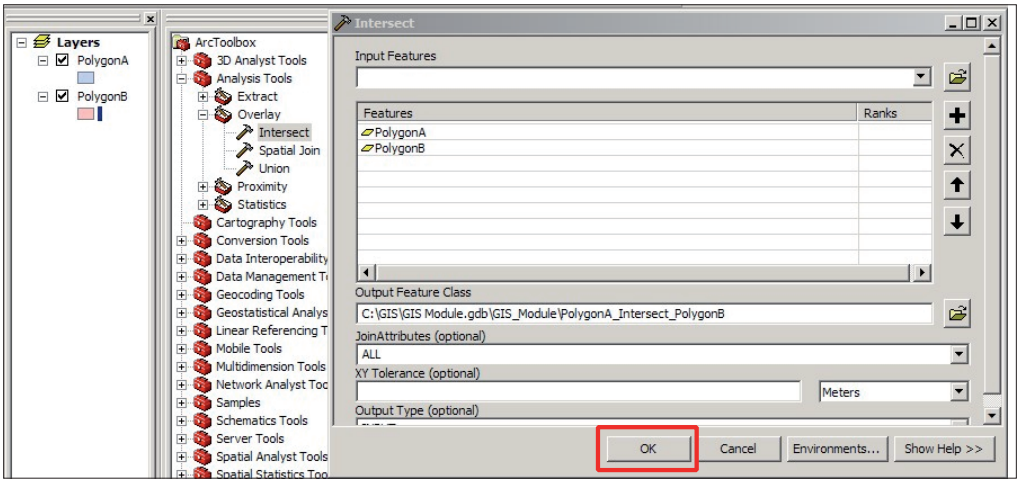
- Open ArcCatalogue.
- Analysis tool.
- Overlay.
- Union- a dialogue box is open.
- In the Input Feature put Polygons to unite.
- Output Feature class -browse to your data storage and give the name.
- Leave other tab as default.
- Ok.



Picture 4.10: (a) Union dialog box



Picture 4.10: (b) Input Features - polygons



Picture 4.11: Intersect dialog box

- Explore other functions in ArcToolbox

Activity 4.2

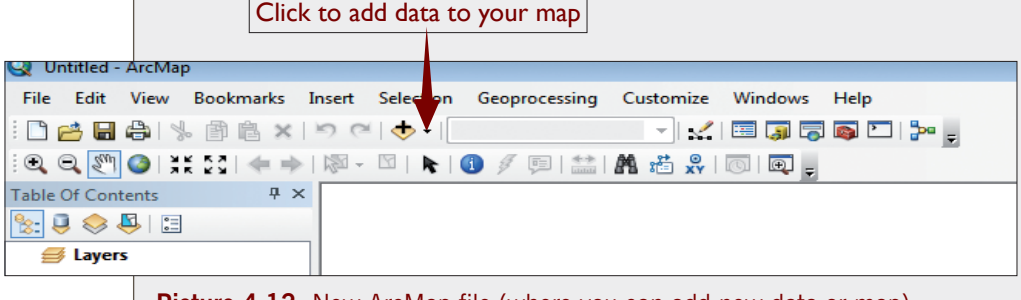
Using ArcGIS, create an administration map of Rwanda, the map should present provinces, districts and lakes.

Use the steps below

Step 1: Start ArcGIS Pro.

Step 2: Open an empty map.

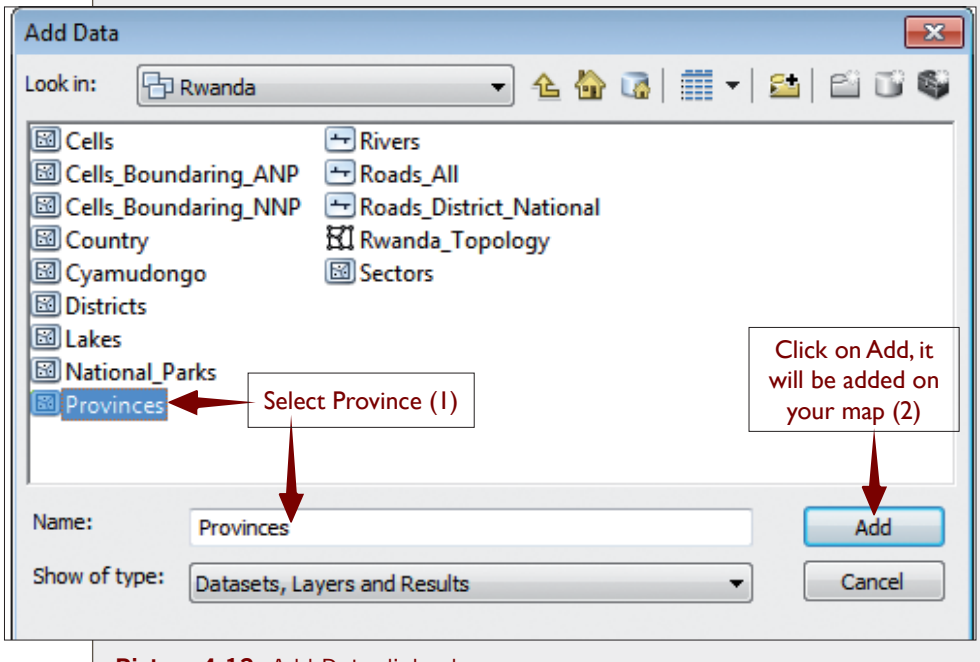
Step 3: Add new data or file.



Picture 4.12: New ArcMap file (where you can add new data or map)

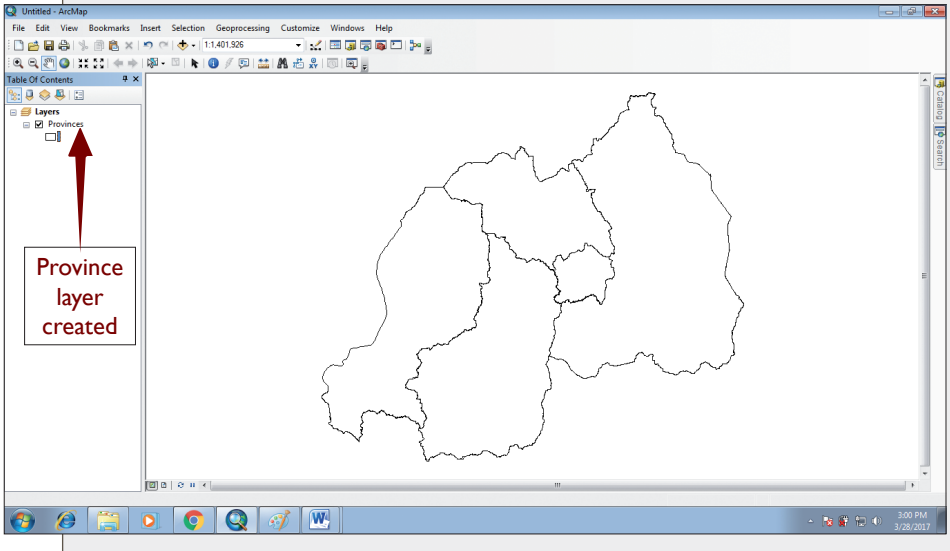
Step 4: On the **Open** page, under **Open**, click **Computer** and click **Browse** .

> **Note:** That the folder that contains data to use must be connected to ArcGIS.



Picture 4.13: Add Data dialog box

The following result will be prompted to you

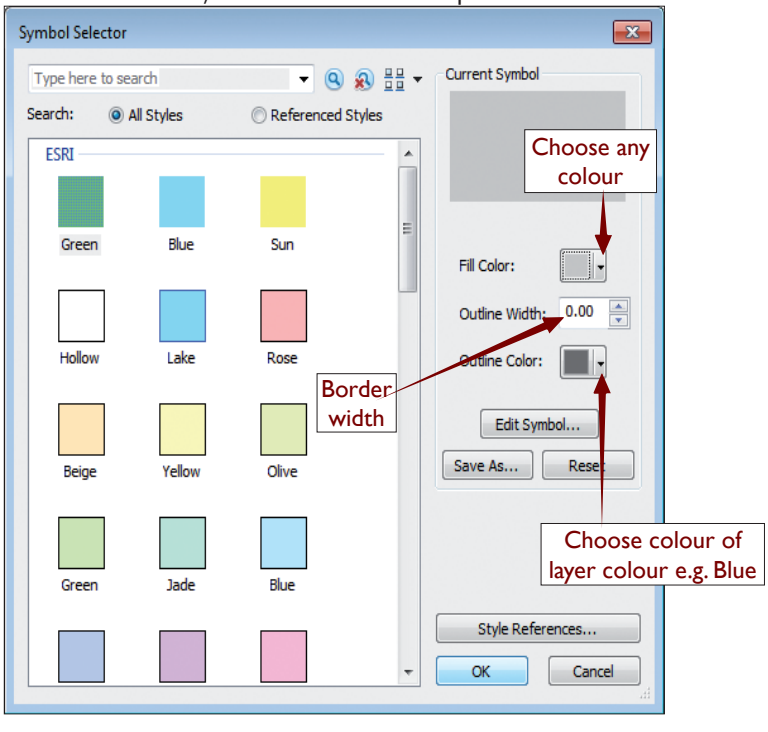


Picture 4.14: Province layer

4.3 Display of a layer (II)

4.3.1 Symbolise layer

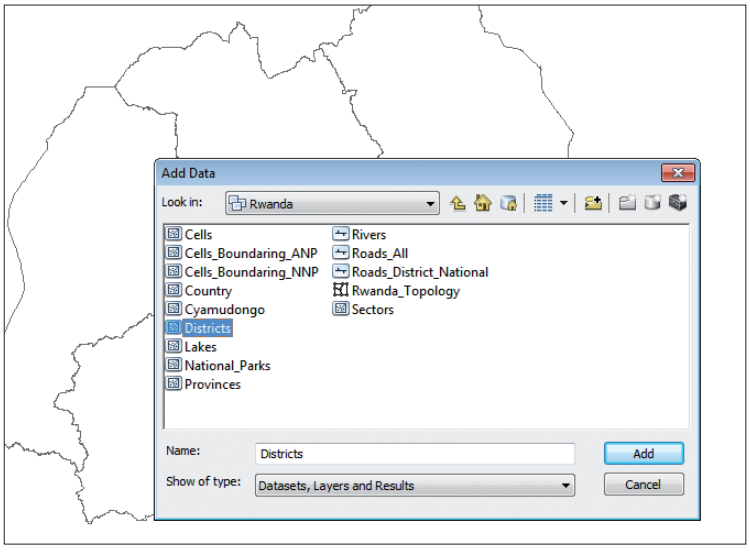
Step 5: If you want to change colour of the layer, double click on the colour, this window will open.



Picture 4.15: Symbol Selector dialog box

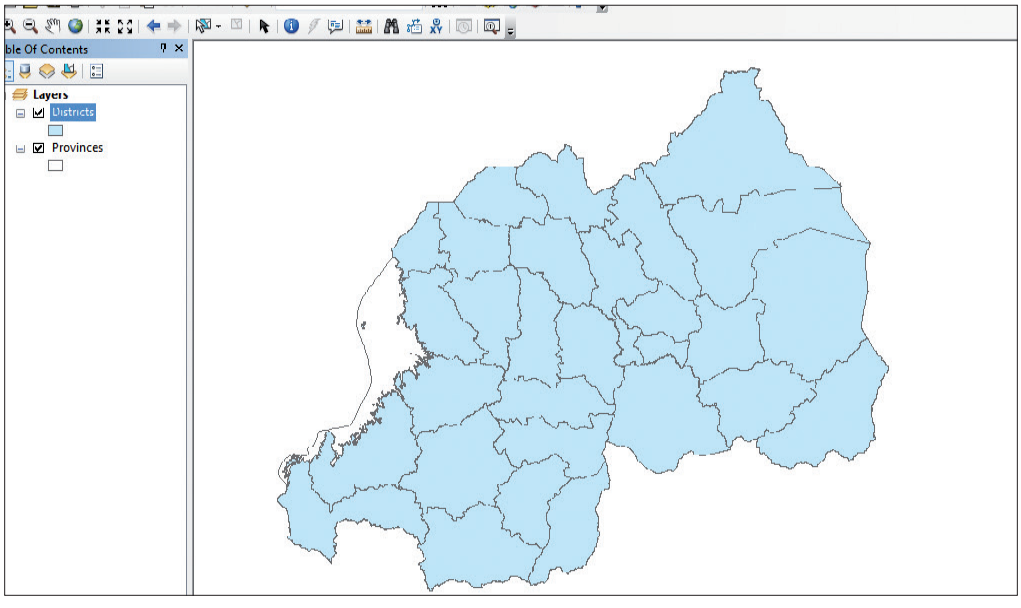
Step 6: Add Districts layer.

Repeat step 3 and 4.



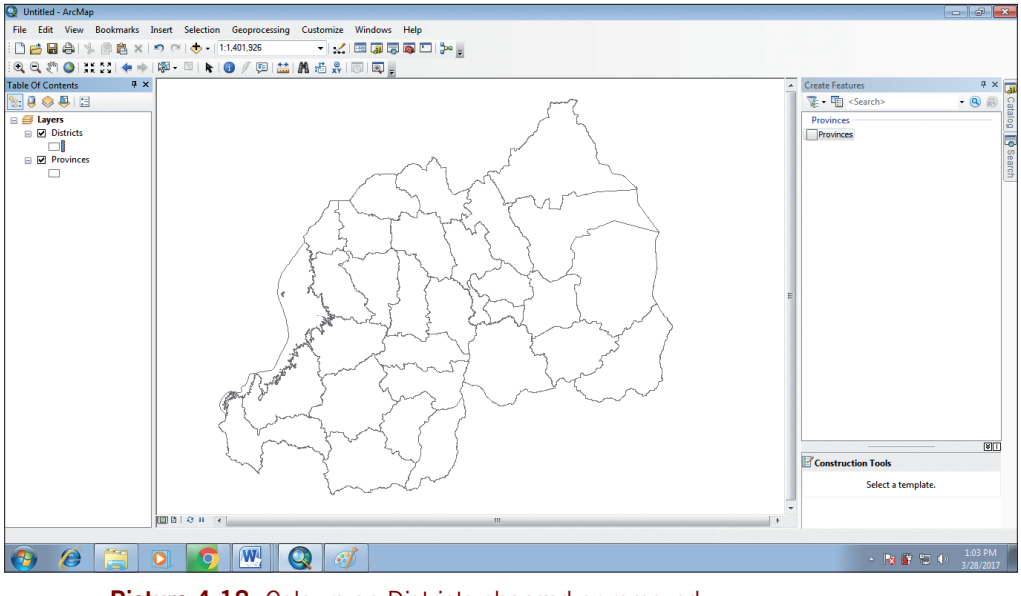
Picture 4.16: Add Data dialog box for adding districts to the map behind

Below screen will be displayed



Picture 4.17: Districts layer added

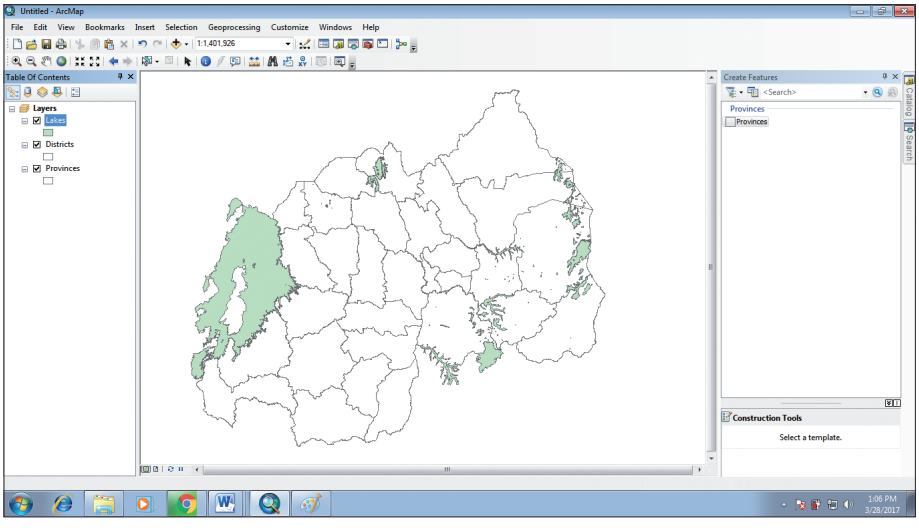
Step 7: To change all Districts layer colour, do the same as step 5.



Picture 4.18: Colours on Districts changed or removed

Step 8: Add lakes layer.

Repeat step 3 and 4



Picture 4.19: Lakes added to the map

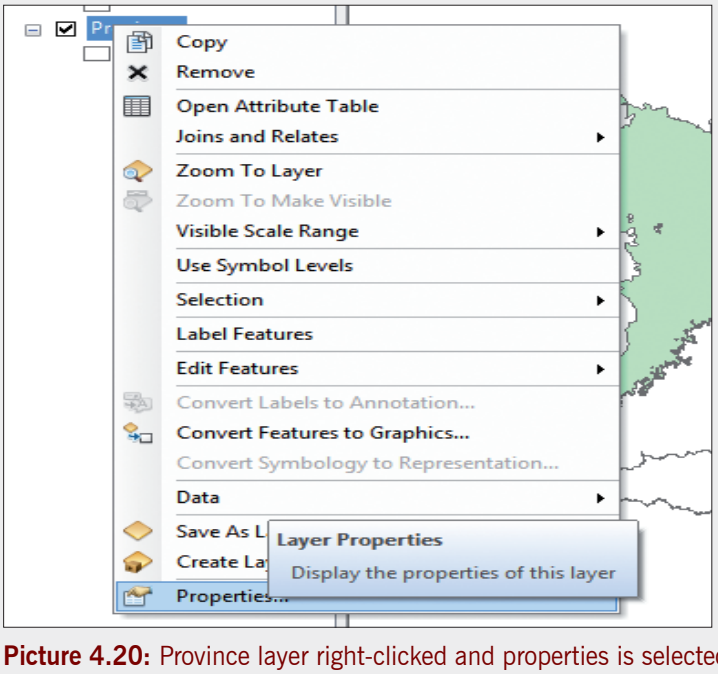
4.3.2 Add and remove label of layer

Activity 4.3

1. Add province labels and districts labels to the map of Rwanda.
2. Remove the labels you have added in Number (1) above.

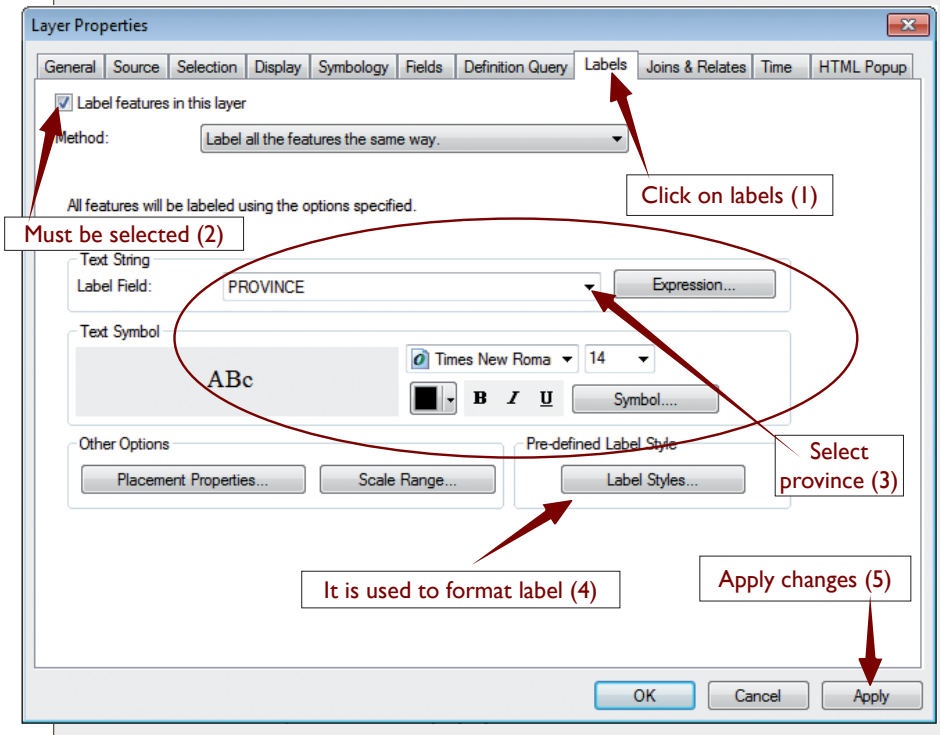
Use the following steps.

Step 1: Right click on the layer, (province).



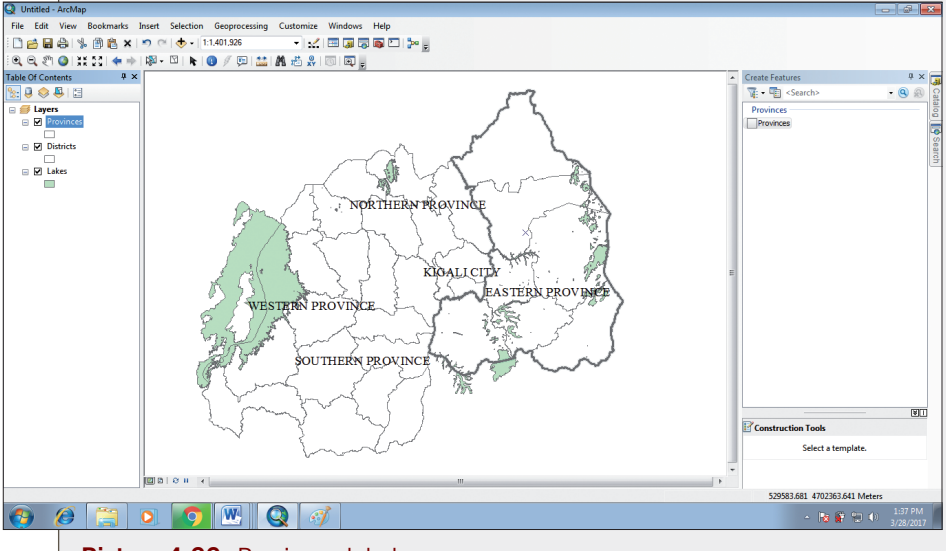
Picture 4.20: Province layer right-clicked and properties is selected

Step 2: Click on **Properties**, the layer properties dialog box below displays.



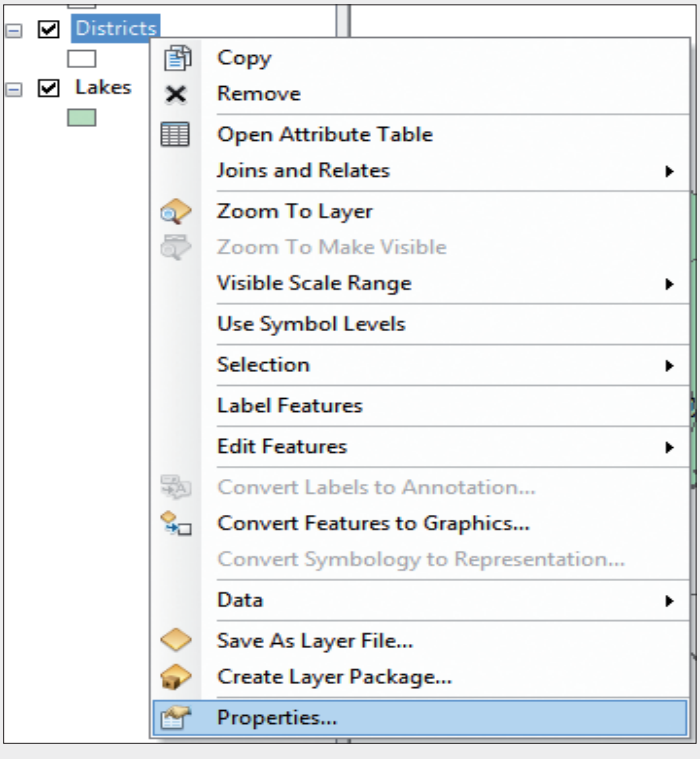
Picture 4.21: Layer properties dialog box. Province (Eastern) is selected

Step 3: Click on Labels Tab. Perform actions 1-5 in dialog box above. After following steps in picture above, the results are shown in picture 4.23.



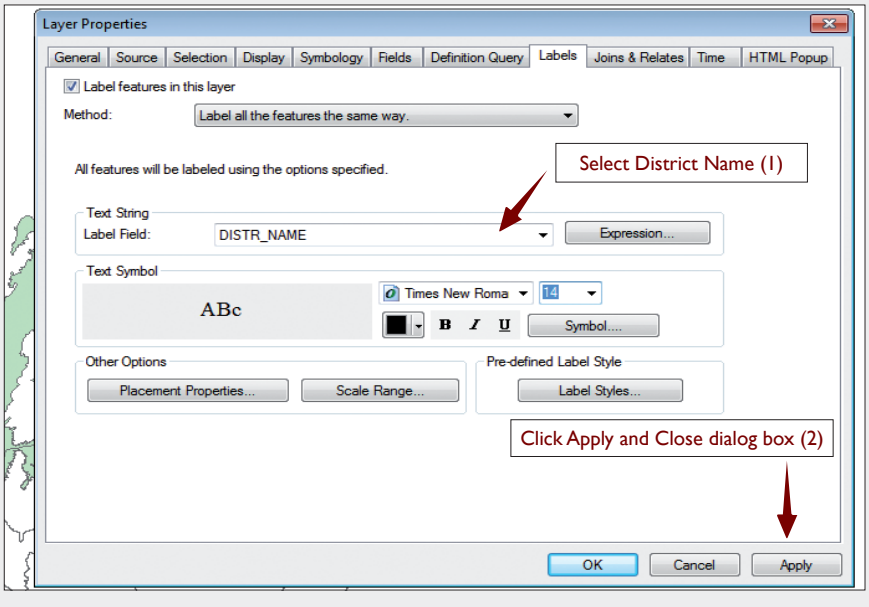
Picture 4.22: Provinces labels

Step 4: Add labels on Districts layer. Right click Districts Layer.



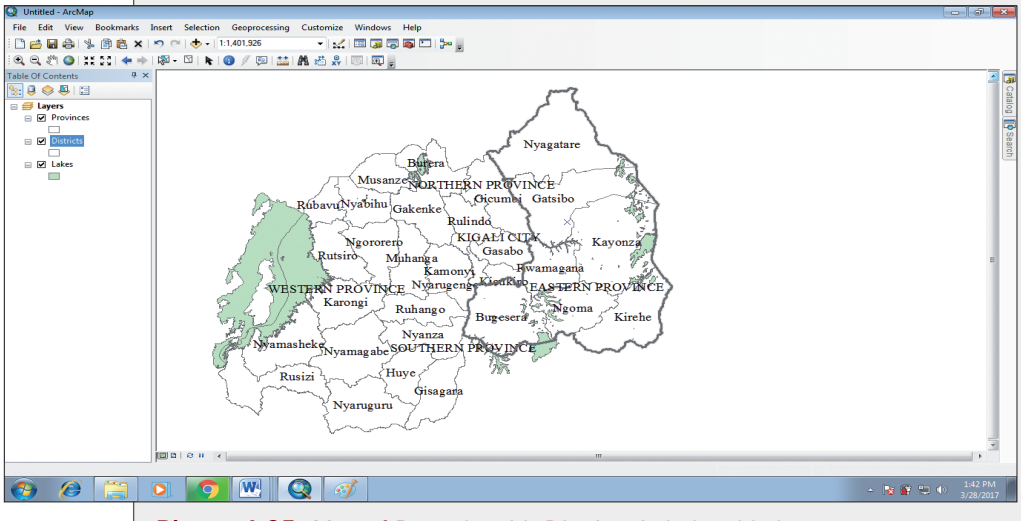
Picture 4.23: Properties selected from Shortcut menu for District layer

Step 5: Select **Labels** Tab, as shown below.



Picture 4.24: Layer Properties dialog box. Labels Tab selected

After performing actions 1 and 2 with the Layer properties box above, the result will be as shown below:

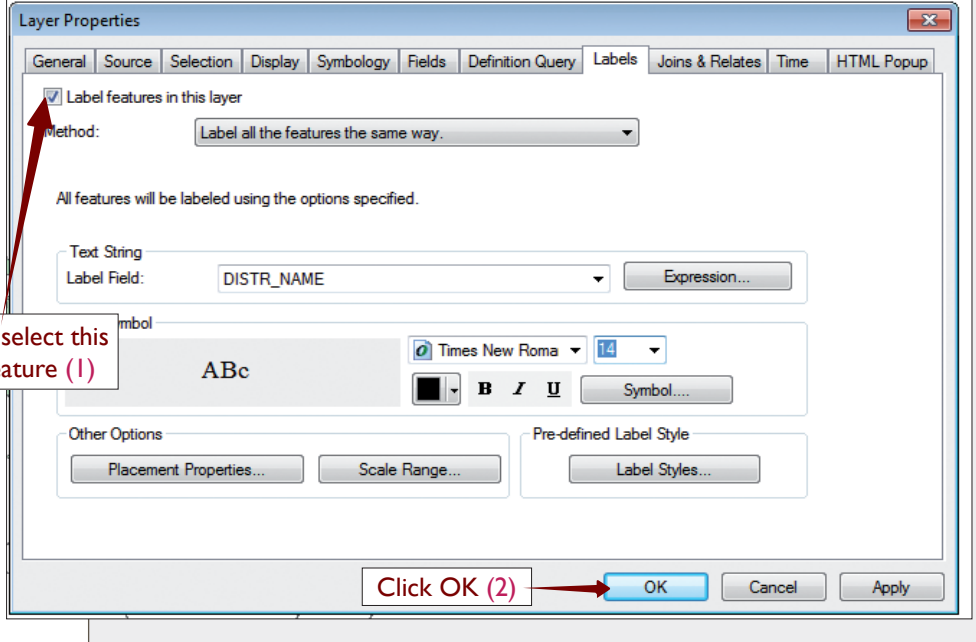


Picture 4.25: Map of Rwanda with Districts Labels added

Remove labels

To remove labels on a layer, follow the steps given below;

Step 1: Right click on layer, e.g Districts then select **properties**.



Picture 4.26: Layer Properties dialog box showing how you remove labels

Step 2: Click **OK** at the bottom of layer properties dialog box.

Activity 4.4

a) Using the Activity 4.3, remove labels on provinces and then add labels on lakes.
b) Add rivers layer and apply labels on it.

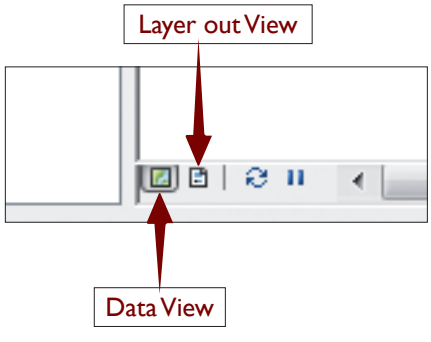
4.4 Map layout

The basic 4 elements that a map should have: title, legend, scale, date, author, orientation and text. We will show how to insert them in a map as an activity. Follow the steps given on each element.

4.4.1 Insert Legend

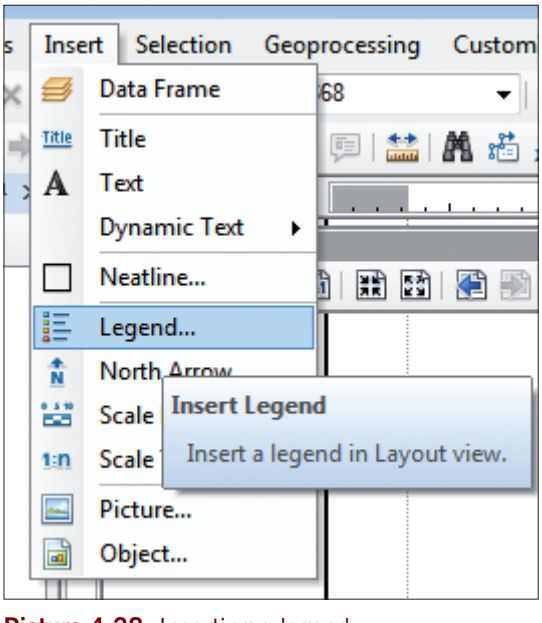
Using the map of Rwanda we used in previous activities, follow steps given below to insert a legend.

Step 1: Change from data view to Layer out view. Use view button or view menu on the lower left side of the Arch map window.



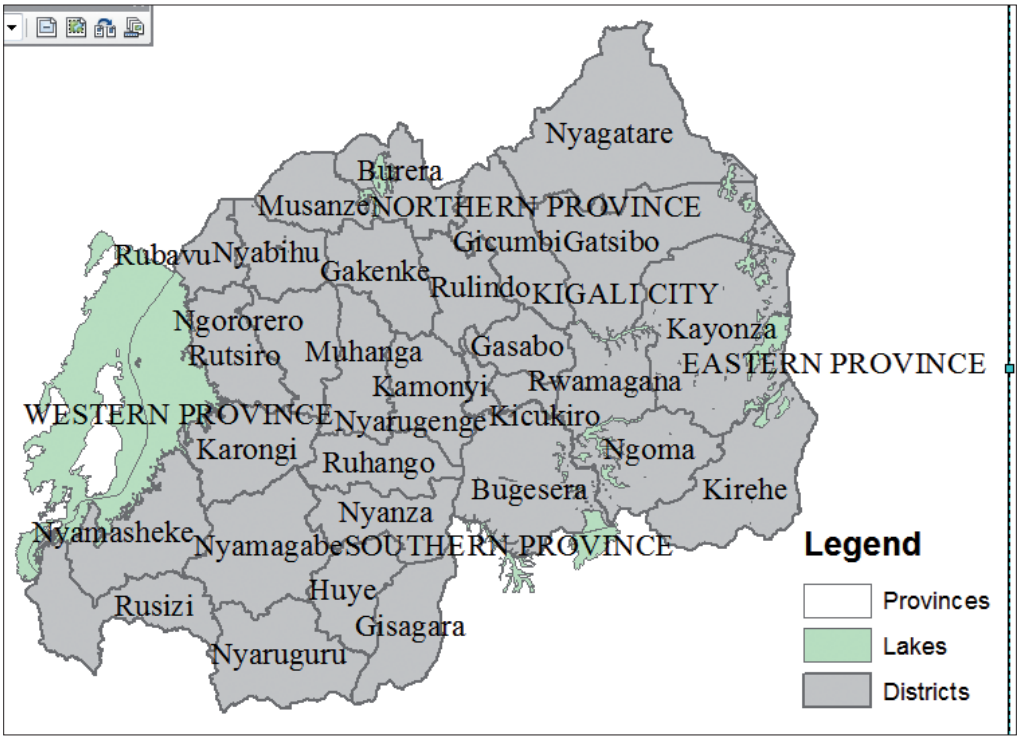
Picture 4.27: Main View buttons

Step 2: Click on **Insert** menu, then Choose **Legend**.



Picture 4.28: Inserting a legend

Follow the instruction given by ArcGIS, Then after click **OK**.

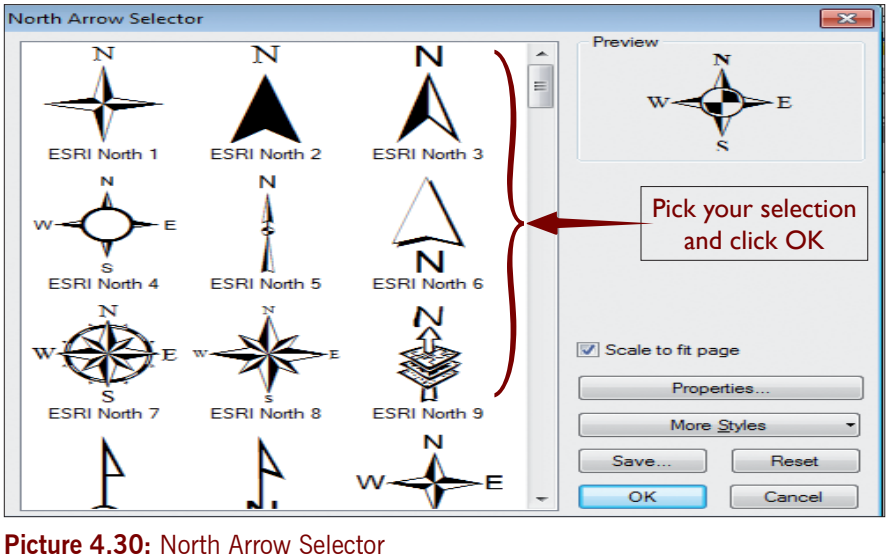


Picture 4.29: A map with a legend

4.4.2 Insert Orientation

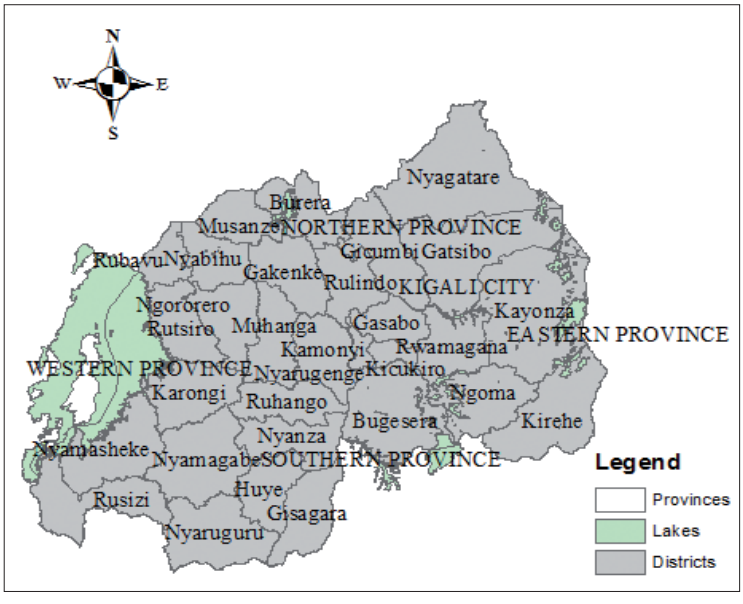
Step 1: Click **Insert menu**.

Step 2: Choose **North Arrow**



Picture 4.30: North Arrow Selector

Step 3: Select how to use, then Click **OK**



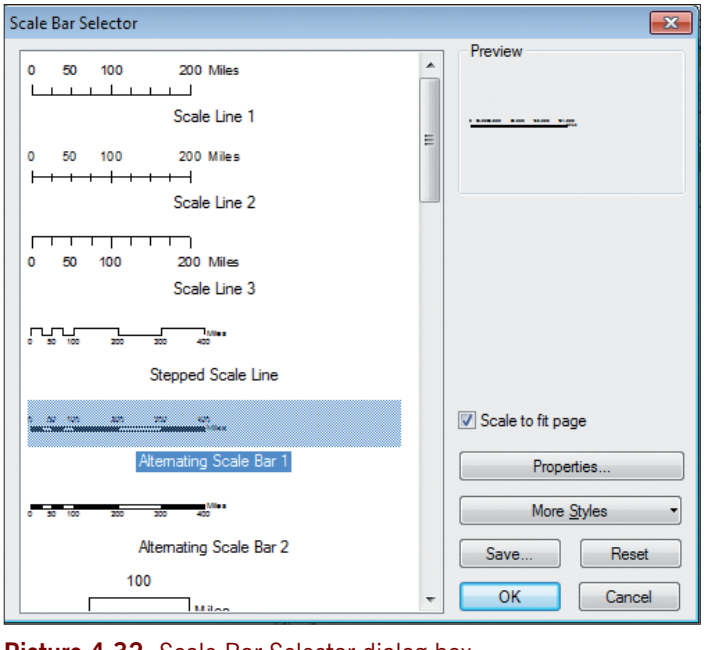
Picture 4.31: A map with a compass

4.4.3 Insert Scale

Step 1: Repeat step 1 and 2, above (under Insert orientation).

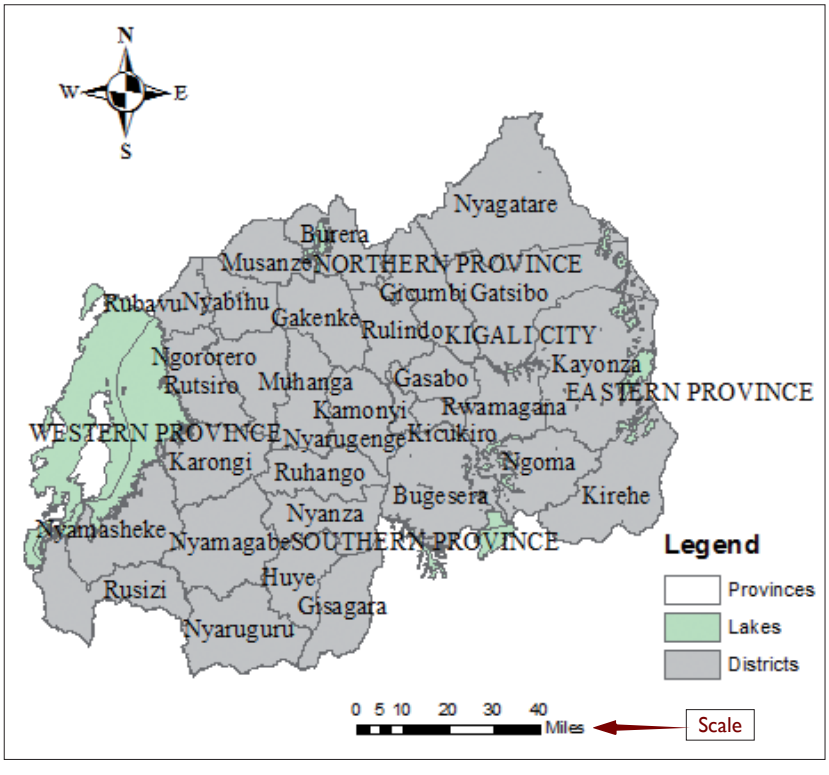
Step 2: Select **Scale bar.**

Step 3: Scale Bar dialog box will be displayed, then choose the scale you want to use, then click **OK**.



Picture 4.32: Scale Bar Selector dialog box

Step 4: A map with scale is displayed as shown below.

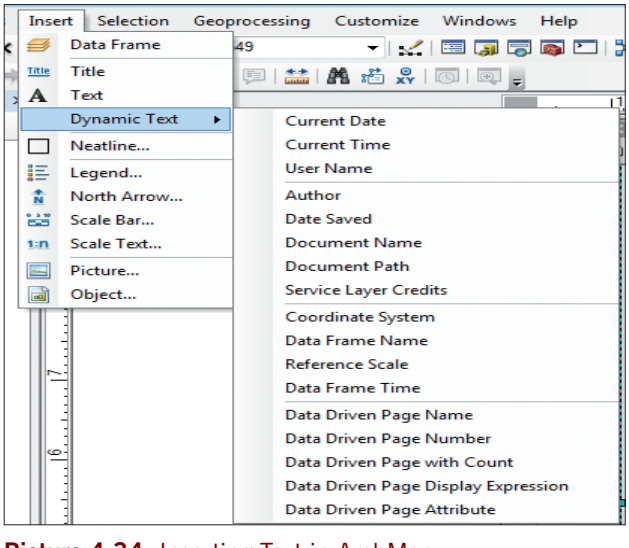


Picture 4.33: A map with scale

4.4.4 Insert Text

There are several kinds of text you can insert in a map. Text can be meaningful words, characters or numbers placed on a map. To add text, follow steps given below:

Step 1: Click **Insert** menu, point to **Dynamic text**.



Picture 4.34: Inserting Text in ArchMap

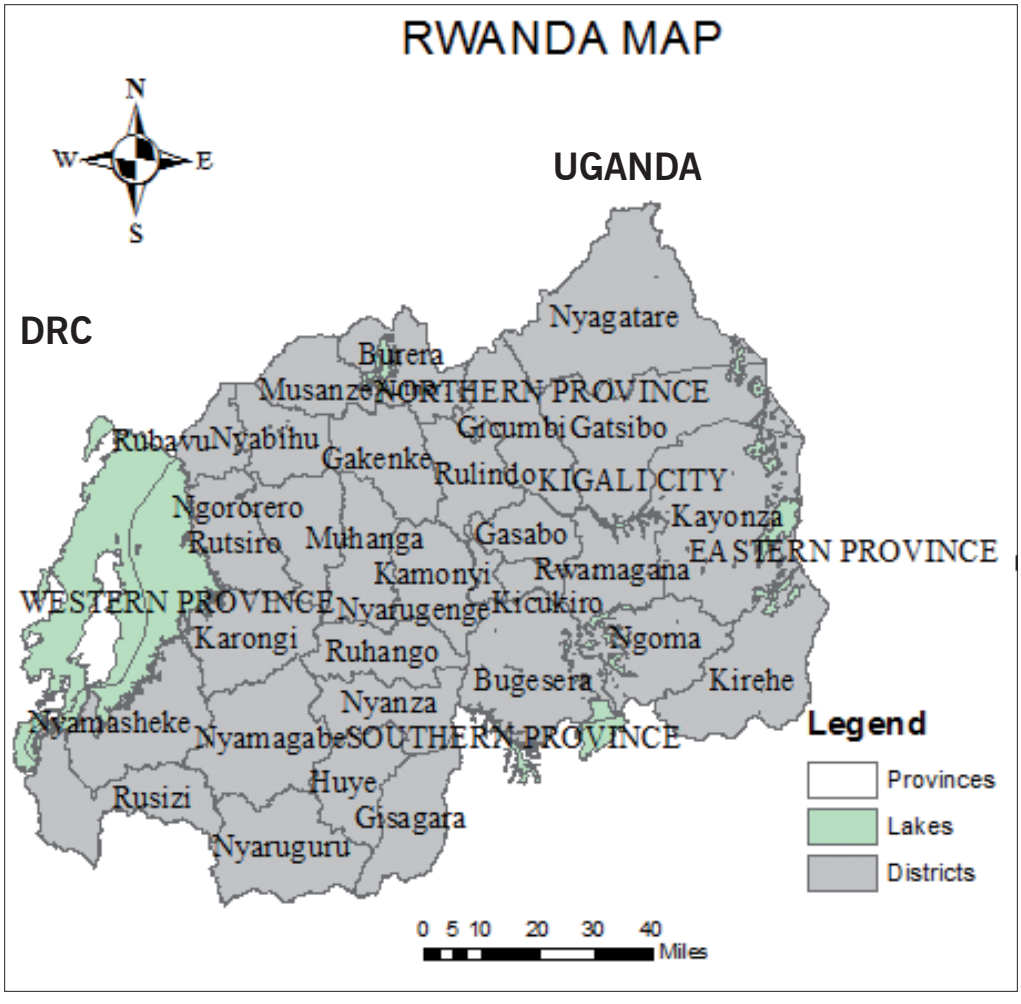
Step 2: Select text category you want to insert e.g Author, Document Name, etc.

4.4.5 Insert Title

Step 1: Click on **Insert** menu.

Step 2: Select **Title**.

Step 3: Type text as title in the dialog box that displays.



Picture 4.35: A map with Text And Title

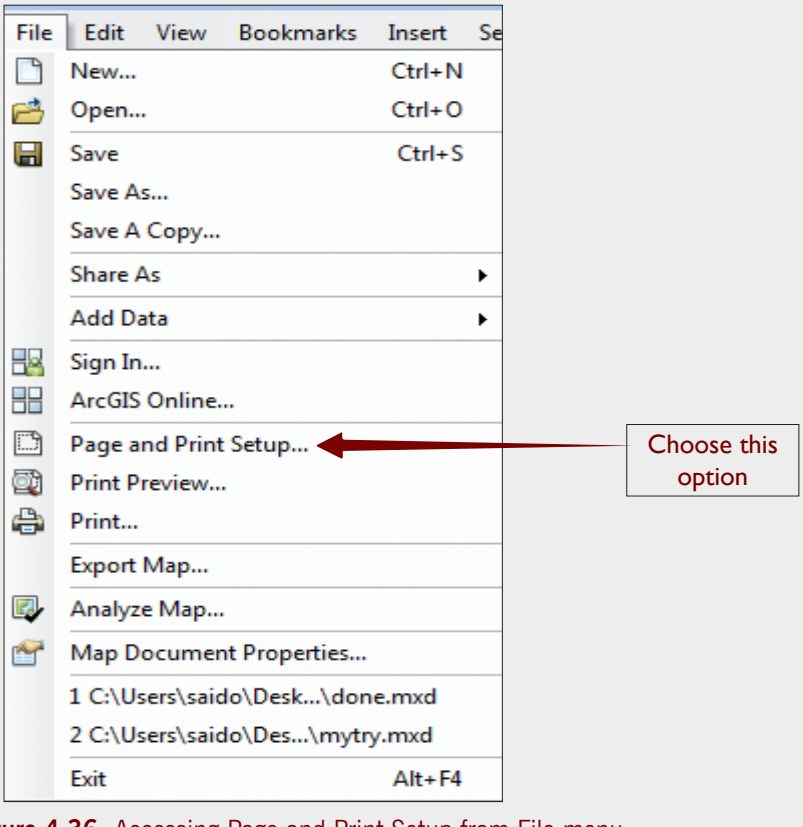
4.5 Use Page and Print Setup Menu

The purpose of page and print setup is to organise your map ready for printing.

Activity 4.5

Perform a page and print setup of the map you added in the previous Activity (4.3). Follow the steps below:

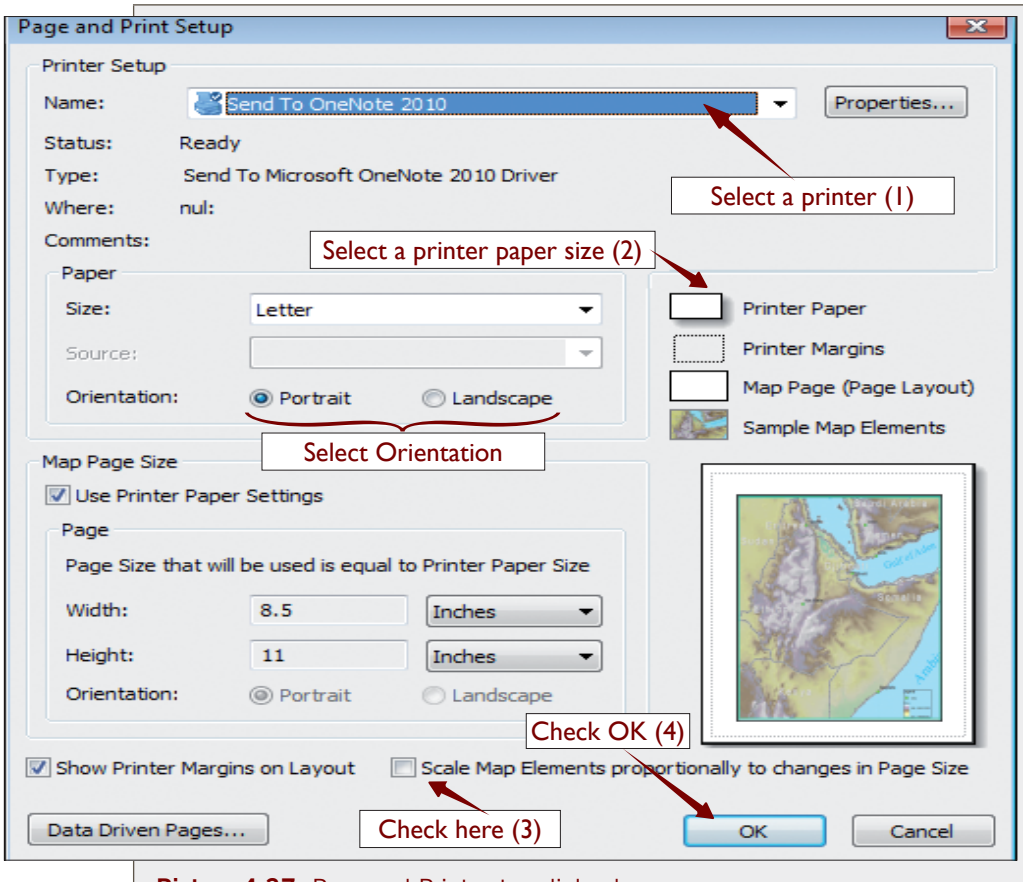
Step 1: Navigate to **File** > **Page and Print Setup**.



Picture 4.36: Accessing Page and Print Setup from File menu

Step 2: Select the printer.

Step 3: Select the Printer Paper size and orientation for the map. See the link in the Related Information section for information on setting up a custom page size.



Picture 4.37: Page and Print setup dialog box

Step 4: Check, if the map has already been created, on '**Scale map elements proportionally to changes in map size**' at the bottom of Print and Print Setup dialog box.

Step 5: Select '**Use Printer Paper Settings**'. This grays out the bottom section, **Map page size**, because the map is now using the Printer paper size and orientation settings.

Step 6: Click **OK**.

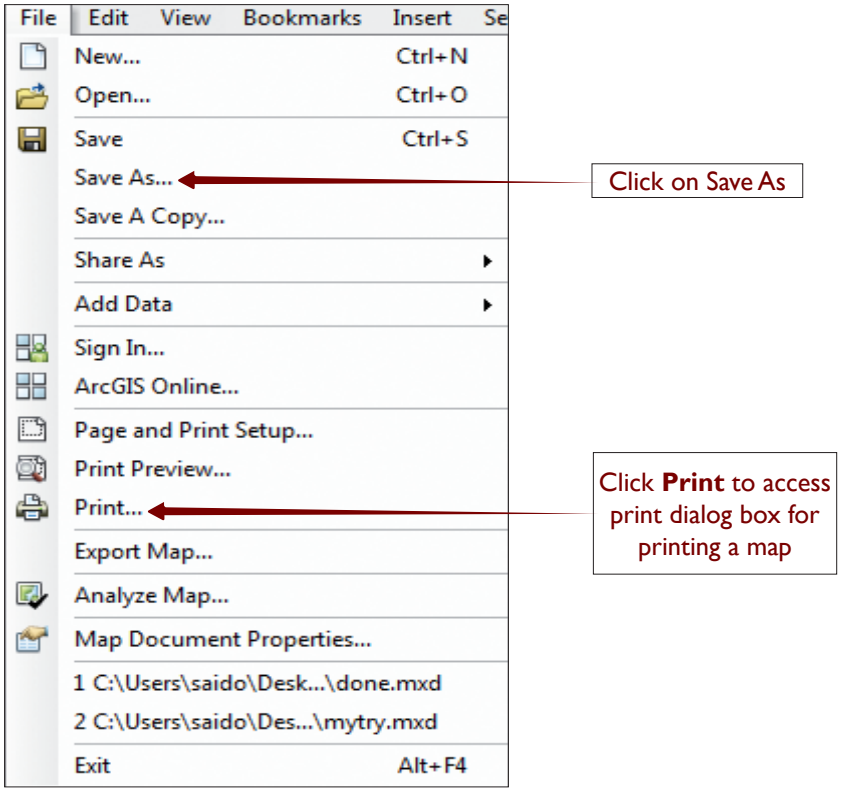
4.6 Save and send a map

To save a map is to store it for future references using a specific name and location on a storage device. To save or export a map is to prepare the map in format that can allow it to be easily moved or exported from one computer to another.

Save a map

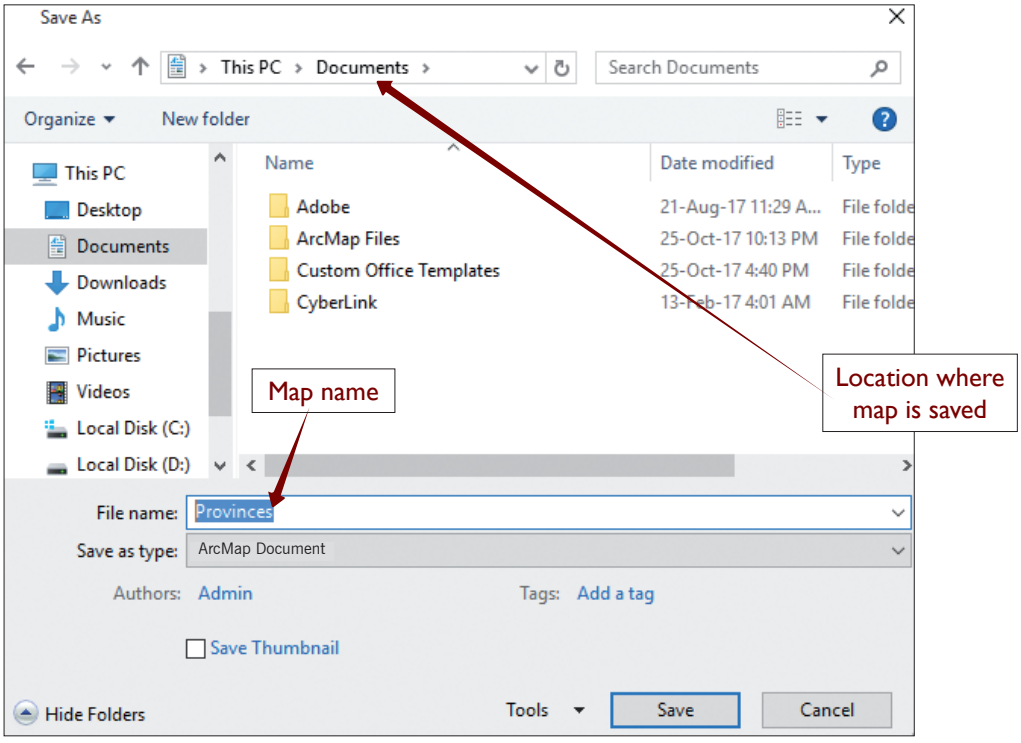
Follow steps below:

Step 1: Click **File** menu and select **"Save As..."**



Picture 4.38: Saving a map

Step 2: Choose the location and the name of the map.

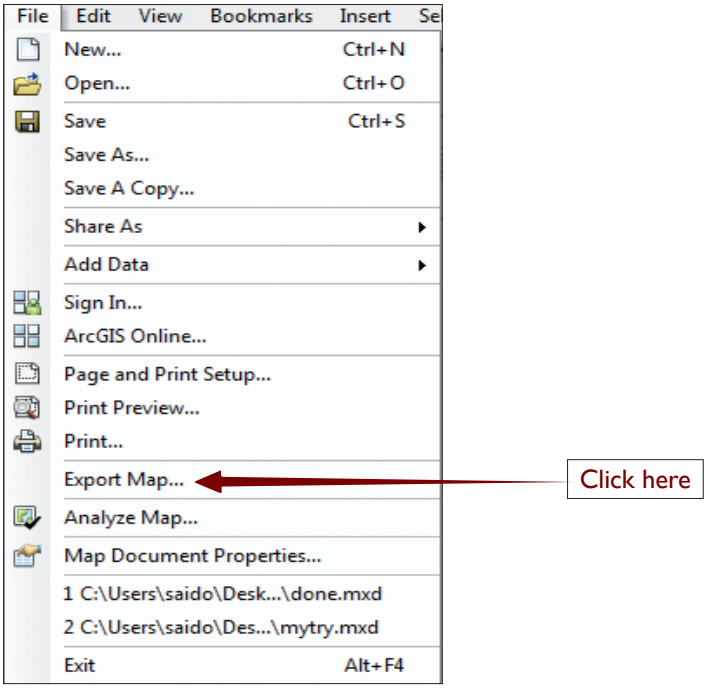


Picture 4.39: Save As dialog box for saving a map

Export a map

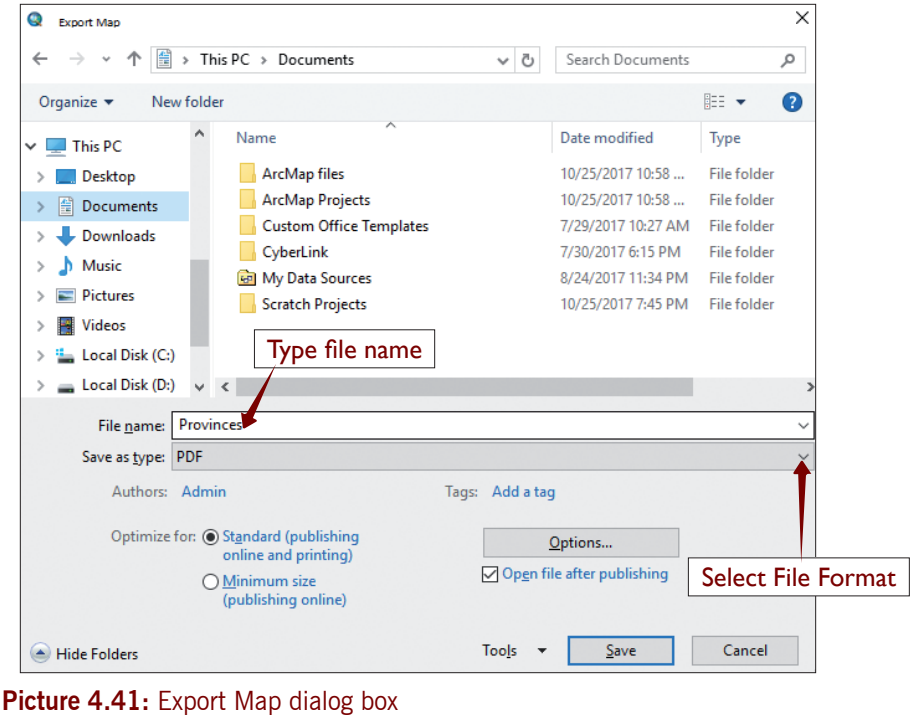
Prepare to send your map by following the steps given below:

Step 1: Click on **File** menu then click on **Export Map**



Picture 4.40: Accessing Export Map from File menu

Step 2: In the Export Map dialog box, type the file name and select the file format.



Picture 4.41: Export Map dialog box

End of Unit 4 Assessment

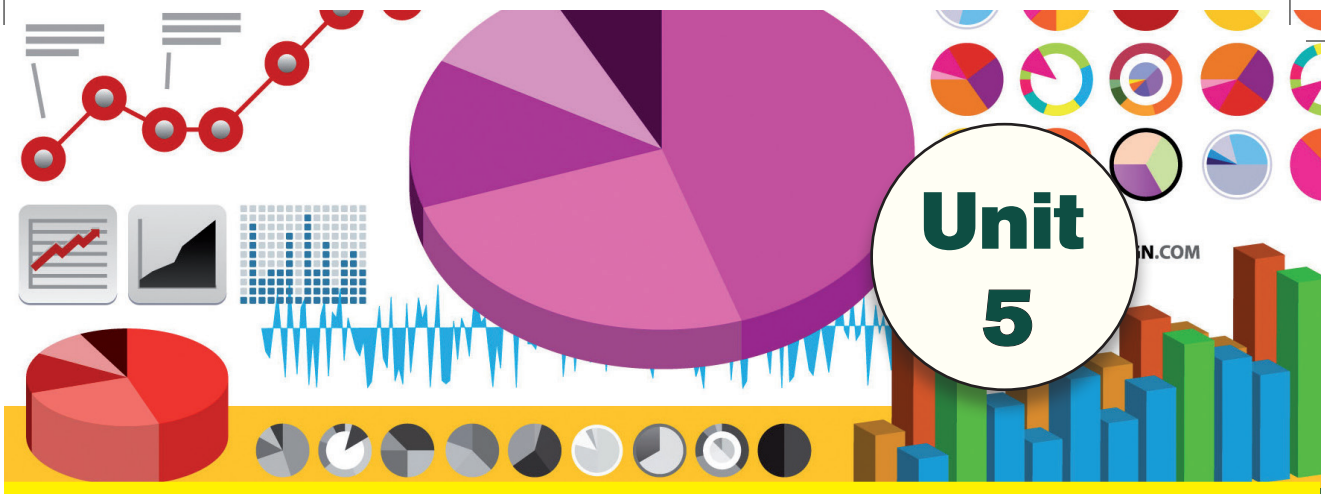
1. Given Rwanda administrative boundaries data ,open a new map document and add the following data on the map:
   a) Provinces
   b) Districts
   c) Sectors
   d) Rivers
   e) National parks

   Then do the following:
   (i) Add label to each layer.
   (ii) Insert legend, scale and orientation.
   (iii) Insert map title, author and date.
   (iv) Export the map in pdf file and send it to your **teacher's email**.
2. Given the map of Kigali city, open the new map and add the following data.
   - City divisions.
   - Roads.

   Then perform the following:
   (i) Add a label to each layer.
   (ii) Insert a map title, author and date.
   (iii) Export the map in **.jpg.** file format.

APPLICATION SOFTWARE

Spreadsheets



Unit 5

Charts and Objects in Spreadsheets

Key Unit Competence

Use Charts and Objects in a spreadsheet, use different techniques to organise a printable datasheet.

5.1 Charts (Graphs)

A chart is a graphical representation of numerical data. It is a sheet of information in form of a table, graph, diagram or object.

Charts enable users to see results of data in detail, interpret and predict current and future data in a much easier way.

5.1.1 Uses of charts

- Used to summarise numerical information.
- View relationships between different variables e.g. Price against Sales volume.
- Detect trends overtime and make forecasts.
- Search for patterns among a large amount of figures.

> **Note:** In unit 3, we looked at how we create charts in MS Word and this means you already know something about charts. Like in MS Word, a chart is created almost the same way in MS Excel but the difference is in steps you take to create it.

5.1.2 Types of charts

There are several types of charts used to present data pictorially. The charts mainly include; column, bar pie, line and scatter graphs.

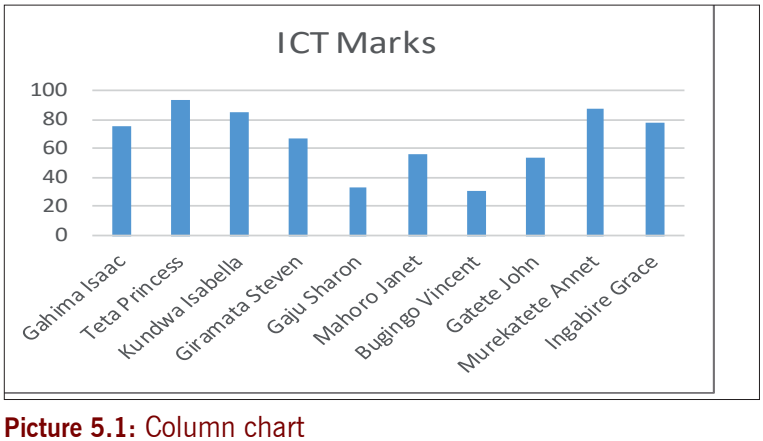
Activity 5.1

You are given the following data to enter in Microsoft Excel. Save the data as 'ICT marks'. Use the data to create a column, bar, pie, line and scatter charts. (Follow steps for creating a chart in section 5.2).

Name	ICT Marks	English Marks
Gahima Isaac	75	98
Teta Princess	93	55
Kundwa Isabella	85	76
Giramata Steven	67	83
Gaju Sharon	33	42
Mahoro Janet	56	61
Bugingo Vincent	31	54
Gatete John	54	84
Murekatete Annet	87	45
Ingabire Grace	78	74

Table 5.1: ICT Marks from Learners' exercise

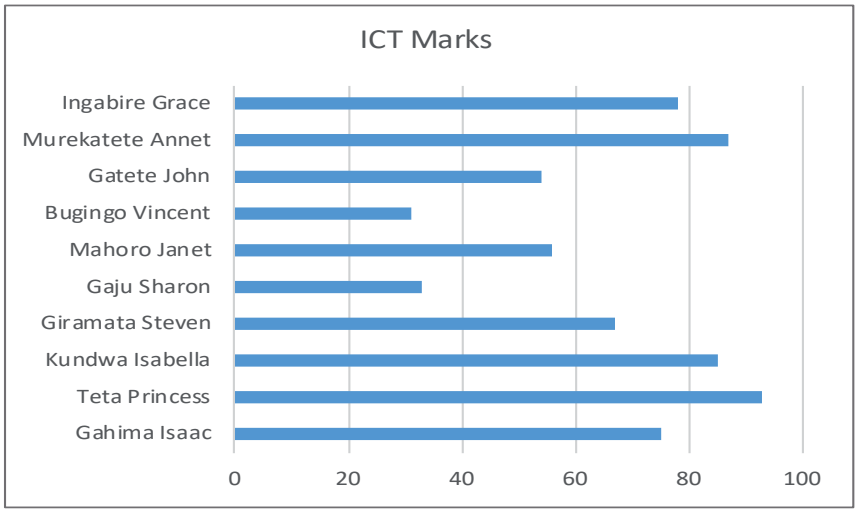
1. **Column chart:** A column chart displays data as vertical bars.
   If the data in table 5.1 above is entered in spreadsheet and a column chart created for ICT marks, it may appear as shown in picture 5.1.



Picture 5.1: Column chart

2. **Bar chart:** A bar chart represents data mainly as horizontal bars or objects.

   When the data in table 5.1 is used in MS Excel to create a chart, a bar chart for ICT marks may appear as shown in picture 5.2.



Picture 5.2: Bar chart

Difference between column and bar charts

A bar chart represents data using horizontal objects but a column chart uses vertical objects.

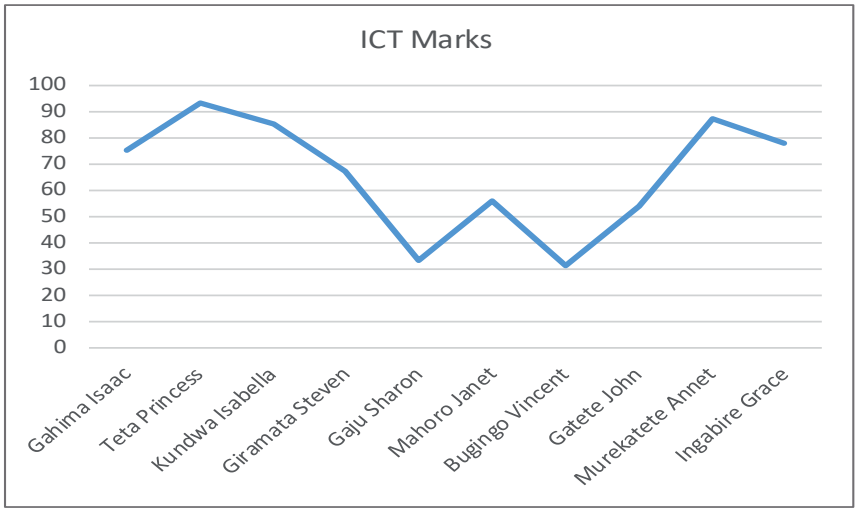
Similarity between column and bar charts

Both bar and column charts represent data using bars or columns to compare items. The length of each bar or column is proportional to the data that it represents. This means that a bar or column corresponding to a value of 100 would be twice as long as one corresponding to value of 50.

3. **Line chart (line graph)**

   A line chart is a graphic representation of data plotted using a series of lines.

   If the data in table 5.1 is used to create a line chart, it would appear as shown in picture 5.3.

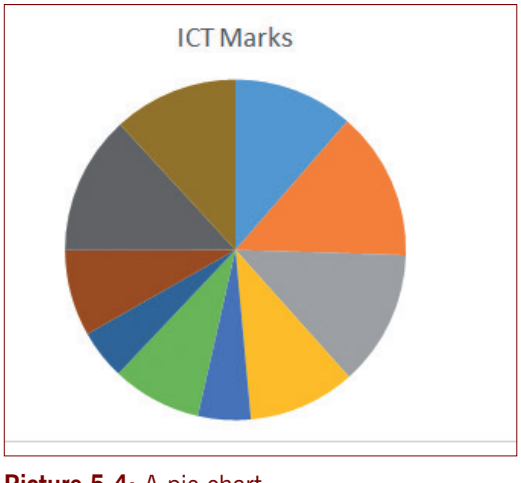


Picture 5.3: A line chart

4. Pie chart

Pie chart is a circular chart sliced into sections; each section represents a percentage of the whole. Pie charts do not display horizontal and vertical axes as other charts.

If the data in table 5.1 is used to create a pie chart, it would appear as shown in picture 5.4.



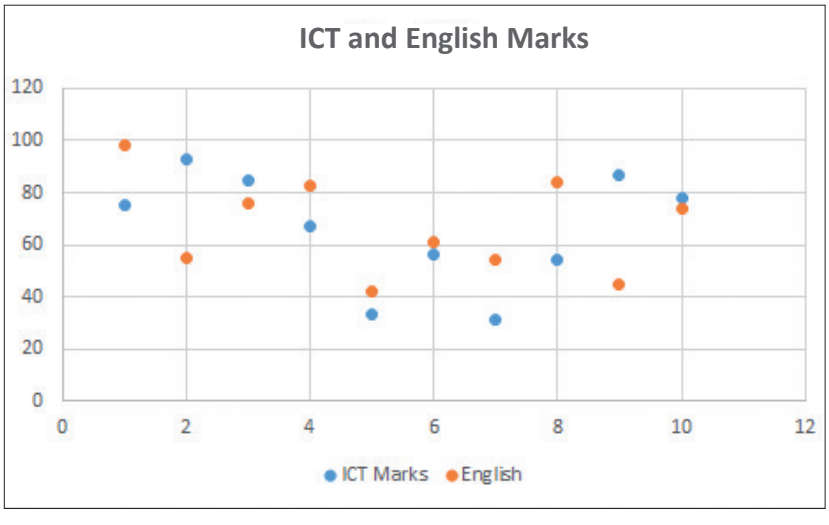
Picture 5.4: A pie chart

5. Scatter chart /graph

A scatterplot is graph of plotted points showing the relationship between two sets of data.

A *scatter (XY) plot* is a graph used to plot the data points for two variables. Each scatterplot has a horizontal axis (x-axis) and a vertical axis (y-axis). One variable is plotted on each axis.

If English marks are added to Table 5.1 to have two variables, then the scatter plot would appear as shown in picture 5.5.



Picture 5.5: A scatter plot

5.2 To create a chart in Microsoft Excel

There are several charts you can create and the common ones are; bar, pie, column and line charts. Common charts are illustrations that are frequently used to represent data in figures.

To create a chart follow the steps given below;

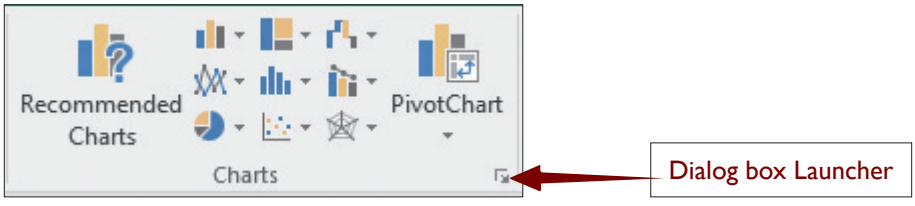
Step 1: Create or open an existing workbook with well-prepared numerical data. In this case open a file **ICT marks**.

Step 2: Select all the cell data you need to be represented in the chart (including all the labels and titles).

If the data is not nearby to each other, press **Ctrl** as you select other pieces of data.

Step 3: On the **Insert** tab, in the **Charts** group, click on the *chart type* you want (example is **Column**) and then click on the *sub type*

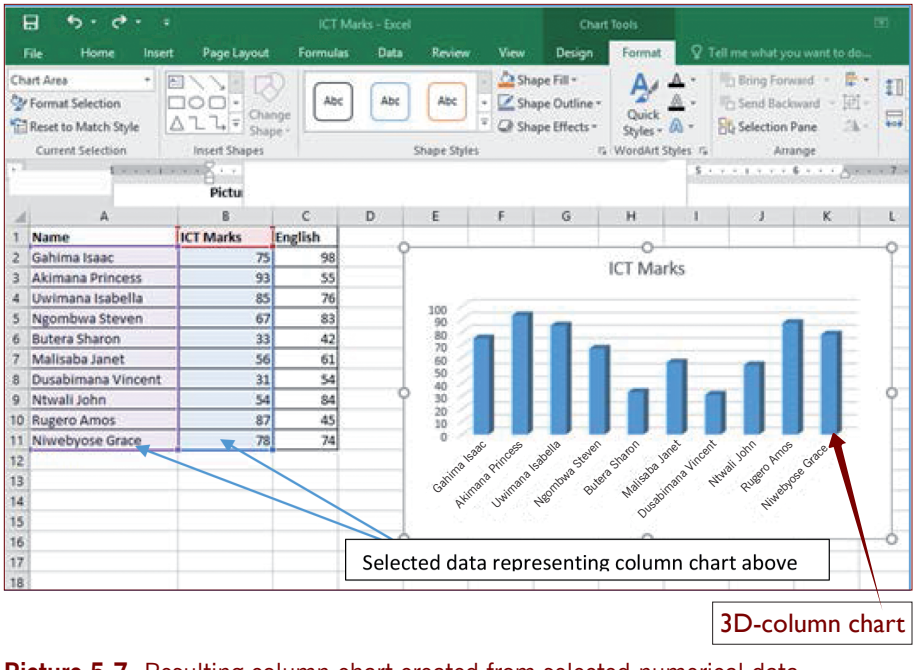
desired from the list that displays (example is **3-D Clustered column**).



Picture 5.6: Charts group of buttons on the Insert tab

Step 4: The new chart displays automatically as a **floating object** (*embedded chart*) in your data.

Using table 5.1, we create a 3-D column chart, and it appears as shown in picture 5.7.

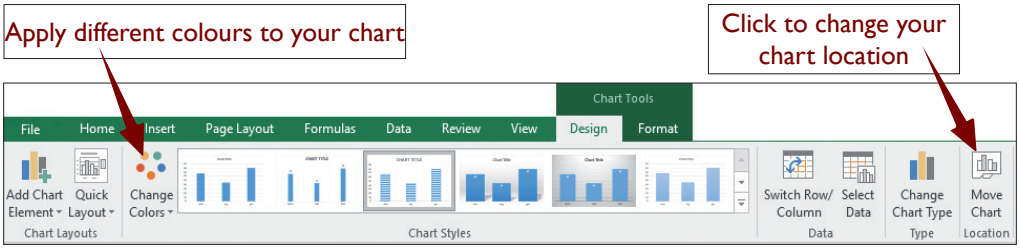


Picture 5.7: Resulting column chart created from selected numerical data

a) If you want the chart to remain in the sheet as object, drag it to appropriate position below or on the right of the data. You can also resize it.

b) If you want the chart to be on a separate sheet do the following:

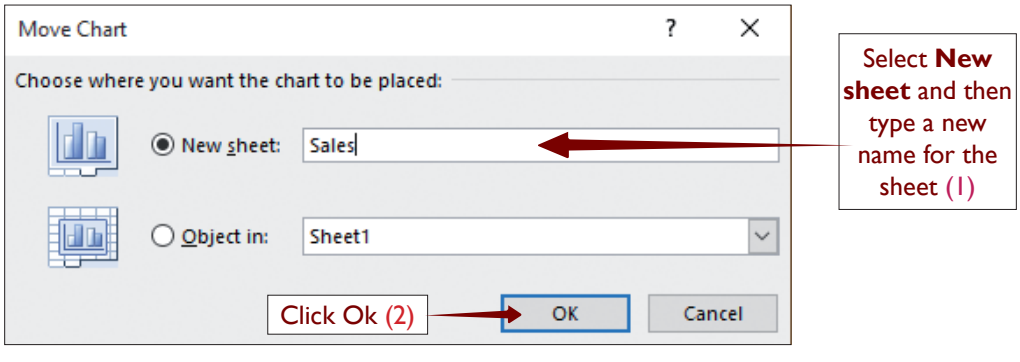
(i) On the **Design** tab (under *Chart Tools*), in the **Location** group at the right, click on the **Move Chart** button.



Picture 5.8: Chart tools on the Design tab

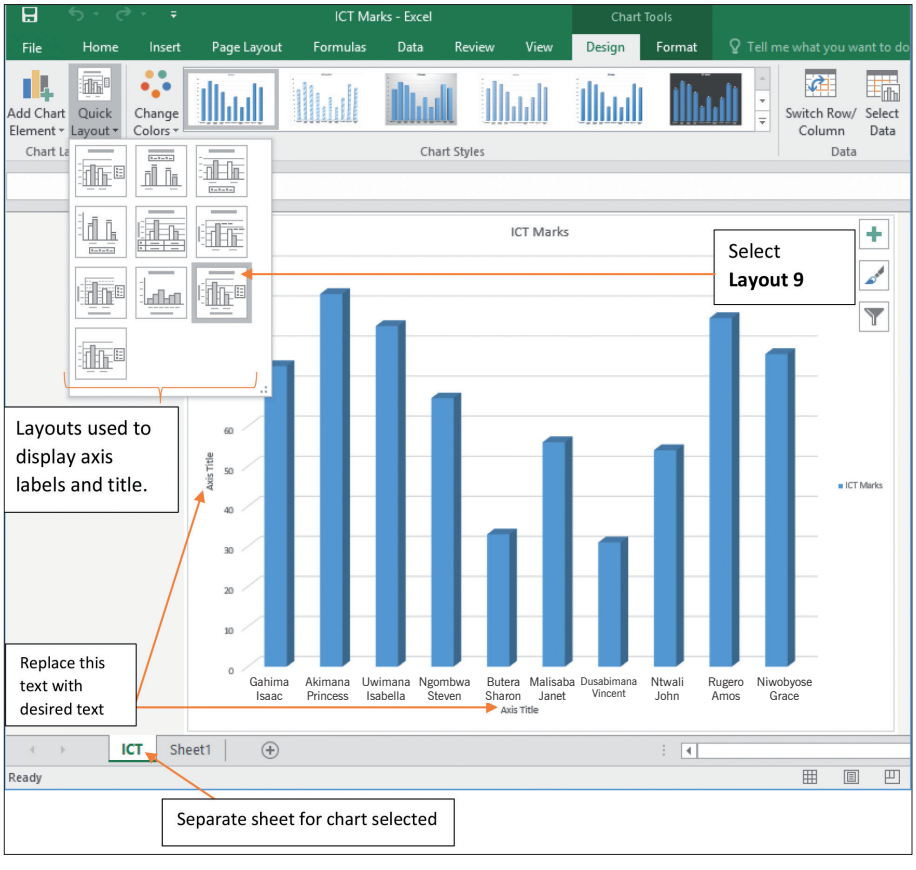
(ii) In the **Move Chart dialog box** that displays as shown below, choose where you want the chart to be placed and click **OK**.

> **Note:** Once you select data for charting, press F11 to place the chart on a separate sheet or press Alt + F1 to place it as an object in the sheet.



Picture 5.9: Move Chart dialog box with options for the placement of created chart

Step 5: The new chart will display on its page as shown in picture 5.10(a). Label your chart by applying chart title, x-axis title and y-axis title.



Picture 5.10 (a): Quick Layout menu with Layout 9 selected to apply to the chart

5.2.1 How to apply a predefined chart layout to your chart

Use the steps given below to apply chart layouts on the charts (column, bar and line charts) you created in Activity 5.1.

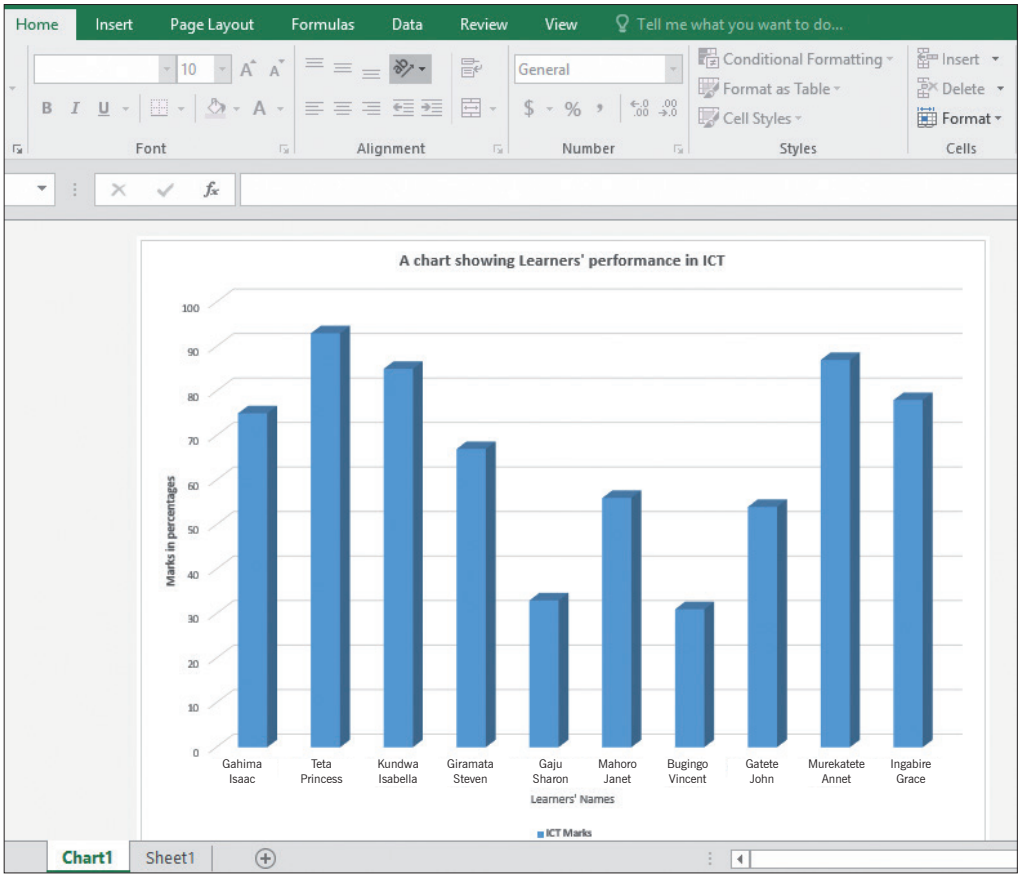
Step 1: Select the chart/graph.

Step 2: On **Design** tab, in the **Chart Layouts** group, click **Quick Layouts** button. On the list of layouts, select **Layout 9** (or you can select any other desired).

Step 3: Replace the default text in the **x-axis**, **y-axis titles** and **Chart title** with **learners' names**, **marks in percentages** and **a chart showing learners performance in ICT**, respectively.

> **Note:** For the chart to be easier to understand, titles must be added i.e. chart title and axis titles.

If the column chart in Activity 5.1 is changed to a 3-D column chart and labelled, it appears as shown in the screenshot. See picture 5.10(b).



Picture 5.10 (b): A labelled 3-D column chart on a separate sheet

Activity 5.2

1. Organise the following data in Microsoft Excel.

Month	Mean Temperature (°C)	Mean Rainfall (mm)
January	5.6	3.5
February	7.2	7.5
March	7.5	7.2
April	9.5	8.9
May	13.8	12.5
June	16.5	25.9
July	17.5	28.6
August	17.9	29.7
September	18.7	32.8
October	18.9	35.2
November	19	9.5
December	19.2	5.3

Table 5.2: Rain – temperatures Data

a) Create a 3-D line chart to display information in table 5.2.

b) Apply labels and title on your chart. Save your work as **'Rain-temperatures'** and print your work.

2. The data in table 5.3 shows Animal data between the years; 1991 and 2000. Enter the following data using Microsoft Excel.

Year	Sheep	Cattle	Goats	Pigs
YR 1991	29,505	48,575	85,950	121,056
YR 1992	35,850	55,679	98,750	132,980
YR 1993	48,599	67,692	105,670	157,091
YR 1994	1,345	5,431	9,257	4,690
YR 1995	2,984	9,429	15,790	6,900
YR 1996	3,695	10,764	21,052	10,950
YR 1997	4,675	13,075	32,109	15,070
YR 1998	5,250	15,872	39,027	25,900
YR 1999	5,664	18,546	45,830	35,092
YR 2000	6,679	23,005	56,049	38,950
Lowest number				
Highest number				
Average number				

Table 5.3: Animal data

a) Copy the information above onto sheet 2 and then include one decimal place on all the figures.

b) Apply a suitable border on all the data.

c) Determine the lowest, highest and average livestock for each category given.

d) Use appropriate range of data series to represent the data for the year 1991 on a pie chart . Place your chart on a separate sheet and name the sheet **YR1991.**

e) Represent the data for the years; 1991, 1992, 1993, 1994, 1995, 1996 and 2000 on a 3D- column chart.

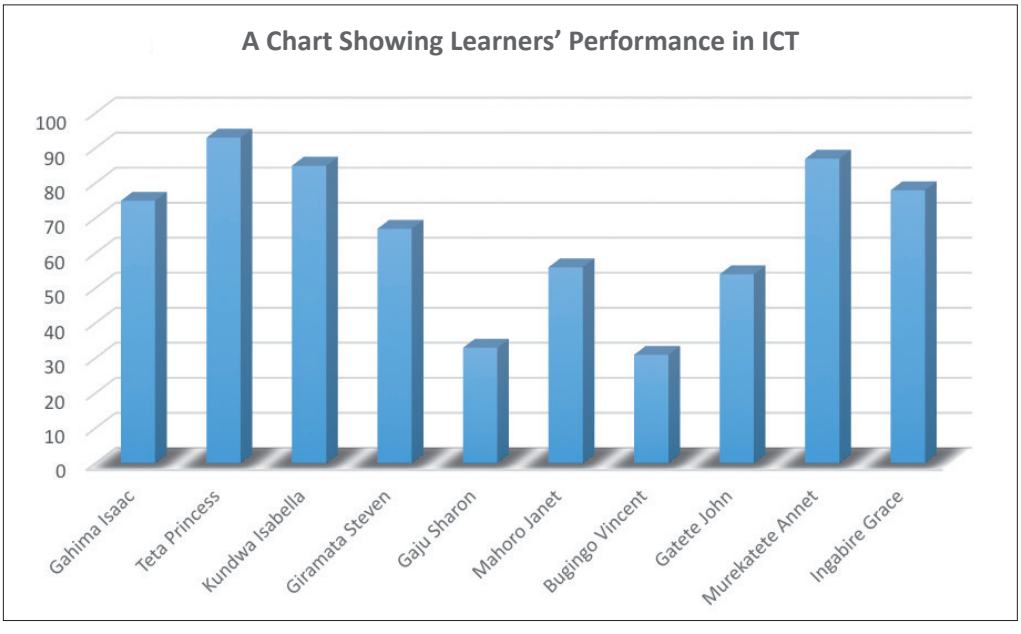
5.2.2 How to apply a predefined chart style

A style is a format clearly created which you can use to improve appearance of your chart. Follow the steps below, using the chart you created in Activity 5.1.

Step 1: Click in the **Chart** that you want to apply a style. The **Chart Tools** will display.

- On the **Design** tab, in the **Chart Styles** group, click the chart style you want to use.

If a chart style is applied to picture 5.1 we created in Activity 5.1, the results are shown in picture 5.11.



Picture 5.11: A chart on which a style has been applied

5.2.3 Creating a combination chart

A combination chart contains data series plotted using more than one type of chart.

We are going to group to use the data below to create a combination chart.

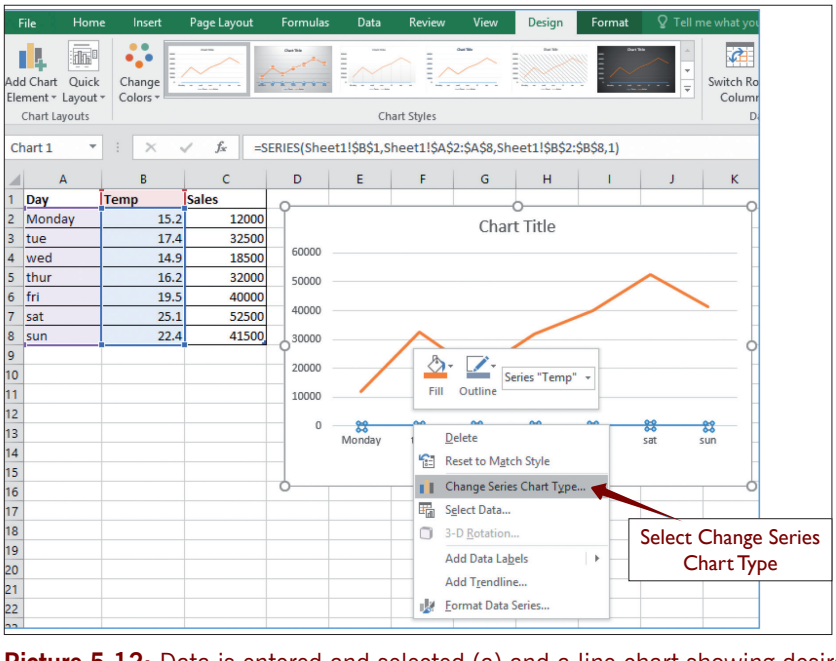
Day	Temp	Sales
Monday	15.2	12000
Tuesday	17.4	32500
Wednesday	14.9	18500
Thursday	16.2	32000
Friday	19.5	40000
Saturday	25.1	52500
Sunday	22.4	41500

Table 5.4: Data about Sale unit versus Temperature of the day

Steps to create a combination chart

Step 1: Create a chart containing all the data you want.

Start by entering the data in spreadsheet software and save it as **Comb**.

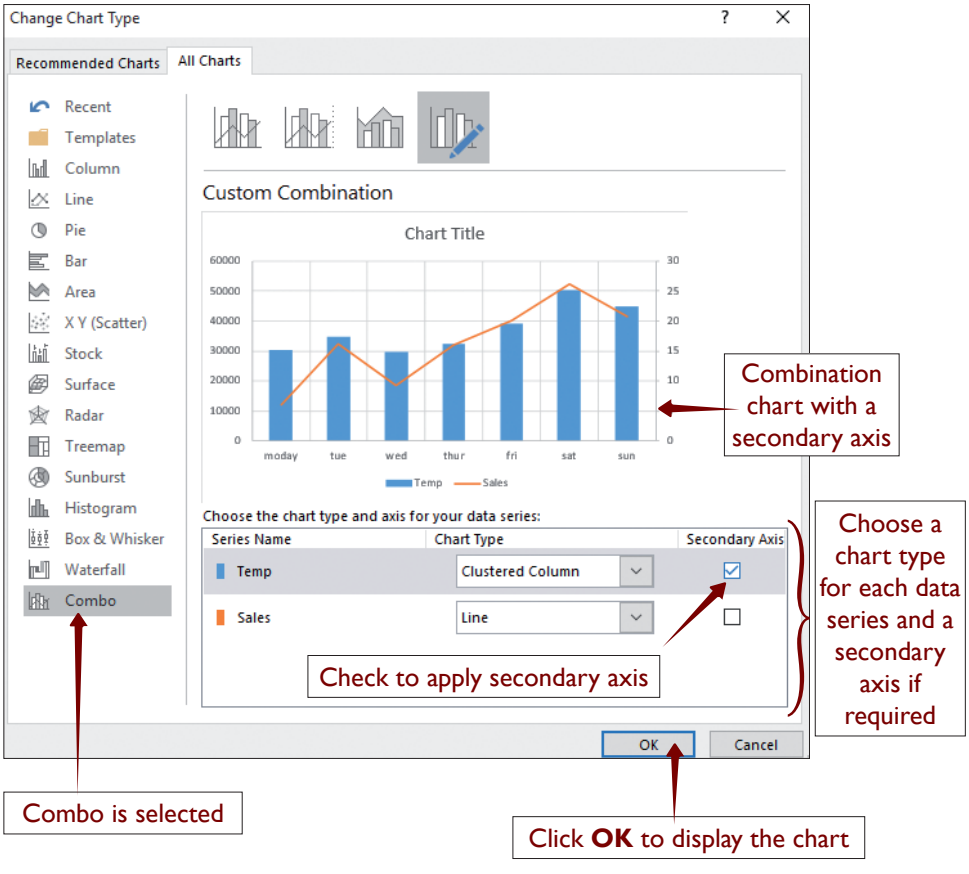


Picture 5.12: Data is entered and selected (a) and a line chart showing desired data series right clicked (b)

Step 2: Right click on the data series you want in the chart.

Step 3: Select the **Change Series Chart Type** from the shortcut menu.

Step 4: Select a different chart type and then observe the changes.



Picture 5.13: A Custom combination chart

> **Note:** When a combination chart is created, it is important you apply two vertical scales.

5.2.4 Change chart type

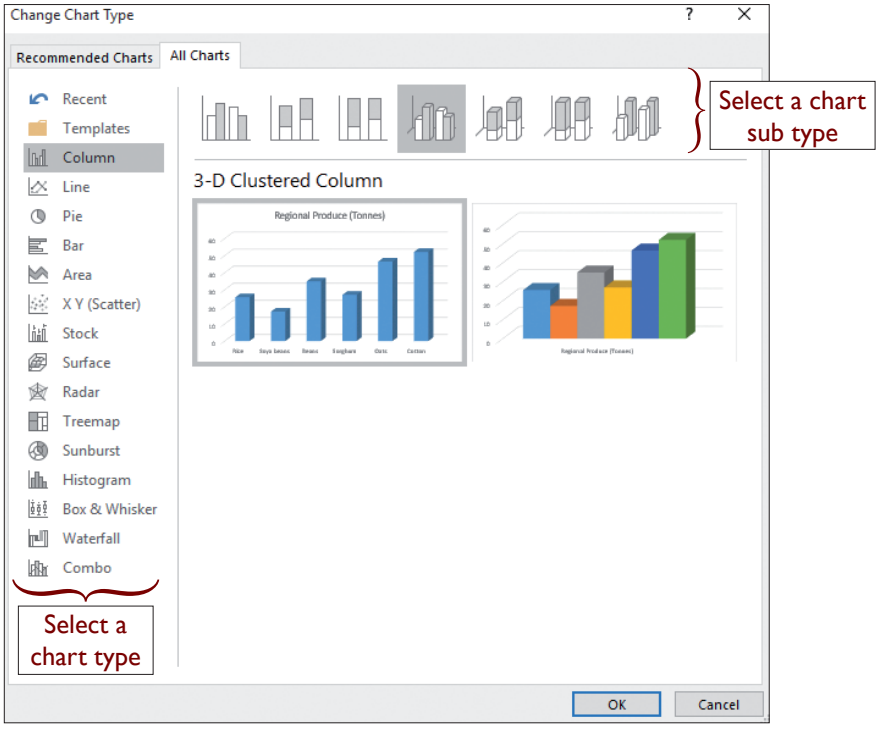
We are going to use **ICT marks** file to change chart type. Begin by opening the column chart as picture 5.10(b) and follow the steps given below.

Step 1: Select the chart you want to change.

Step 2: On the **Design** tab in the **Type** group, click **Change Chart Type.**

You can also right click the chart and select **Change Chart Type.**

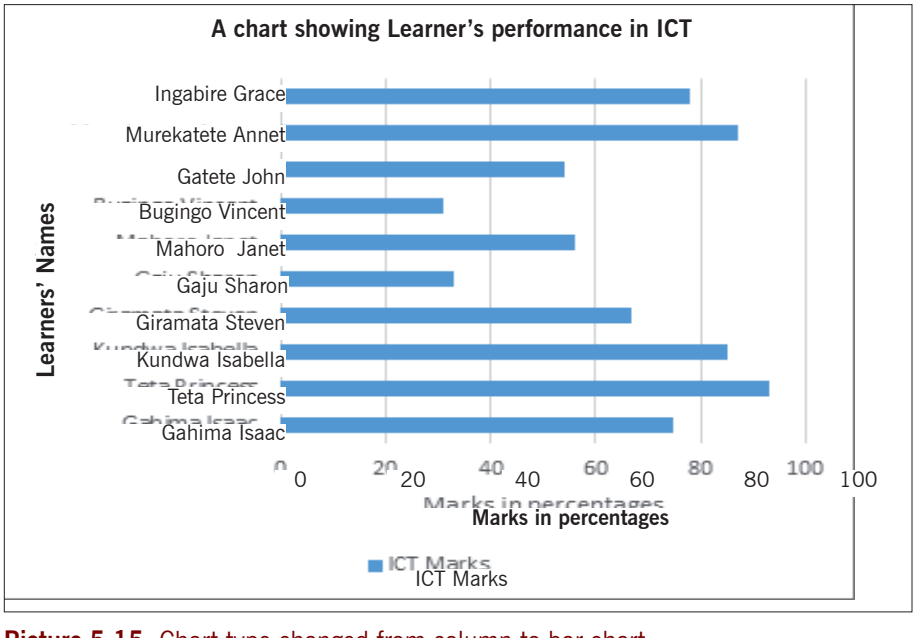
Step 3: In the **Change Chart Type** dialog box that displays, select the **chart type** and **sub type** you want.



Picture 5.14: Change Chart Type dialog box

Step 4: Click **OK.**

In case you select a Bar Chart, the resulting chart will appear as shown in picture 5.15.



Picture 5.15: Chart type changed from column to bar chart

Activity 5.3

Create the following data in Microsoft Excel as it is and save it as **Exam Results.** The figures are in percentage pass at credit level.

Ordinary Level Examinations Results for 2016		
Subject	**Boys**	**Girls**
Biology	36.6	30.49
Physics	29.8	22.27
Chemistry	32.5	23.4
ICT	36	38.9
Geography	19	29.2
Mathematics	28.79	25.6
Kiswahili	38	38.3
Kinyarwanda	27.7	28
Business Studies	26	26
English	33	38

Table 5.5: Ordinary Level examinations data

a) Set the number of decimal places to 1.
b) Create a 3D-clustered column chart on a separate sheet to display the data given in the table above. Name the sheet as '3D results'.
c) Apply a chart layout that includes all **titles** to your chart.
d) Format the plot area to a **pattern fill** having a **yellow** *(50%)* colour in the foreground and **white** in the background.
e) Change the fill colour for Data Series '*Boys'* to purple and '*Girls'* to a **gradient fill** with a **red** colour and **black** colour.

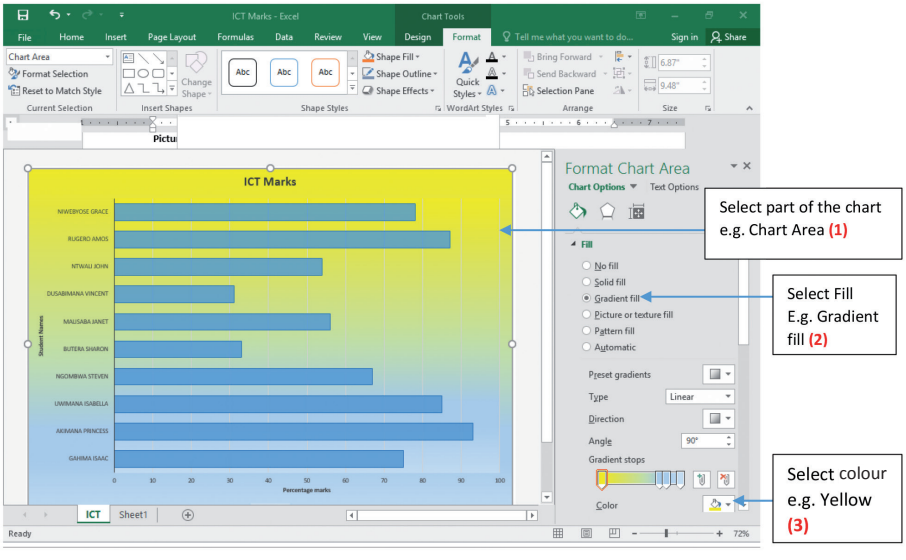
5.3 Formatting chart

To format a chart is to change the appearance of a chart so as it looks attractive. You can format chart background colours and patterns, legend, axis and labels. Now open **ICT marks** file to get a saved bar chart, as shown in picture 5.15.

Follow the steps below to format chart

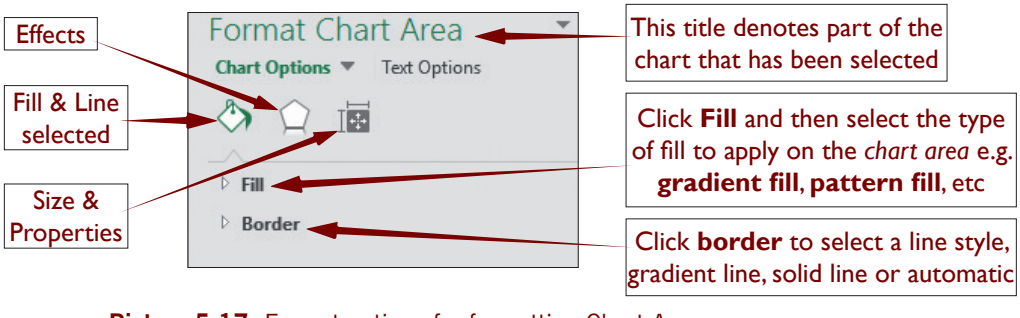
Step 1: Create or open an existing chart in MS Excel.

Step 2: Click or select any part of the chart e.g. Chart Area, legend, horizontal axis or horizontal axis title, vertical axis or vertical axis title, data series, etc.



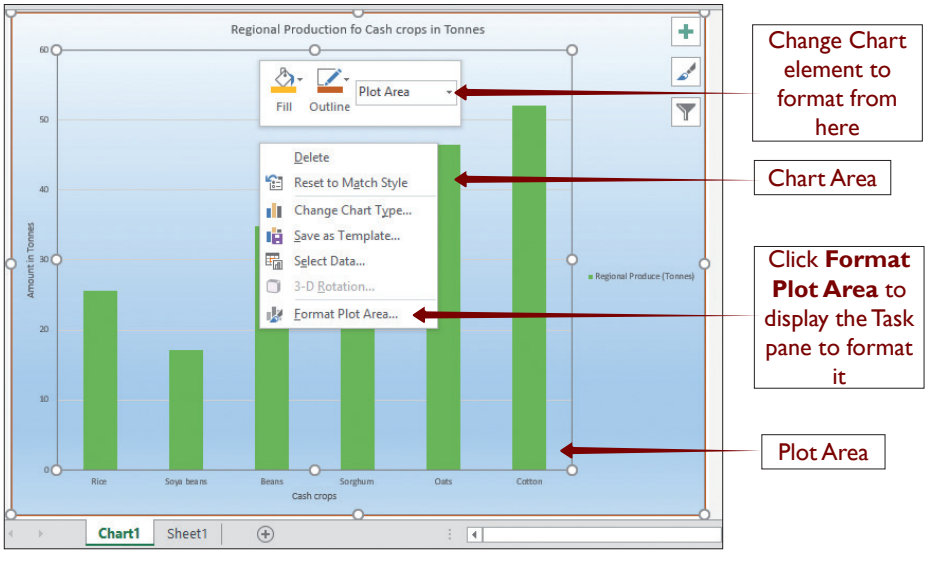
Picture 5.16: A chart whose area has been formatted

Step 3: On **Format** tab, in the **Current Selection** group click **Format Selection**. The **task pane** displays (on the right of Excel window) showing **Chart Options** to **format** *Chart Area*. The task pane displays Chart Options depending on the part you have selected.



Picture 5.17: Format options for formatting Chart Area

Alternatively, you can format a chart quickly by right clicking on any part of the chart you want to format. In the Shortcut menu, select **Fill Colour** or **Line colour** you want.



Picture 5.18: Plot Area of a column chart right-clicked to display shortcut menu

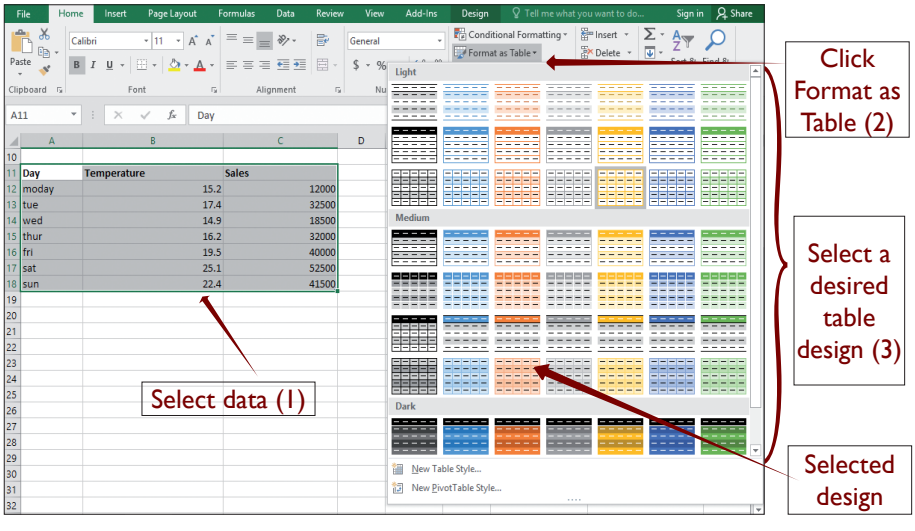
5.4 Format cell data as a table

Cell data is any piece of data you want to format as a table contained within spreadsheet cells.

Steps to format cell data as table

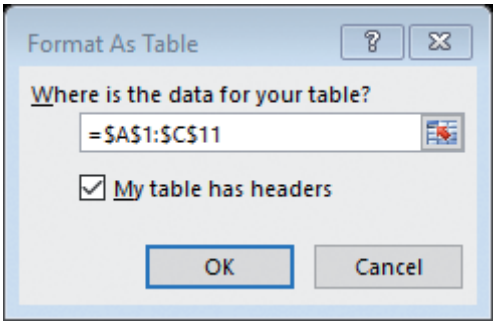
Step 1: Select the spreadsheet data you want to format as table or click in it (must be nearby each other). In this case, open **Comb** file.

Step 2: On the **Home** tab, in the **Styles** group, click **Format as Table** drop down list and select a desired table style from the list.



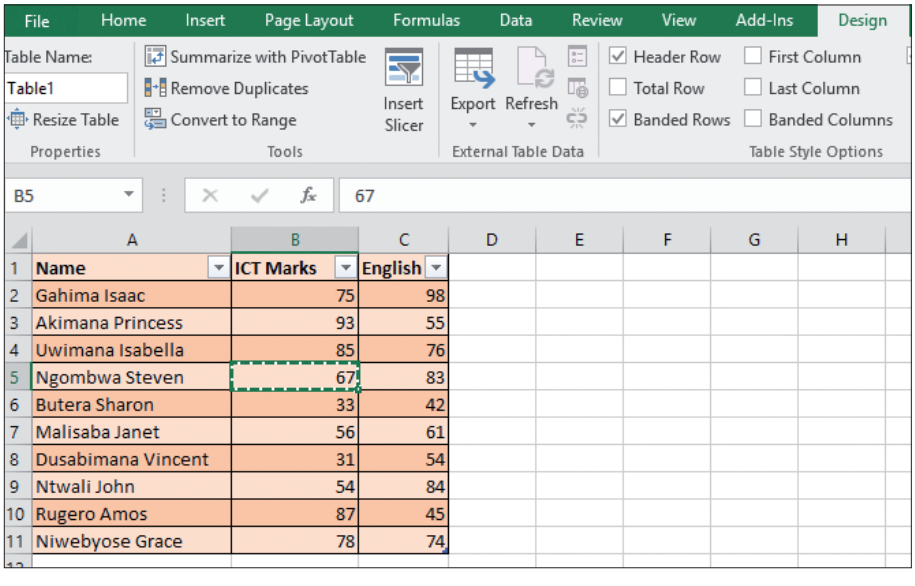
Picture 5.19: Selected data to be formatted as a table using inbuilt table designs

Step 3: **Format as Table** dialog box appear, click **OK**.



Picture 5.20: Format as Table dialog box

Step 4: Table Tools display on the **Design** tab. Use Table tools to modify your table as desired.



	A	B	C	D	E	F	G	H
1	Name	ICT Marks	English					
2	Gahima Isaac	75	98					
3	Akimana Princess	93	55					
4	Uwimana Isabella	85	76					
5	Ngombwa Steven	67	83					
6	Butera Sharon	33	42					
7	Malisaba Janet	56	61					
8	Dusabimana Vincent	31	54					
9	Ntwali John	54	84					
10	Rugero Amos	87	45					
11	Niwebyose Grace	78	74					

Picture 5.21: Data in comb file formatted as table

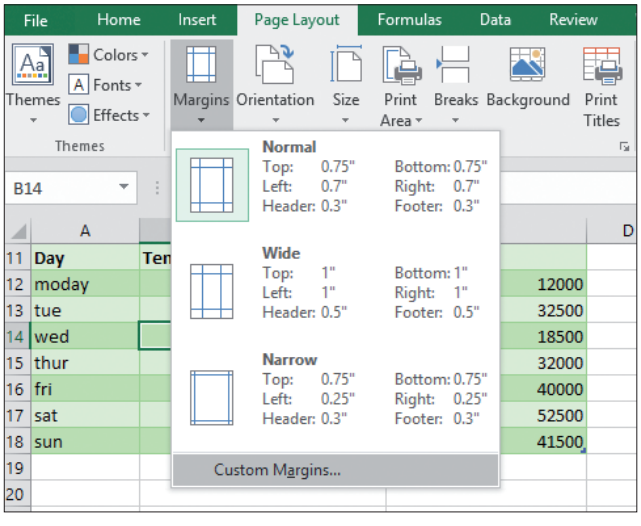
5.5 Printable datasheet

Before you print a worksheet, it is important that you set a print area. Printing is the action of producing a hardcopy information using a printing machine such as a printer or printing press. Page setup options control the layout of a printed sheet and therefore must be used before a worksheet is printed. Page setup options include; margins, headers and footers.

5.5.1 To set page margins

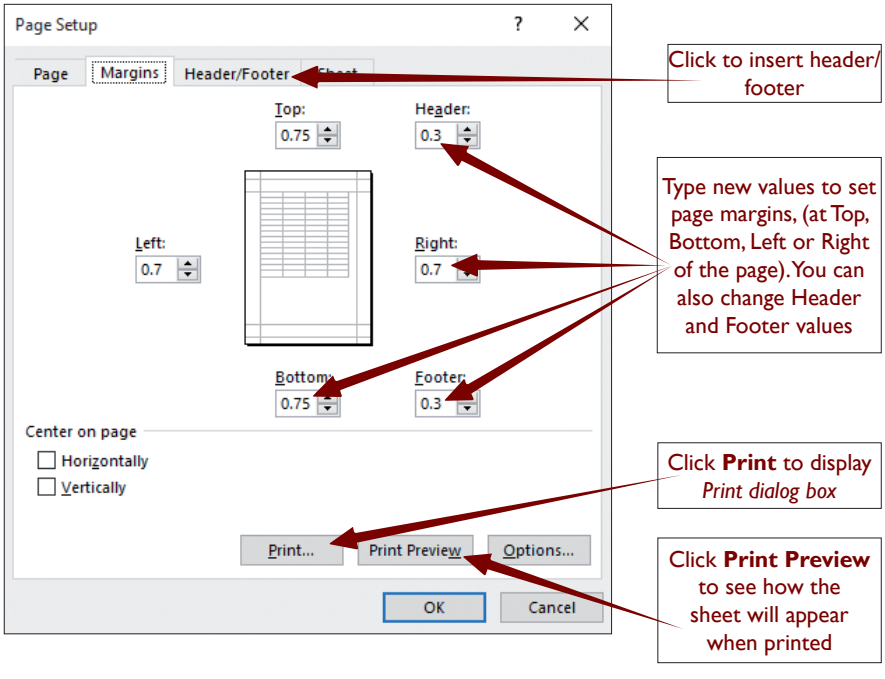
Use the data given in Comb file and use it to set page margins. Follow the following steps.

Step 1: On the **Page Layout** tab, in the **Page Setup** group, click **Margins** and in the menu select "**Custom Margins**".



Picture 5.22: Part of MS Excel window showing how to access **Custom Margins** on **Page Layout** tab

Step 2: In the **Page Setup dialog box** for **Margins**, increase or reduce the margins and click **OK**.



Picture 5.23: Page Setup dialog box displaying features for changing page margins

5.5.2 Set headers and footers

A header is information printed at the top of every page and footer is information printed at the bottom of every page. Headers are suitable for Company names, page titles; footers are good for page numbers and printout dates or times.

> **Note:** Headers and footers are not displayed on the worksheet in normal view.

On ordinary worksheets you can Insert header/footer by clicking on **Insert** tab, in the **Text** group, click **Header/Footer**. Automatically the cursor goes in the centre of the header.

Insert header/footer (for chart sheet)

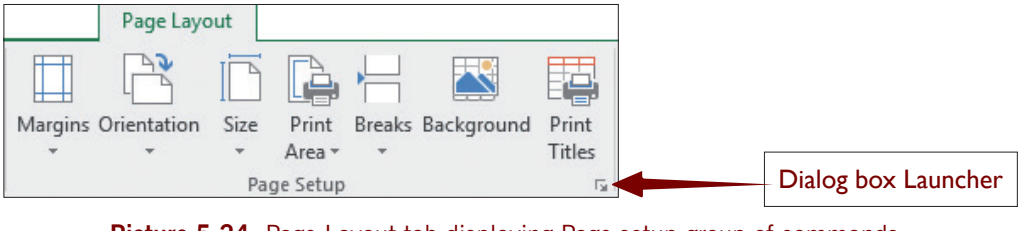
Follow the steps given below to insert header and footer.

Step 1: On the **Page Layout** tab, in the Page Setup group, click ***dialog box Launcher.***

Step 2: In the Page Setup dialog box that displays, click on **Header/Footer** tab.

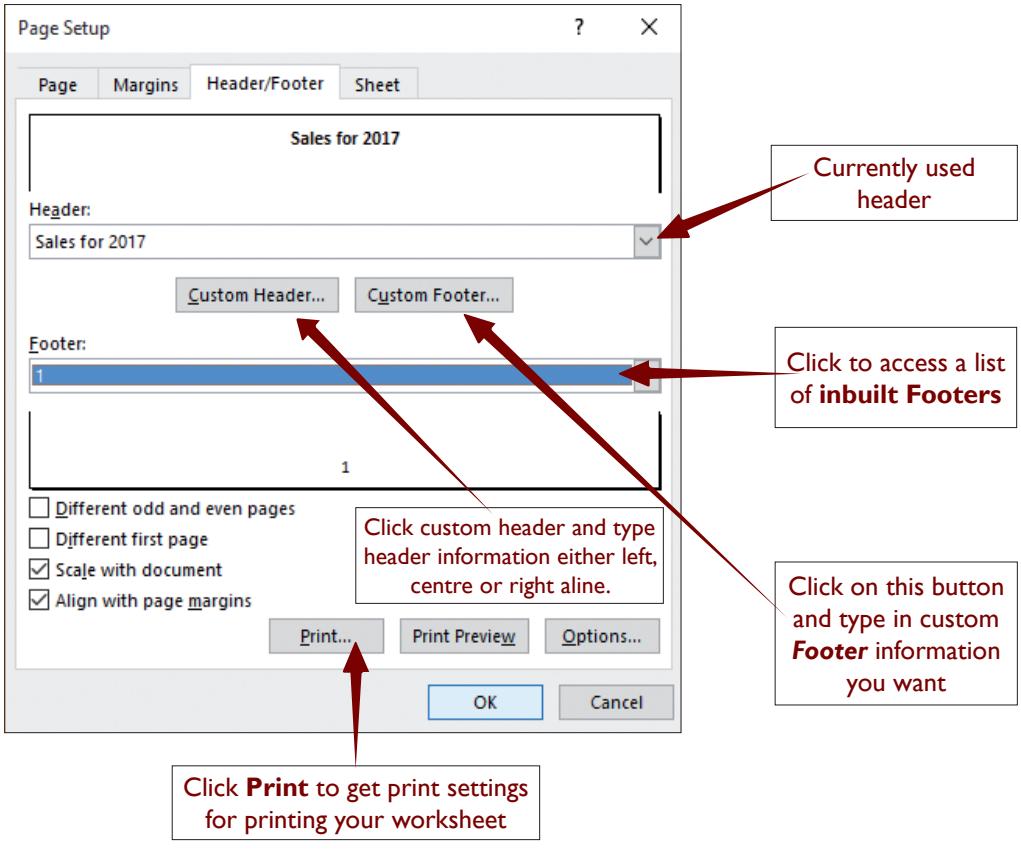
Step 3: Click on **Custom Header** to insert your header or **Custom Footer** to insert footer.

Step 4: Click in the **Left section**, **Centre section**, or **Right section** box, and then click the buttons to insert the header or footer information that you want in that section.



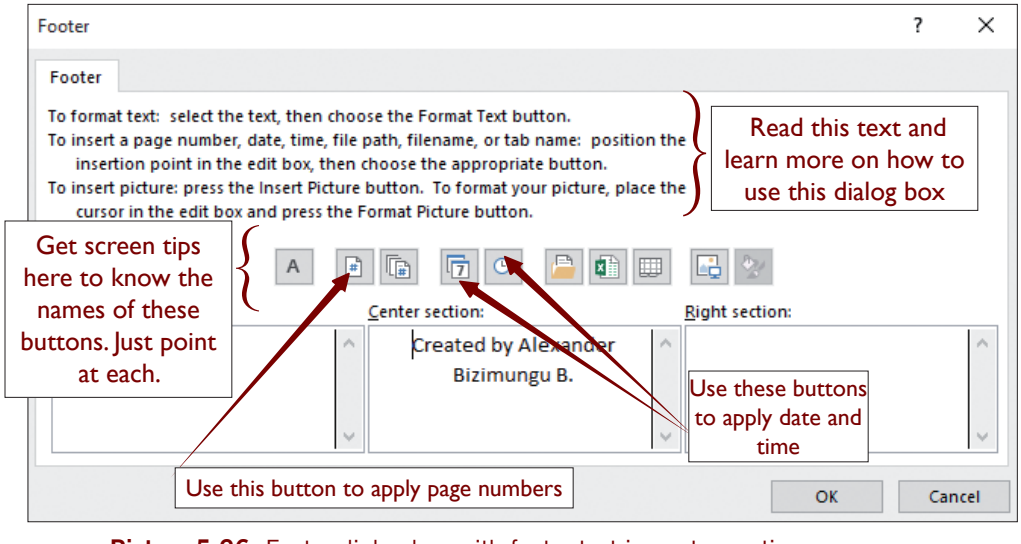
Picture 5.24: Page Layout tab displaying Page setup group of commands

The page setup dialog box is shown in picture 5.16, if you click either **Custom Header or Custom Footer**, the Header or Footer dialog box displays. To add or change the header or footer text, type additional text or edit the existing text in the **Left section**, **Centre section**, or **Right section** box.



Picture 5.25: Page Setup dialog box displaying Header/Footer options

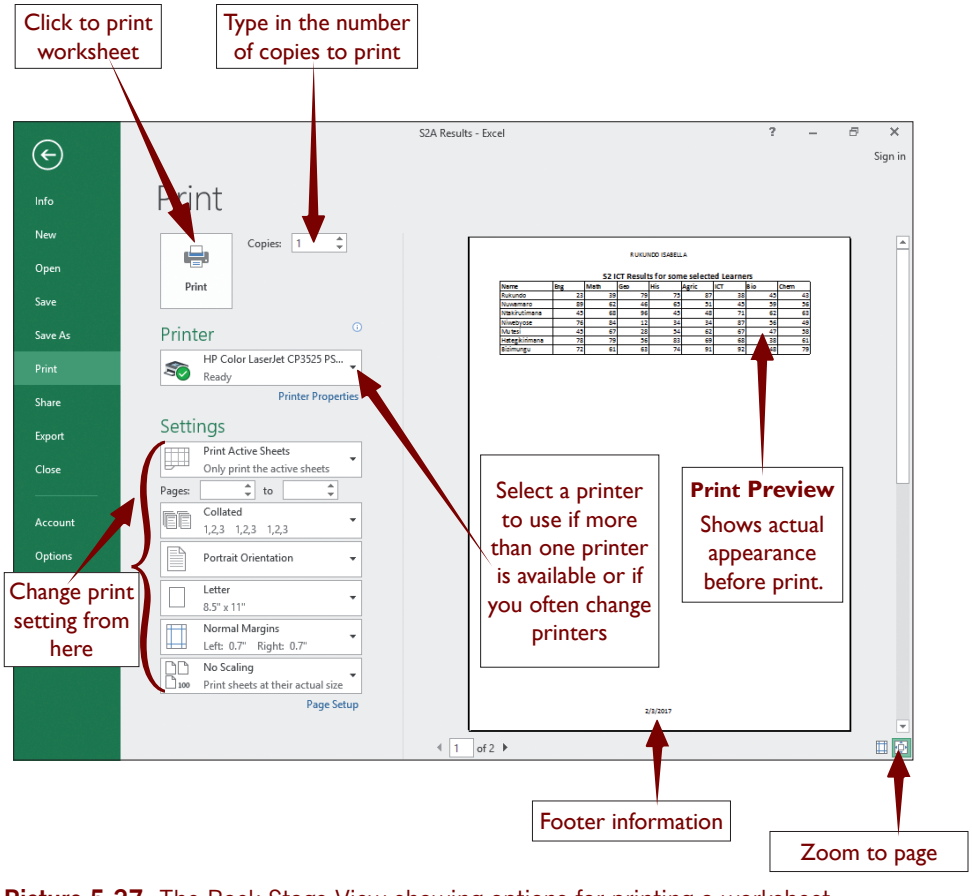
When you click on Custom Header or Custom Footer you get a *Header* and *Footer* dialog box respectively. When you use these dialog boxes, you can position your text or object in the left, centre or right section of the page in the header and footer.



Picture 5.26: Footer dialog box with footer text in centre section

Header/Footers are displayed only in **Page Layout** view and on the printed pages. You can insert headers or footers in **Page Layout view** where you can see them, or you can use the **Page Setup dialog box** if you want to insert headers or footers for more than one worksheet at the same time.

For other sheet types, such as chart sheets, you can insert headers and footers only by using the **Page Setup dialog box**.



Picture 5.27: The Back Stage View showing options for printing a worksheet

In Microsoft Excel 2016, when you want to print or get a print preview, you always get the same screen similar to the one in the picture above. On **File** tab, click Print or press **Ctrl + P** on keyboard.

The following important commands are available in the screen

Zoom: Magnifies the page to actual size. This button is located on the lower right.

Print: Sends a copy of the worksheet to the default printer.

Page Setup: Displays page setup dialog box.

5.5.3 Print area

This is one or more ranges of cells that you designate to print when you don't want to print the entire worksheet. This means only the print area set is printed.

A worksheet can have multiple print areas. Each print area will print as a separate page.

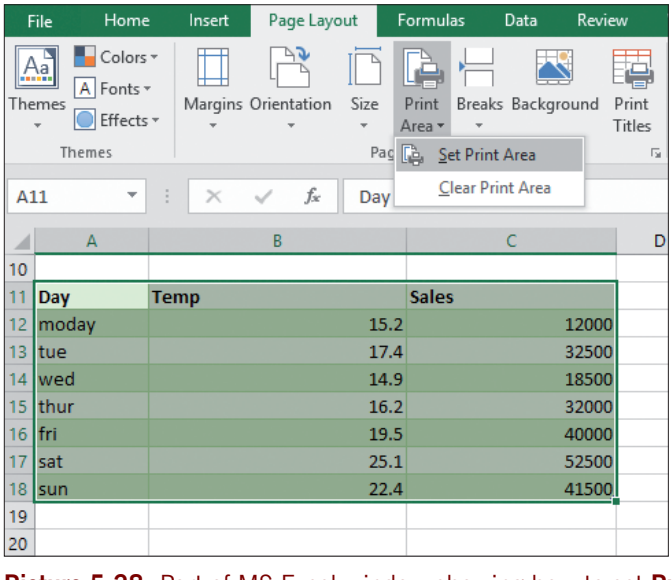
To define or specify the print area

Use the steps given below to specify print area. Use data give below.

Step 1: Create or open an existing worksheet.

Step 2: Select the cells you want, define as print area (data range).

Step 3: On the **Page Layout** tab, in the **Page Setup** group, click **Print Area**, and then click **Set Print Area.**



Picture 5.28: Part of MS Excel window showing how to set **Print Area** from **Page Layout** tab

> **Note:** A line around the data marks the print area. When you save a worksheet the print area is also saved.
>
> Use the same steps given above to **add** *and* **clear** the print area.

5.5.4 Printing a Chart

If you want to quickly print the chart which is part of the data, select/click it and press **Ctrl** + **P** on keyboard. Click **print** button to print using default printer.

If the chart is on a separate sheet; select Print on the **File** tab, then click **print** button to print from default printer.

End of Unit 5 Assessment

1. A business consultancy firm advertises in the local newspaper and it spends different amounts of money on advertising and records the number of appointments booked from different adverts as shown in table below.

   Required

   Produce a scatter graph (with smooth lines and markers) from the data given in table below to see any correlation between the amount spent on adverts and the appointments booked.

Amount spent on adverts in (Rwanda Francs)	Number of appointments booked
15,000	47
25,000	48
35,000	60
50,000	65
85,000	100
120,000	180
150,000	200
250,000	420

Table 5.6: Business data on consultancy firm

   Label and save your graph as 'business'.
   Print your graph.

2. Use a suitable spreadsheet software on your computer and enter the following data beginning from cell A1 on sheet1. Save the file as **Results**.

	A	B	C	D	E	F	G
1	Name	English	Science	Math	Social Studies	Total	Average
2	Gatete Isaac	78	98	87	76		
3	Teta Princess	90	55	90	98		
4	Keza Isabella	85	76	65	54		
5	Bugingo Stephen	67	83	34	76		
6	Ingabire Sharon	33	42	12	84		
7	Mutesi Janet	56	61	45	91		
8	Kwizera Vincent	21	54	87	43		
9	Gisa John	54	84	54	65		
10	Giramata Amos	83	95	32	83		
11	Mugisha Grace	74	74	54	93		
12							

Table 5.7: Data on examination results

Required

a) Create a 2D-clustered column chart to represent learners' performance in Science and Social Studies. Label your chart correctly on a separate sheet. Name the Sheet as 2ESS. Format your chart appropriately.

b) Create a 3D-clustered column chart to represent all learners' performance in the four subjects. Place your chart on a separate sheet you name as 'Comparison'. Format your chart as desired.

c) Use a suitable formula to calculate the total marks and average marks in the total column and average column respectively. Represent the total and average marks on a stacked line chart. Place the chart as an object on sheet2.

d) Create a pie chart as an object on sheet3 to represent the performance of learners in Math only.

3. Mrs Gaju has a wholesale shop selling Mineral water. The shop is located in one of the suburbs of Kigali City. Last week she decided to record track of how many bottles of mineral water she sells versus the noon temperature of that day. The figures for 7 days are as shown below:

Mineral water vs Temperature	
Temperature °C	**Mineral water (Rwanda Francs)**
15.2	1200
17.4	3250
14.9	1850
16.2	3200
19.5	4000
25.1	5250
22.4	4150

Table 5.8: Data on Gaju's sales

a) Organise the data in a spreadsheet and save it as **Gaju sales**.
b) Create a combination chart (temperature with a column chart and sales on a line chart). Apply different vertical scale for sales, a chart on a separate sheet. Name sheet as 'mineral water'.
c) Apply titles or otherwise use a suitable **Quick layout** on your chart that can make it more organised.
d) Insert header as your Names and footer as Page numbers.
e) Print your charts on separate sheets that contain suitable headers.

APPLICATION SOFTWARE

Presentation

Unit 6

Presentation

Key Unit Competence

Prepare and make a presentation.

6.1 Presentation

A *presentation* is an organised report or message prepared as a talk before audience, with the help of a computer program. Examples of programs/software which you can use to create presentations include among others the following: Microsoft PowerPoint, Harvard Graphics, Corel Presentations, Open Office .org Impress, Lotus Freelance Graphics, Kingsoft Presentations, etc.

Presentation software is a program used to create slide shows for presentation on screen to an audience. Presentation program/software can supplement or at times can replace use of visual aids like handouts, chalkboards, posters, etc.

6.1.1 Role of presentation applications

- Conveying information about an important issue such as disease control measures.
- Introducing a new idea for business.
- Reporting progress using charts or graphs.
- Training by demonstrating how it is done by using screen recorder or animation programs.

6.1.2 Working with (Microsoft) PowerPoint presentation

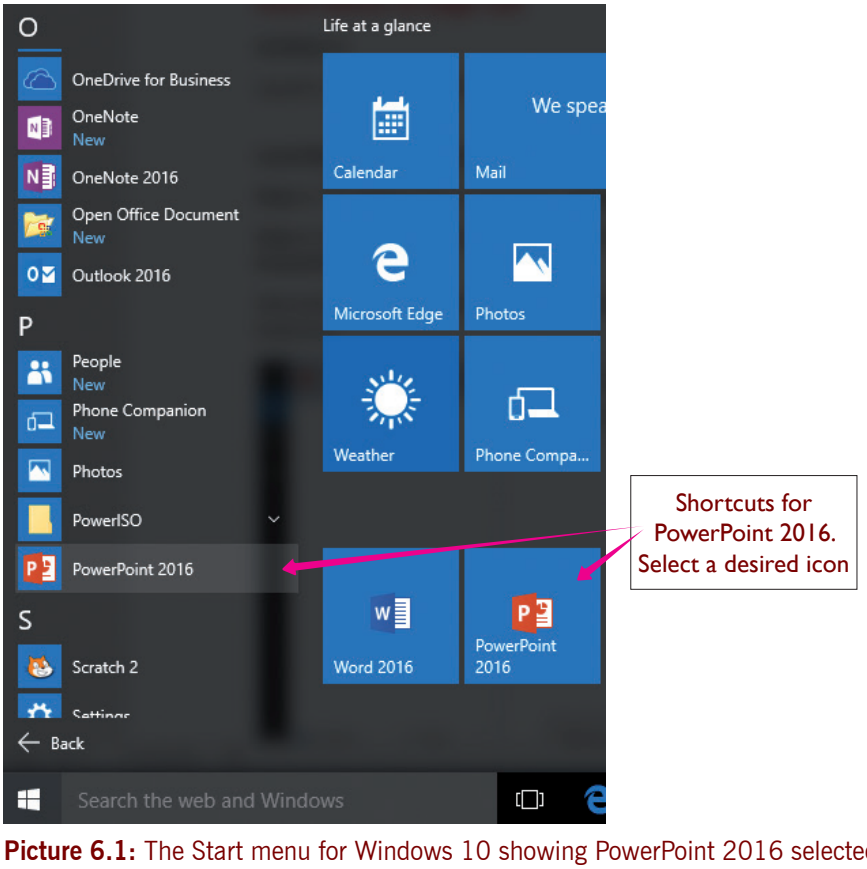
Microsoft PowerPoint is a presentation graphics software commonly used when you plan to give a talk as a presentation. The purpose of the talk may be to inform, create awareness, present strategies or to sell a product or service. PowerPoint presentations can be done on computer screen if the audience is very small. If the audience is large the computer can be connected to a projector that projects the image onto a large screen/wall.

Using PowerPoint, you can create speakers' notes or handouts for conveying information to the audience.

When using Microsoft PowerPoint, the data file you create is known as a **Presentation**. Each presentation is made up of one or more slides. In the case of this unit PowerPoint 2016 is going to be used.

6.1.3 Launching Microsoft PowerPoint presentation

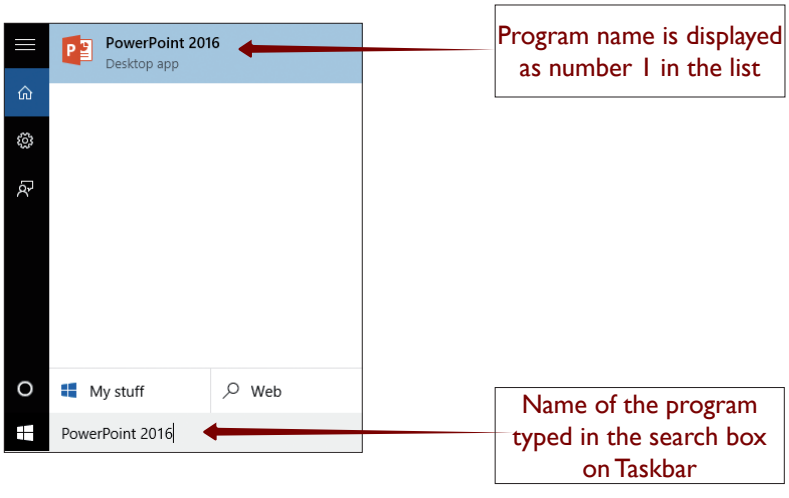
Step 1: Click **Start** button and select **All apps**



Picture 6.1: The Start menu for Windows 10 showing PowerPoint 2016 selected

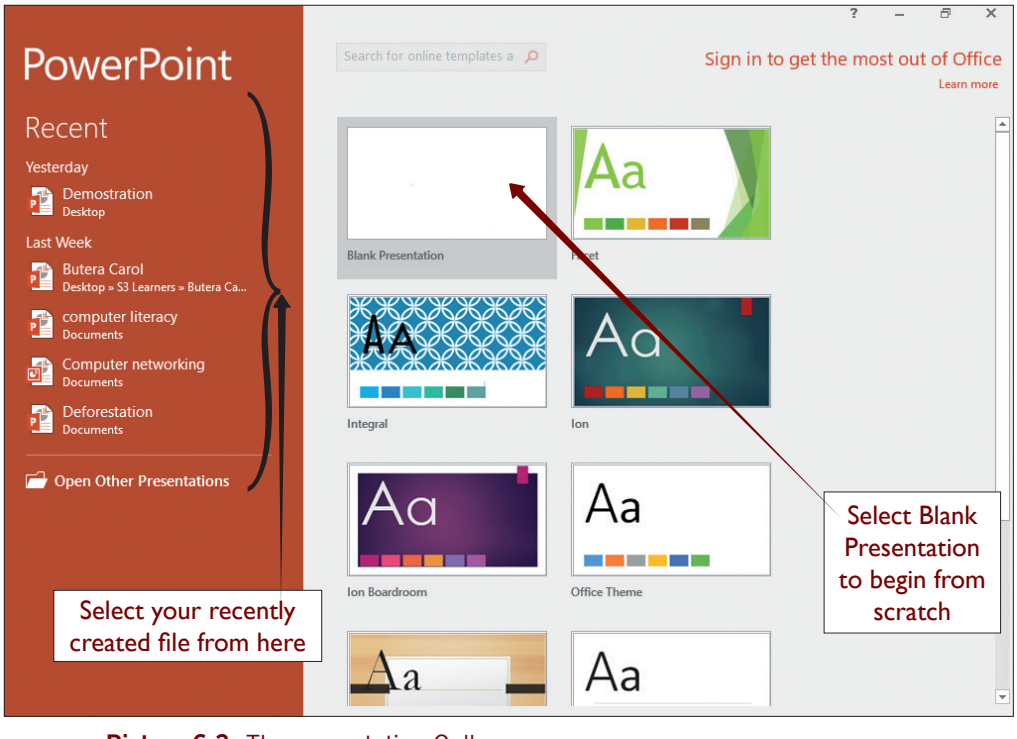
Step 2: Scroll down and select **PowerPoint 2016** (or click **Microsoft Office** and then select **Microsoft PowerPoint**).

Alternatively click in the *Search box on Taskbar*, type in **PowerPoint 2016** and press **enter** key on your keyboard.

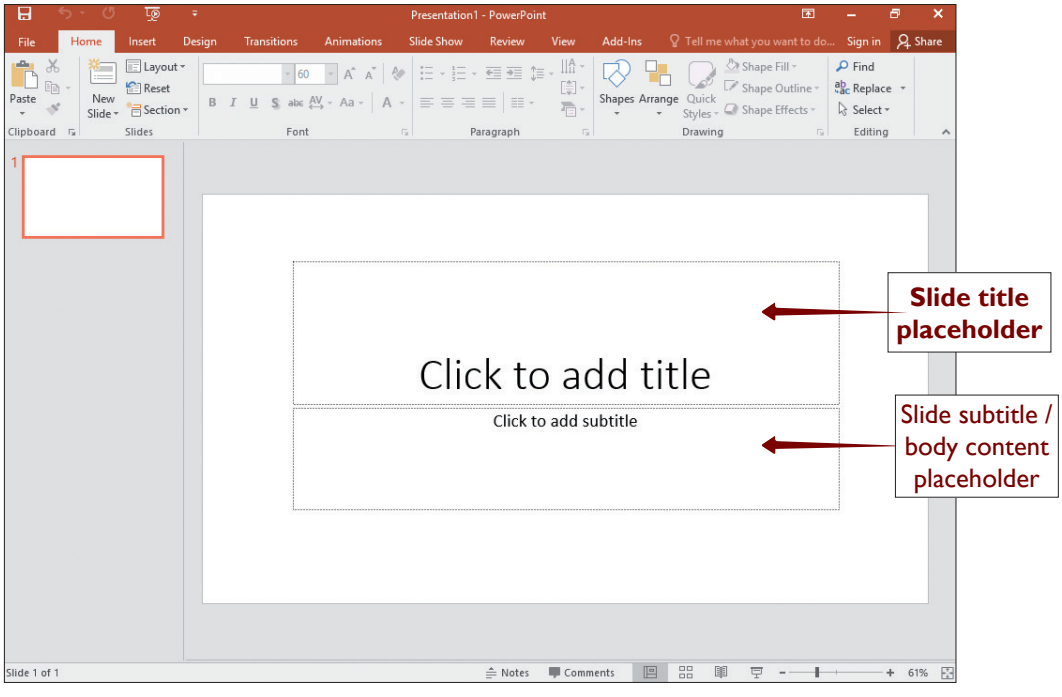


Picture 6.2: The Search box

Step 3: The **Presentation Gallery** displays as shown below. Select the **Blank Presentation** with a new slide, to begin from scratch.



Picture 6.3: The presentation Gallery



Picture 6.4: MS PowerPoint Window with blank presentation

Step 4: You can now add text, pictures or objects to the slide(s) to enhance its appeal. Afterwards save your presentation.

Activity 6.1

Create and save a presentation with microsoft power point.

6.1.4 Saving a presentation

When you open MS Powerpoint by default you have created a presentation. In this case add pieces of data e.g. level of sanitation in your school.

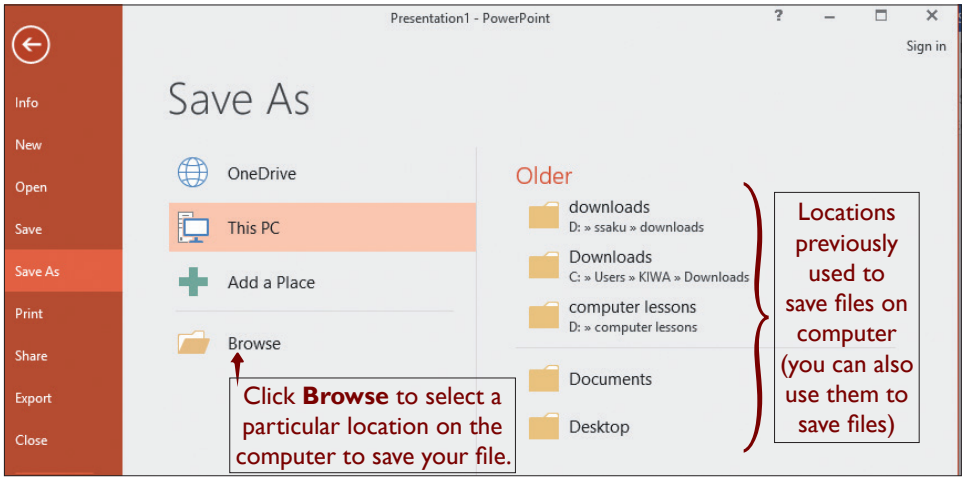
Follow steps below to save a presentation

Step 1: On the **File** tab, click **Save As** to get the backstage view for Save As. See picture 6.6.

Step 2: Select a location or **browse** a location to save your file. The **Save As dialog box** displays, (as shown in picture 6.6).

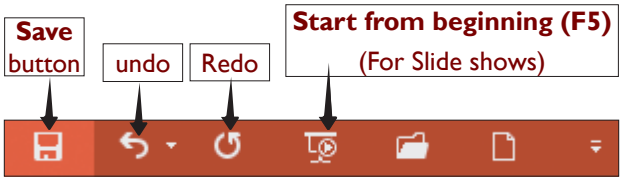
Step 3: Type in the desired **file name** (see picture 6.7) and then click **Save**.

Note: By default, PowerPoint 2016 save files in the PowerPoint Presentation **(.pptx)** file format. To save in another file format, click on the **Save As type** list and select the file format you want.

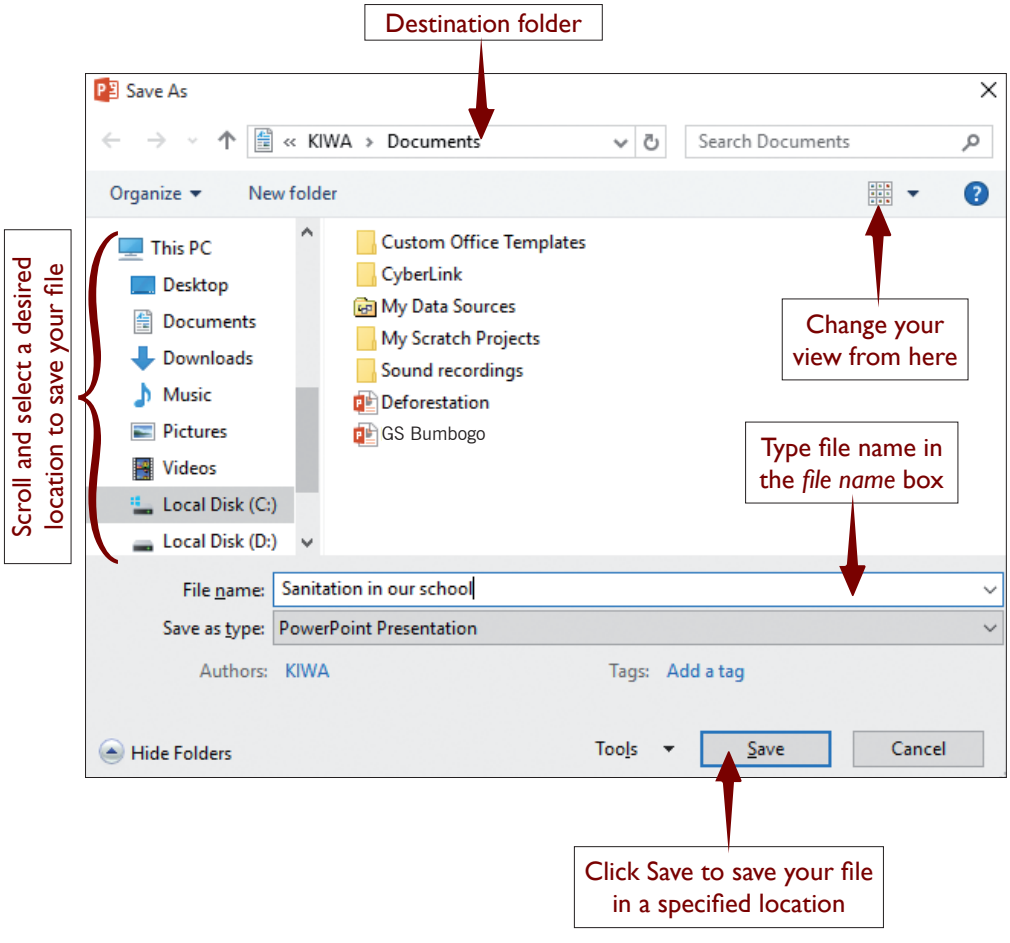


Picture 6.5: The Save As Backstage view

Note: Access quickly the Save As Backstage view by pressing **Ctrl + S** on keyboard or clicking **Save** button on the ***Quick Access Toolbar***.



Picture 6.6: The Quick Access Toolbar showing frequently used commands



Picture 6.7: The Save As dialog box

Step 5: Close the application window or file created.

6.1.5 Opening an existing presentation

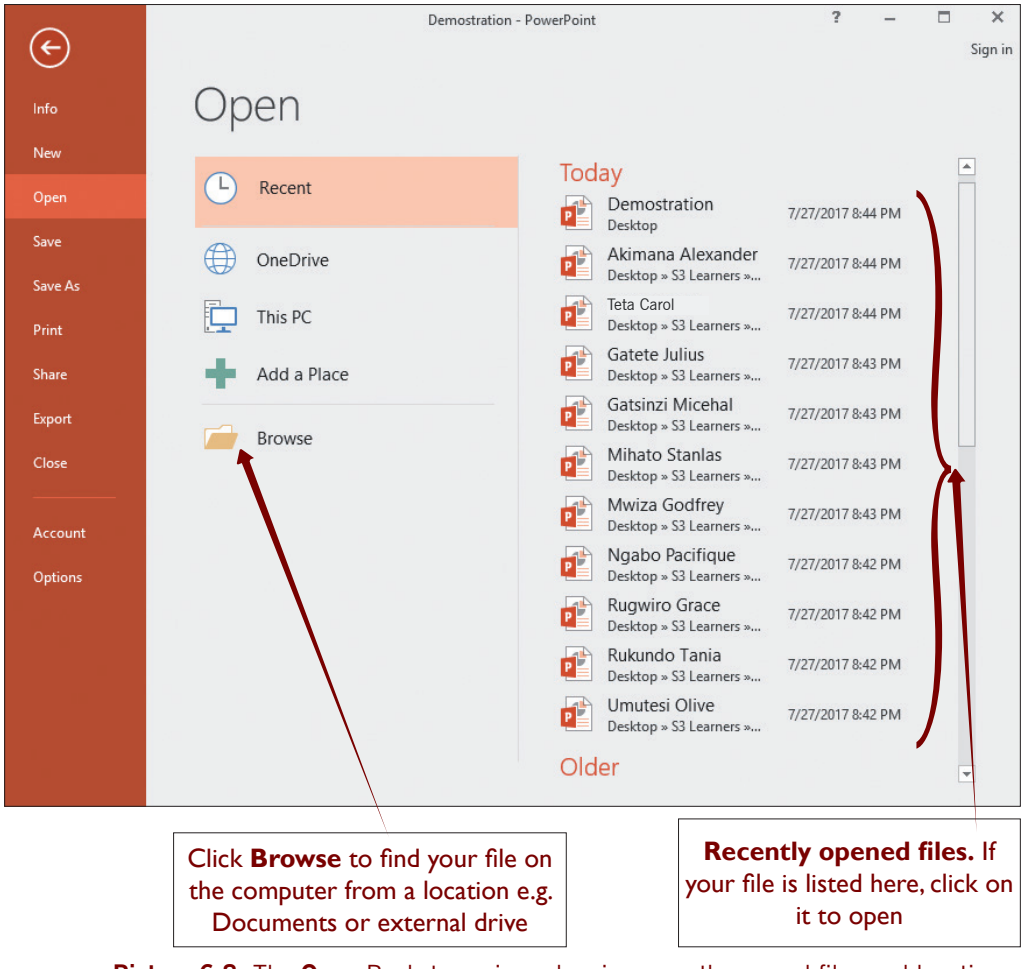
Activity 6.2

Open an existing presentation you saved previously Activity 6.1 or open any other presentation earlier created.

Follow the steps given below to open an existing presentation.

Step 1: Start Microsoft PowerPoint program.

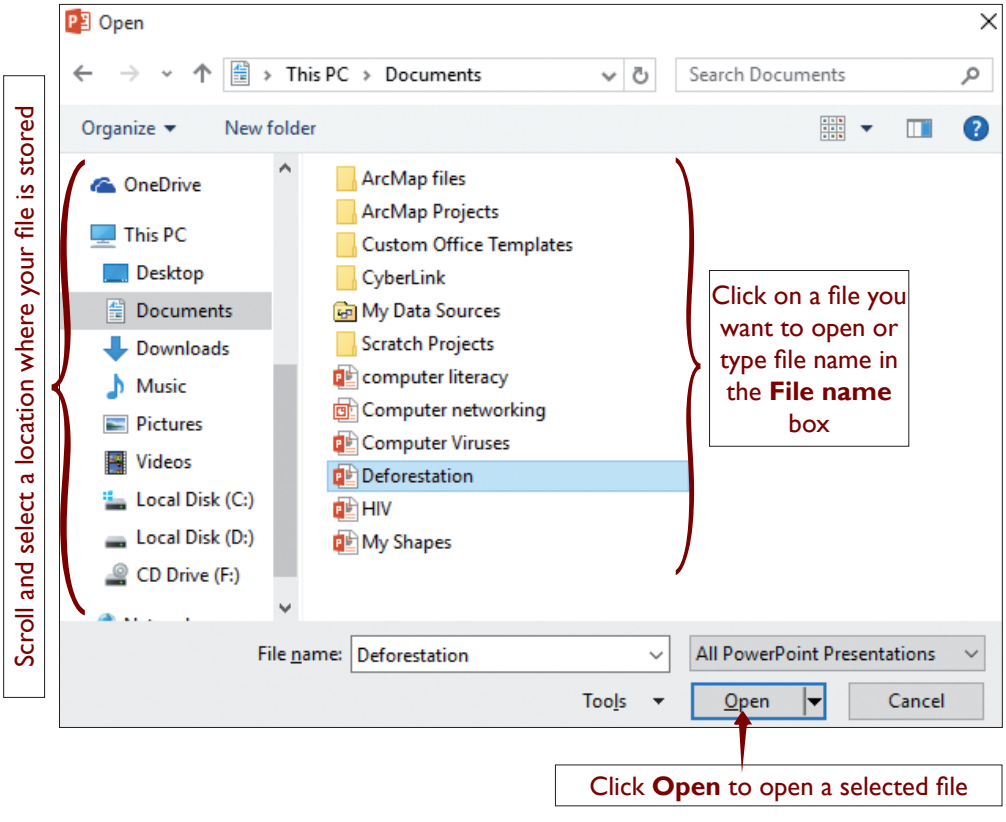
Step 2: On the **File** tab, click **Open.** The Open Backstage view opens. See picture 6.8.



Picture 6.8: The **Open** Backstage view, showing recently opened files and locations to find your file

Step 3: Select a location where your file is located or **browse** in folder to find the file. In the *Open dialog box* , in the **File name** box, type the name of the file you want to open (or scroll, locate and double click on the file).

Step 4: Click **Open** button and the file will open.



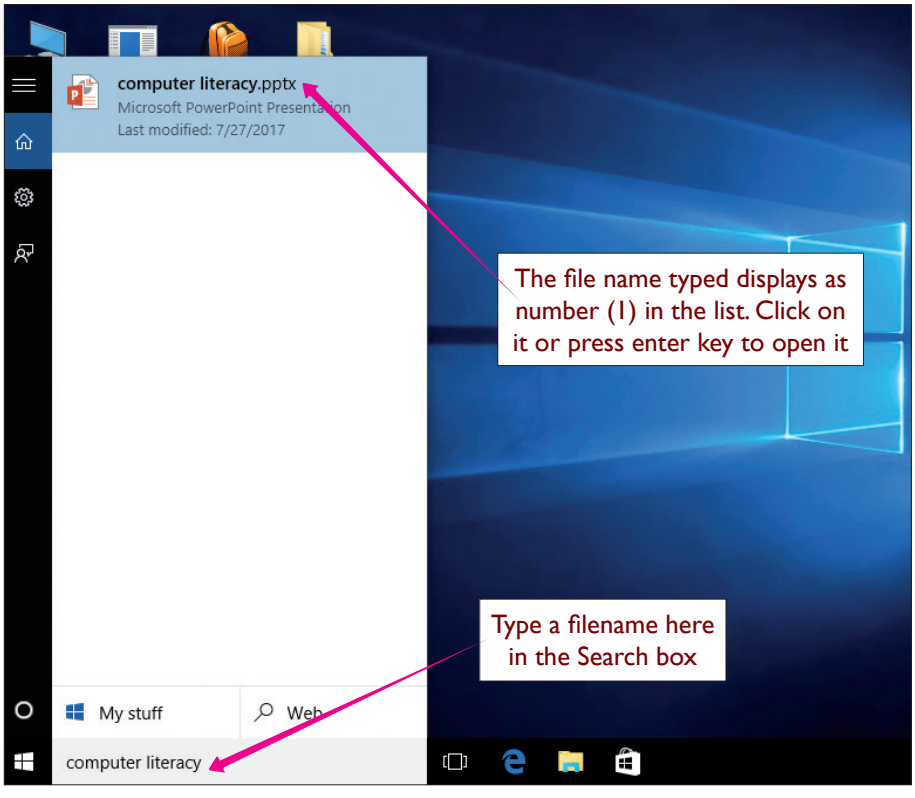
Picture 6.9: The **Open** file dialog box

> **Note:** After starting PowerPoint, you can quickly access the ***open Backstage View*** by pressing **Ctrl + O** on the keyboard.

Other methods for opening an existing presentation

Step 1: Click **Start** button.

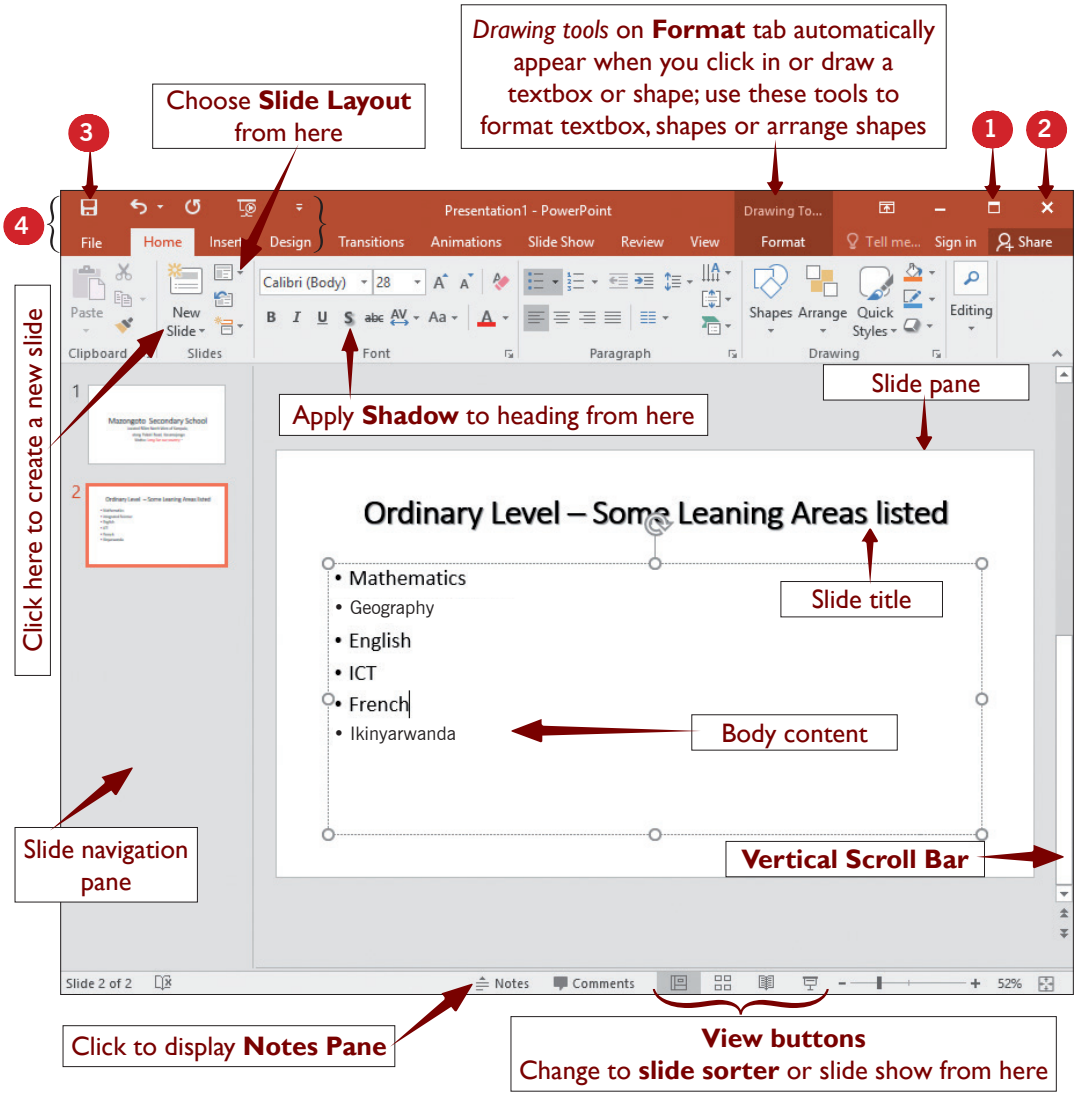
Step 2: In the **Search** box, type the file name and press '*Enter*' key on keyboard.



Picture 6.10: The Desktop showing a filename typed in **Search** box on the **Start**

6.2 Components of presentation environment

Microsoft PowerPoint 2016 has a number of tools, panes, buttons, bars, etc which help the user achieve his/her task. The window below shows different components of PowerPoint 2016environment:



1. Maximise button (makes window fill the whole screen).
2. Close button (closes the presentation).
3. Save button.
4. Quick access toolbar.

Picture 6.11: MS PowerPoint window showing main features

6.3 Slides

A slide is a single page of information in a presentation created with programs such as PowerPoint or Corel Presentation. A presentation is made up of one or several slides.

Activity 6.3

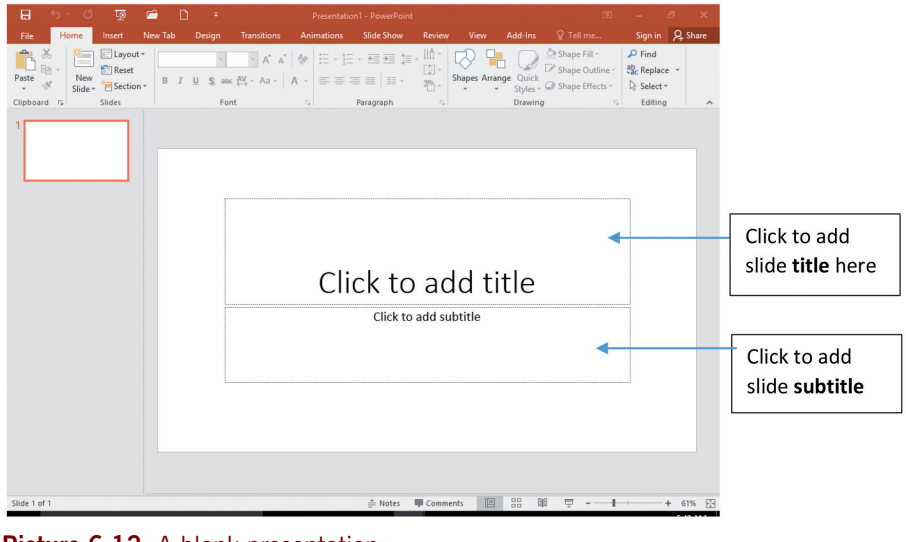
Rwanda Government has made a significant progress in protecting the environment. Create a presentation about Environmental Protection in Rwanda and save the presentation as **"Nature-protect"**.

Note: We shall use this presentation later to learn many features of a Microsoft PowerPoint presentation.

Use the following steps to create the presentation

Step 1: Open a blank presentation.

The presentation opens with only one slide

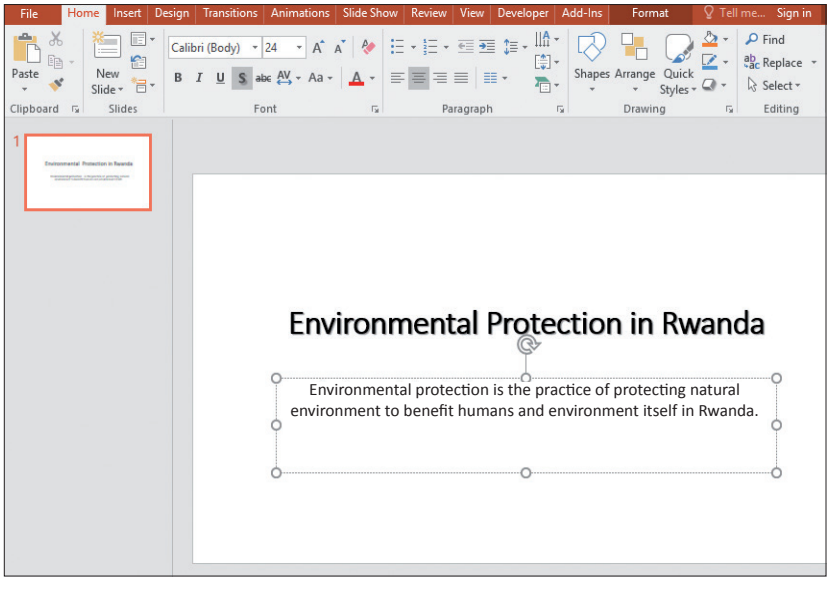


Picture 6.12: A blank presentation

Step 2: Type the title as **Environmental protection in Rwanda.**

Step 3: Type the sub title as **Environmental Protection is the practice of protecting natural environment to benefit humans and environment itself.**

Save your presentation as **"Nature-protect"**.



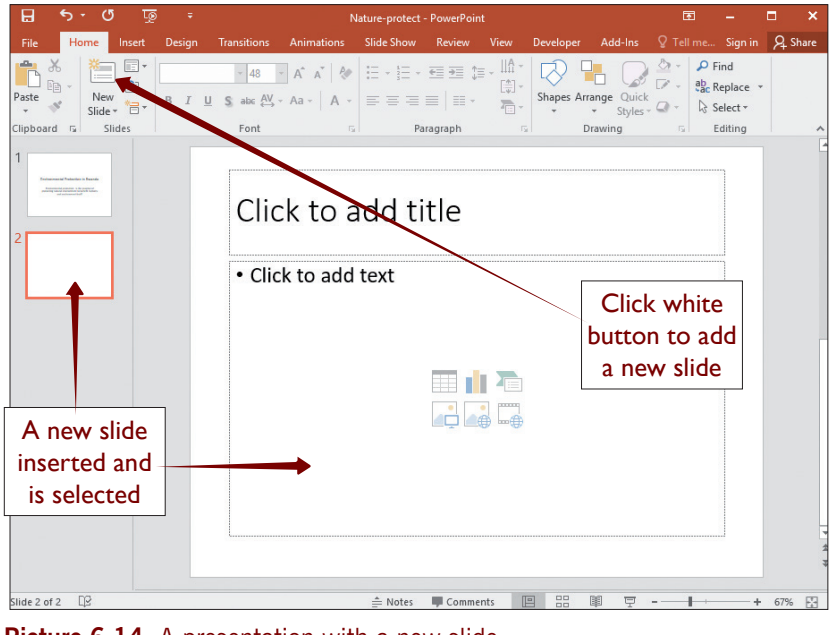
Picture 6.13: A presentation where data has been added on the first slide

6.3.1 Insert a new slide

After working on the first slide, you need more slides to complete your presentation. Open the file **Nature-protect** that you have created.

To get new slides, do the following:

On **Home** tab, click **New Slide** button (or just press **Ctrl** + **M** on keyboard). See picture 6.14. Add the following data on the new slide.



Picture 6.14: A presentation with a new slide

Add the following data to the new slide (Slide 2): Add title as "**Rwanda Environmental Problems**". Add bulleted text as shown below.

- Land degradation
- Deforestation
- Wetland and biodiversity loss
- Natural causes
- Man-made disaster
- Reduction of water resources
- Human settlements

> **Note:** since we are using a Presentation program, we are not supposed to write details on points. Details are explained when giving the presentation to your audience.

Add the following slides in your presentation

Slide 3: Title as "**Causes of Environmental Problems in Rwanda**". Text in bullet style as;

- Population growth and pressure on land
- Declining resources
- Over exploitation of natural resources
- Land scarcity

Slide 4: Title as "**Rwanda Environmental Management Authority (REMA)".**

Text as;

- REMA is Government organ responsible for execution of environment related policies and laws in Rwanda.
- REMA designs policies and procedures used to conserve natural resources, preserving the state of current environment and where possible reversing its degradation.

Slide 5: Title as "**How to protect environment in Rwanda**".

Text as;

- Harvest rain water and conserve all waters for proper use
- Use biodegradable items and practice re-using packaging products.
- Join with others in cleaning wells, roads, beaches or riversides
- Plant native trees plus flowers that bees like
- Raise awareness of threats to nature
- Use alternative source of energy other than wood

Slide 6: Title as "**Rwanda Environmental Features**"
Text as;

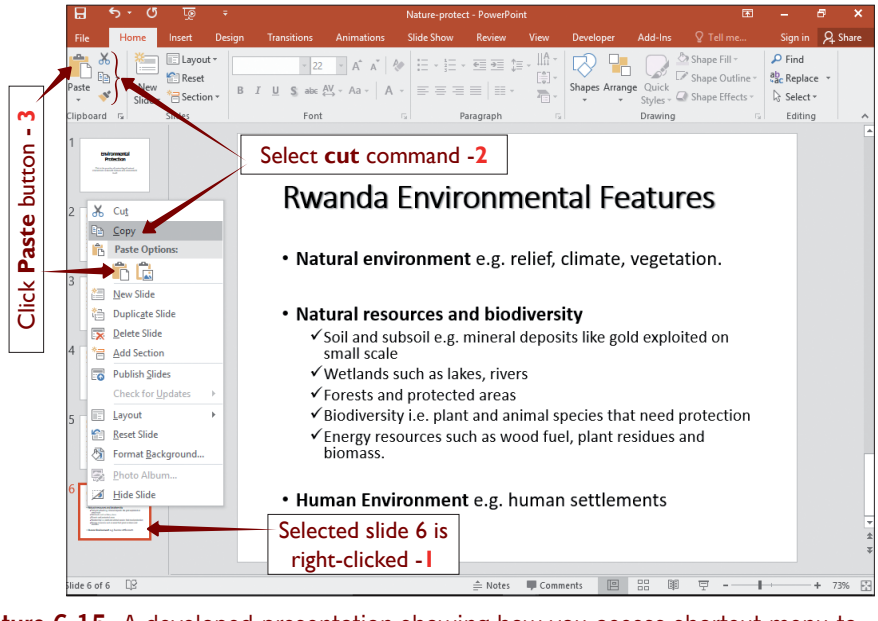
- Natural environment e.g. relief, climate, vegetation
- Natural resources and biodiversity
  - Soil and subsoil e.g. mineral deposits like gold exploited on small scale
  - Wetlands such as lakes, rivers
  - Forests and protected areas
  - Biodiversity i.e. plant and animal species that need protection
  - Energy resources such as wood fuel, plant residues and biomass.
- Human environment e.g. human settlements.

6.3.2 To cut or copy and then paste slides

Use the open file, Nature-protect to cut or copy slide(s). Follow the steps given below.

Step 1: In the **Slide Navigation Pane,** click on the slide you want to cut or copy. In this case select slide 6 or right click on it as shown in picture 6.15.

Step 2: On the **Home** tab, in the **Clipboard** group, click **Cut** or **Copy** button.



Picture 6.15: A developed presentation showing how you access shortcut menu to cut/copy a slide

Step 3: Click in the *destination* place and then on the **Home** tab in the **Clipboard** group, click **Paste** button.

In our activity right click below slide 6 and then select paste.

To copy and paste a slide

Repeat steps 1 above and in the shortcut menu select copy. Lastly click in the destination point and choose paste from the shortcut menu.

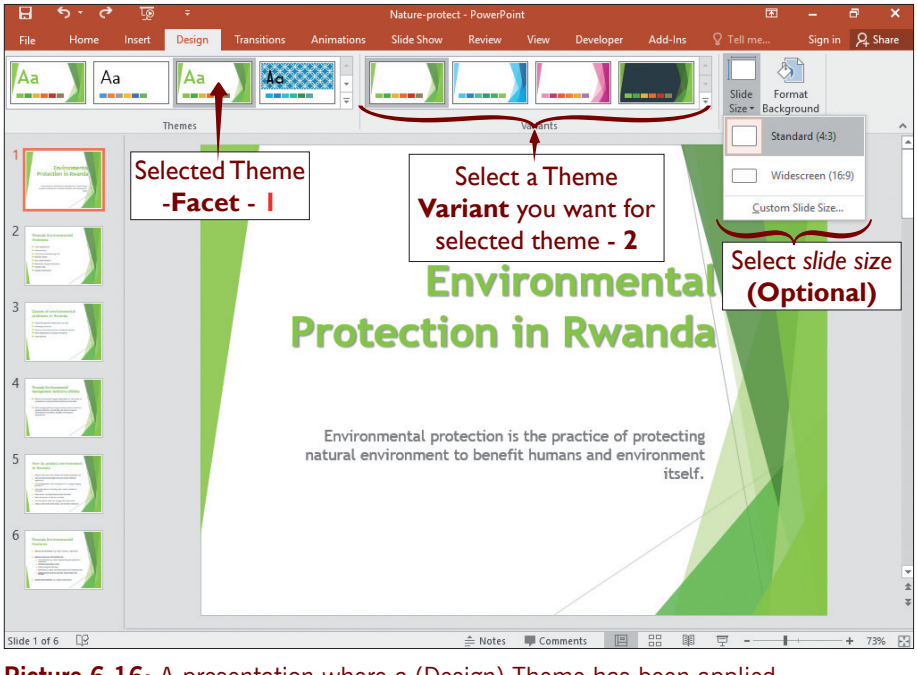
> **Note**: When you cut a slide it disappears from its original location and goes to the clipboard, but when you copy a slide, a copy of it remains and another copy is taken to the clipboard.

6.3.3 Apply design theme in a presentation

By using the file **"Nature-protect"**, we are going to apply a design theme to our presentation using the steps given below.

Step 1: Click on the **Design** tab.

Step 2: From the **Themes** group select a theme you want. (See picture 6.16)



Picture 6.16: A presentation where a (Design) Theme has been applied

Step 3: Select a Theme Variant in case you need it and then save changes to your presentation. A theme variant is a set of colors that will appear in a theme.

6.4 Objects

An object is something that you can see or touch.In Presentation software such as Microsoft PowerPoint, the shape of an object can be drawn or inserted from another source.

There are several objects that you can insert in presentation software. These include: Textbox, Images, Table, Clip Art, Word Art, Smart Art, Shapes, Charts and Media Clips.

6.4.1 Textbox

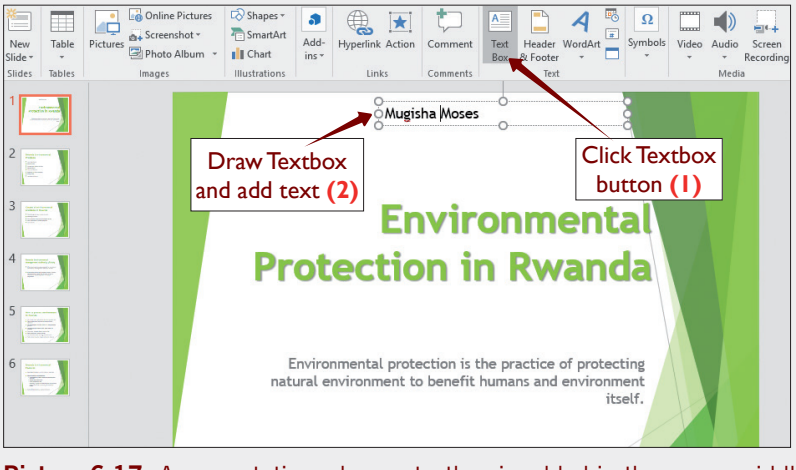
This is a box in the program from where the user can type or edit text, dates or numbers. A textbox can be drawn and used to place text in a particular location you want in your presentation.

There is a difference between text placeholder and textbox. A place holder, is a predefined part of slide where information can be inserted. You cannot insert a text placeholder in a slide since it is part of the layout for your slide and exists when you insert a new slide but textbox need to be inserted manually.

Activity 6.4

Open **"Nature-protect"** file. Add Textbox in the upper middle part of slide 1 and type in your names. Repeat the same action for all the slides in the presentation. Follow the steps given below for Inserting textbox:

Step 1: On the **Insert** tab, click **Textbox** command from the **Text** group. The pointer changes to upside down cross.



Picture 6.17: A presentation where a textbox is added in the upper middle of the slide

Step 2: Move the pointer to the location where you need to draw the textbox and then draw it. Automatically the insertion point appears in the textbox to indicate where text will appear when you type it.

Step 3: Type in your information (i.e. your names) in the textbox. If you move the textbox in another place, the text will move together with the textbox.

6.4.2 Images

An image is the actual picture or mental picture of something. Adding pictures can make your presentation more interesting and attractive.

You can insert a picture from a file on your computer onto any slide.

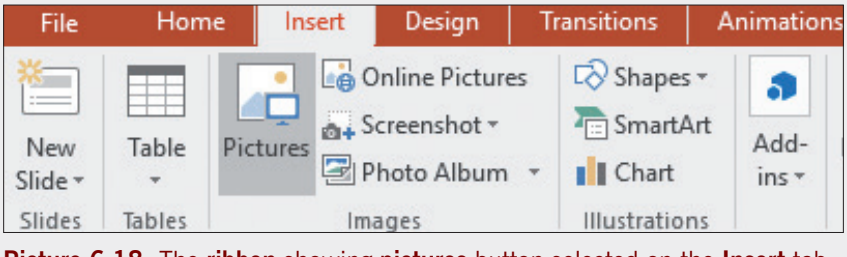
Activity 6.5

Open the file **Nature-protect**. In it add a suitable picture on the lower middle of each slide from your computer or another location. The picture may be the same or different. Save the changes to your presentation.

To insert a picture in a presentation

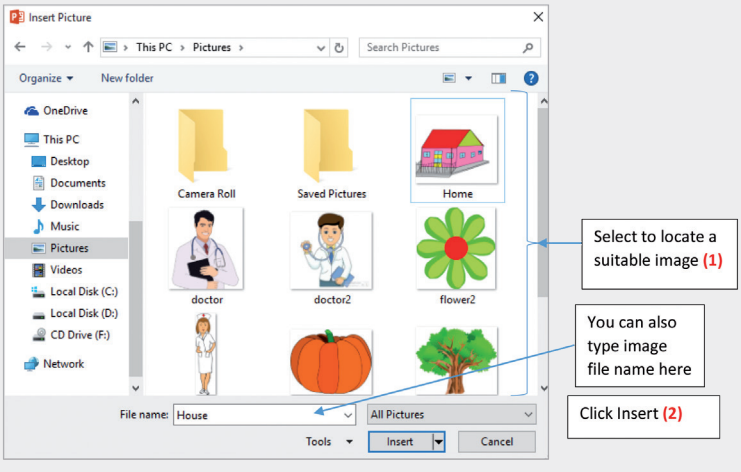
Select a slide where you need a picture. In this case select slide 1 in **Nature-protect** file to add a picture.

Step 1: Select the **Insert** tab, then click the **Pictures** command in the **Images** group.



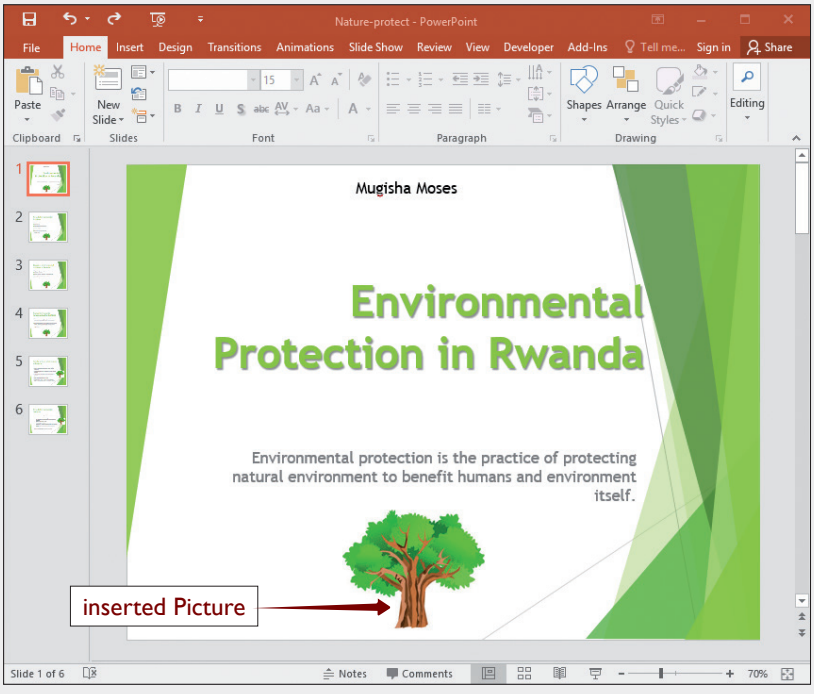
Picture 6.18: The **ribbon** showing **pictures** button selected on the **Insert** tab

Step 2: **Insert Picture dialog box** will appear. Locate from your PC and select a desired image file, then click **Insert**.



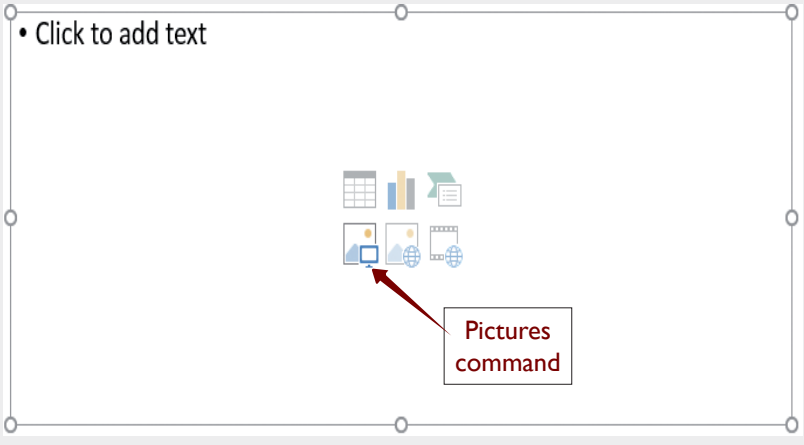
Picture 6.19: Insert Picture dialog box showing pictures on the PC that can be added to a slide

Step 3: The picture will display on the currently selected slide. Repeat step 1 and step 2 for the rest of the insertions. Alternatively copy the picture and then right-click on each and every slide as you select paste.



Picture 6.20: A slide presentation where a picture is added in the lower middle of the slide

Note: You can also click the **Pictures** command in the slide ***placeholder*** to insert images (for new slides).



Picture 6.21: Slide placeholder showing some commands (e.g. pictures) to insert objects on a slide

6.4.3 Inserting online pictures (Clip Art)

In case you don't have a desired picture on your computer, you can find a suitable **picture online** and then add it to your presentation. In PowerPoint 2016, Online pictures are used instead of ClipArt that exist in earlier versions of the program.

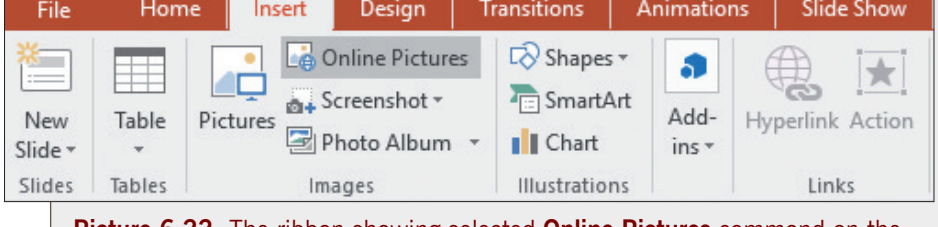
Activity 6.6

Open **"Nature-protect"** file and add 2 suitable online pictures on a new slide (slide 7).

Use the following steps to add online pictures to Nature-protect presentation;

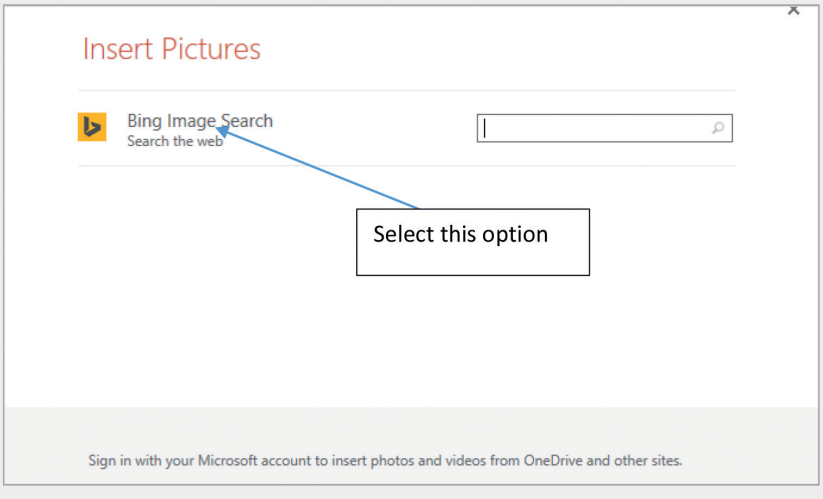
Step 1: Insert a new slide after the last slide.

Step 2: On the **Insert** tab, in the **Images** group, click **Online Pictures** command.



Picture 6.22: The ribbon showing selected **Online Pictures** command on the **Insert** tab

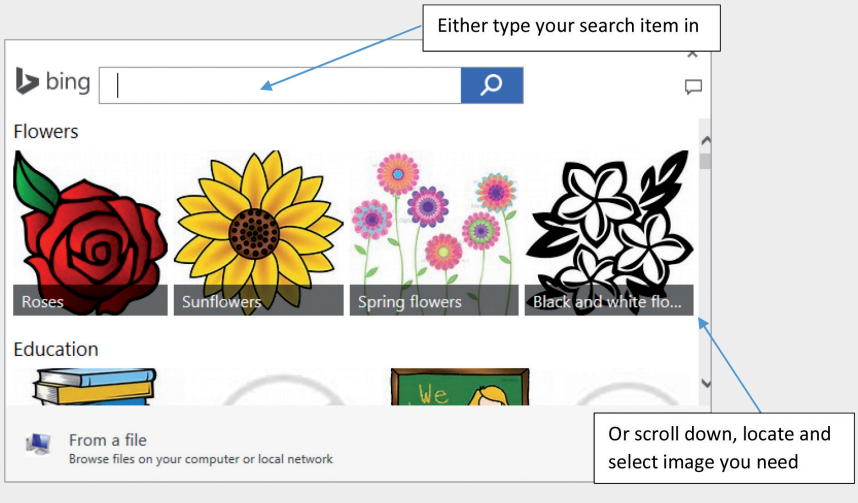
Step 3: The **Insert Pictures** dialog box will appear as shown below.



Picture 6.23: The Insert Online Pictures dialog box

Step 4: Choose **Bing Image Search.**

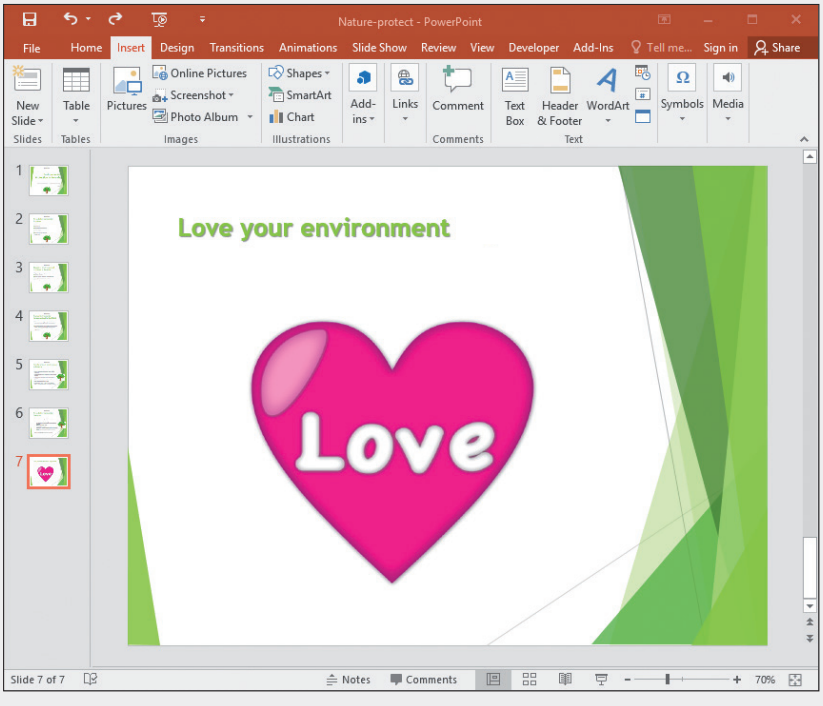
Step 5: Press the **enter** key. Your search results will appear in the dialog box.



Picture 6.24: The Online search results

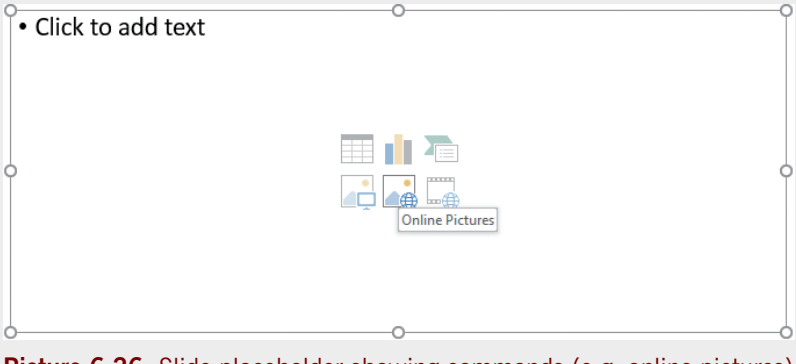
Step 6: Select the desired image, then click **Insert**.

Step 7: The image will appear on the currently selected slide.



Picture 6.25: A new slide with an online picture

You can also select Online Pictures command in a placeholder to insert online images



Picture 6.26: Slide placeholder showing commands (e.g. online pictures) to insert objects on a slide

6.4.3.1 Moving and resizing pictures/images

Once a picture is inserted, it may require you to move it in a different location on the slide or change its size.

6.4.3.2 To move a picture

Click and drag to move a picture to a new location you want on a slide. See picture 6.27.

6.4.3.3 To delete a picture

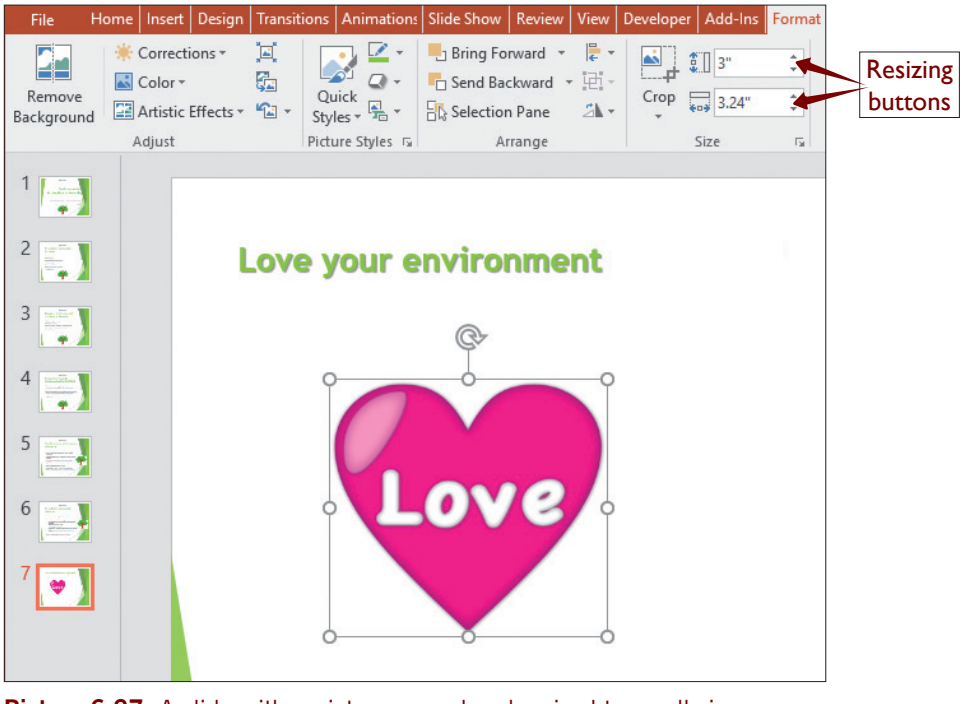
Select the picture and then press **backspace** or **delete** key on your keyboard.

6.4.3.4 Resizing picture

Follow the steps below:

Step 1: Click on the picture. The picture will display selection circles as shown in picture 6.27.

Step 2: On the Format tab, click on Shape height and or Shape Width using existing arrows.



Picture 6.27: A slide with a picture moved and resized to small size

Note: Alternatively, after clicking on the picture, point to one of the selection circles until the pointer changes to double pointed arrow. Then click and drag outwards to increase size; or inwards to reduce the size.

6.4.4 Table

A table is made of rows and columns. A row is a space between two horizontal lines in a table while a column is a space between vertical line. Data or information can be arranged using these rows and columns.

Methods

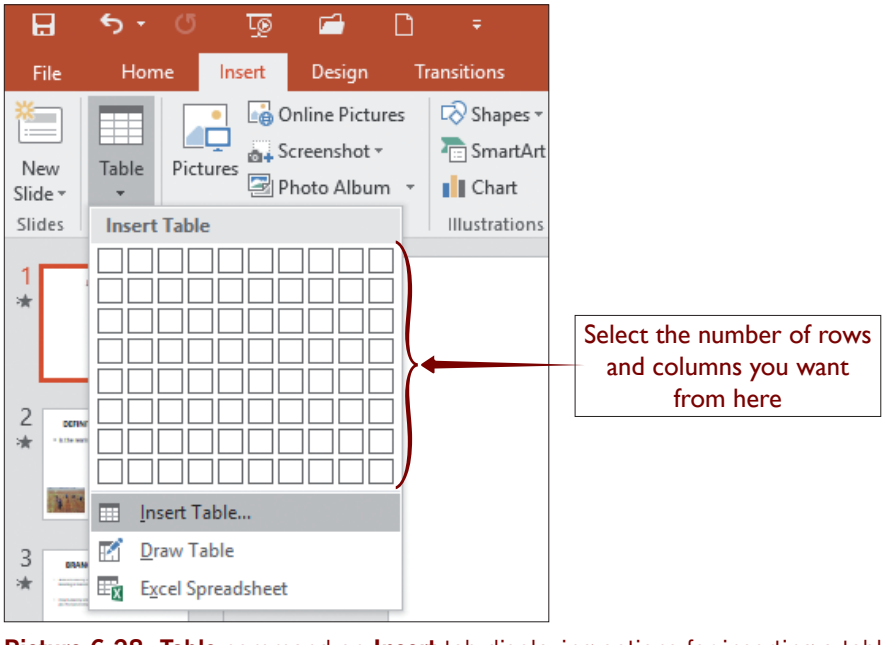
a) Create and format a table within a presentation.
b) Import a table from Word or a group of cells from Excel spreadsheet.

6.4.4.1 Method 1: Create and format a table in MS PowerPoint

Use the steps given below to create the table: Open the **"Nature-protect"** file.

Step 1: Select the slide that you want to add a table to. In this case add a new slide after last slide.

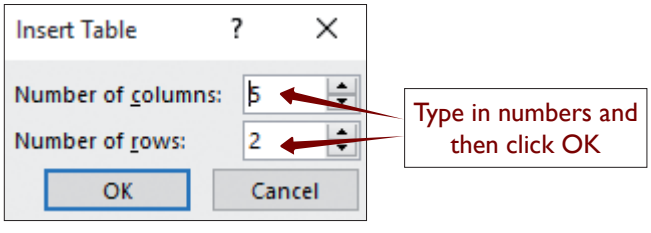
Step 2: On the **Insert** tab, select **Table**.



Picture 6.28: Table command on **Insert** tab displaying options for inserting a table

Step 3: In the **Insert Table** dialog box displays.

> **Note:** Either use a mouse to select the number of rows and columns you want or Select **Insert Table** and enter the number in **Number of columns** field and **Number of rows** field. Lastly click **OK**.



Picture 6.29: Insert Table dialog box

Activity 6.7

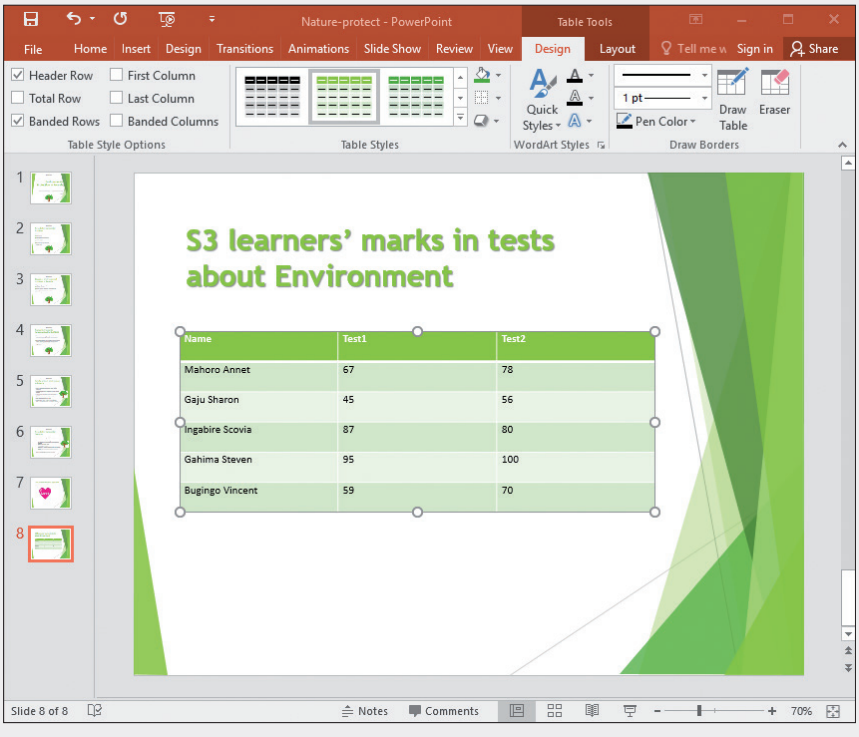
Open "Nature-protect" presentation file and create the table given below on slide 8.

In our activity we are going to add the following data on the new slide 8.

Learners were given assessment tests about environmental protection. The following is part of S3 learners' **marks obtained in 2 tests**.

Name	Test1	Test2
Mahoro Annet	67	78
Gaju Sharon	45	56
Ingabire Scovia	87	80
Gahima Steven	95	100
Bugingo Vincent	59	70

Save changes to your file. The new slide in your presentation may appear as shown below.



Picture 6.30: The presentation displaying a slide where a table has been added.

Step 4: To add text to the table cells, click a cell and then enter your text. Afterwards click outside the table.

6.4.4.2 Method 2. Copy table

Use the steps below to import a table from Ms Word to Ms PowerPoint:

Step 1: Open a Word document containing a table you want to copy.

Step 2: On the **Layout** tab (***Table Tools***) in the **Table** group, click **Select** and then click on **Select Table**.

Step 3: On the **Home** tab in the **Clipboard** group, select **Copy**.

Step 4: Click on your *PowerPoint Presentation*, select a slide where you want to copy the table to. On **Home** tab, in the **Clipboard** group, click on **Paste**.

> **Note:** Using the method above, you can copy and paste a table from one office application or file to another.

6.4.5 WordArt

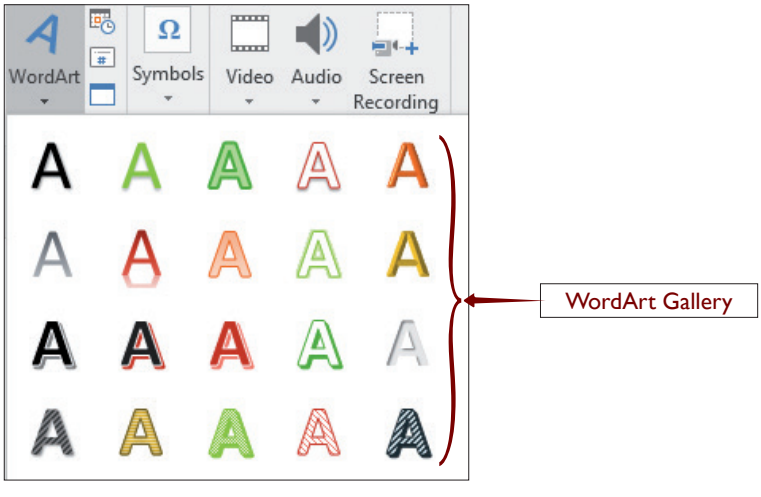
Word art is a text with a special design or look. It is an object that you can move, resize or rotate within the document. Word art is applied to text to appear in a unique form such as a circle, curve or oval; use word art.

6.4.5.1 Insert Word art

Follow steps given below for adding word art in **Nature-protect** slide. Start by opening the file.

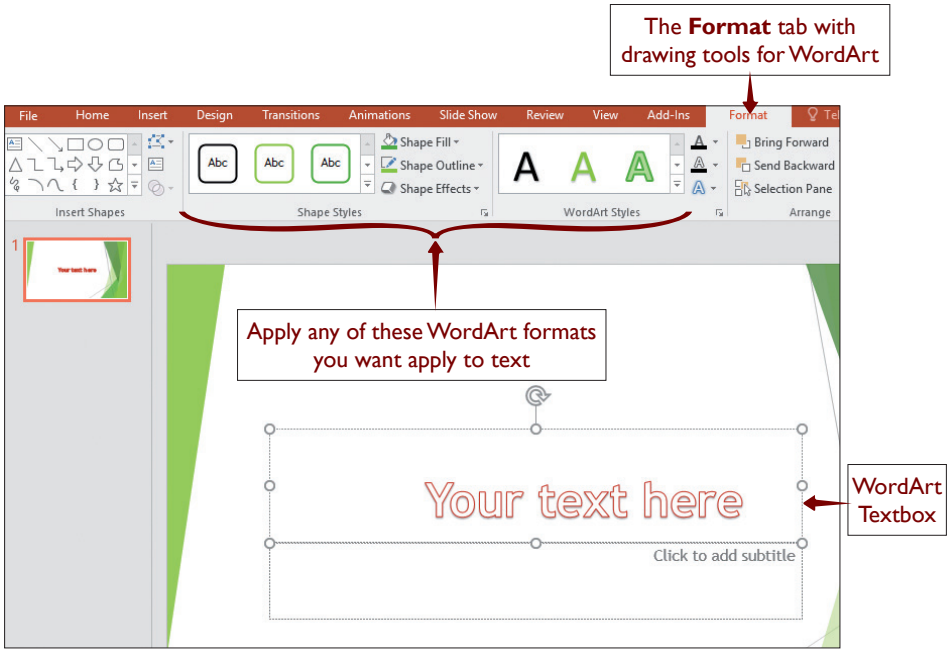
Step 1: Select the slide where you want to insert a WordArt.

Step 2: Click on the **Insert** tab and then click on the **WordArt** button in the **Text** group. A gallery of *WordArt styles* is displayed as shown in picture 6.31:



Picture 6.31: WordArt button on the Insert tab of the Ribbon displaying WordArt Gallery

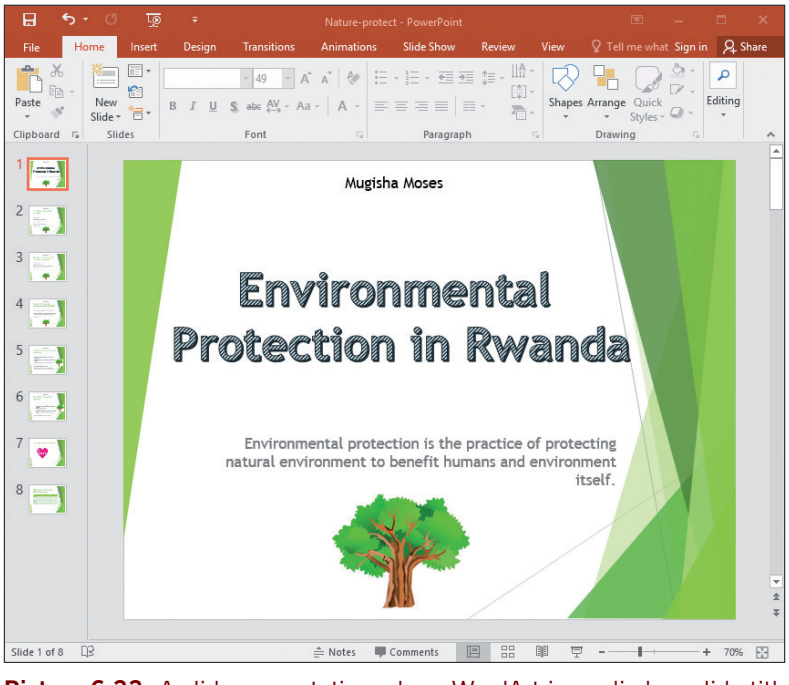
Step 3: Select a WordArt style you want to use. The WordArt textbox will be inserted on the slide as shown in picture 6.32.



Picture 6.32: A slide with WordArt textbox added

Step 4: Move the WordArt in suitable location. And then delete the original text and textbox.

Step 5: Repeat steps 1-4 and apply a desired WordArt to all slide titles. Slide 1 in our presentation may appear as shown in picture 6.33.



Picture 6.33: A slide presentation where WordArt is applied on slide title

Step 6: Click on the WordArt textbox and then type the desired text.

6.4.6 SmartArt

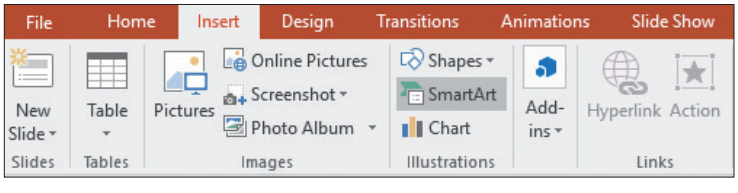
SmartArt is a picture used to communicate information in many different ways. It is an option that allows the user to create diagrams easily.

Create a SmartArt graphic and add text to it

Use the steps given below to insert a SmartArt graphic to your presentation.

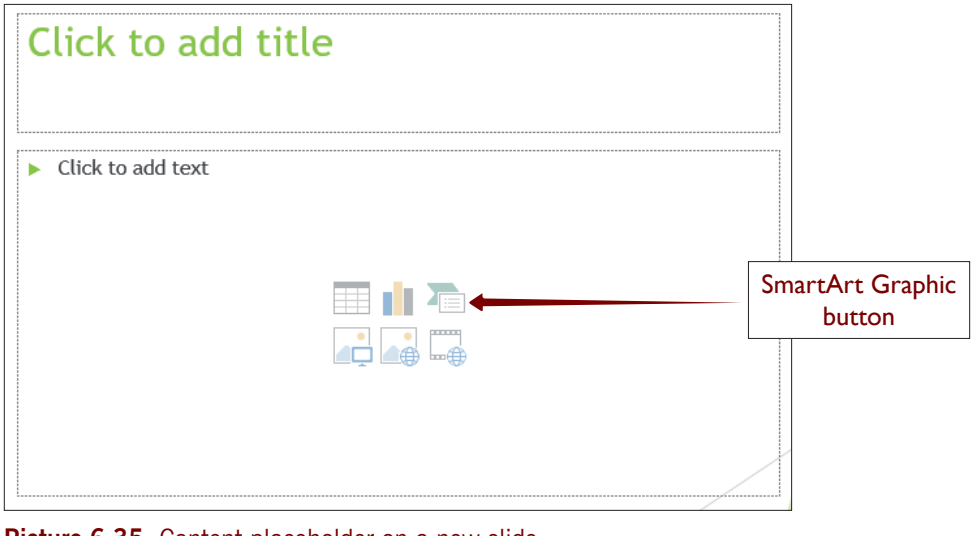
Step 1: Open "Nature-protect" file presentation and insert a **new slide (slide 9)** where you need a **SmartArt**. You can also create new presentation.

Step 2: On the **Insert** tab, in the **Illustrations** group, click **SmartArt.**



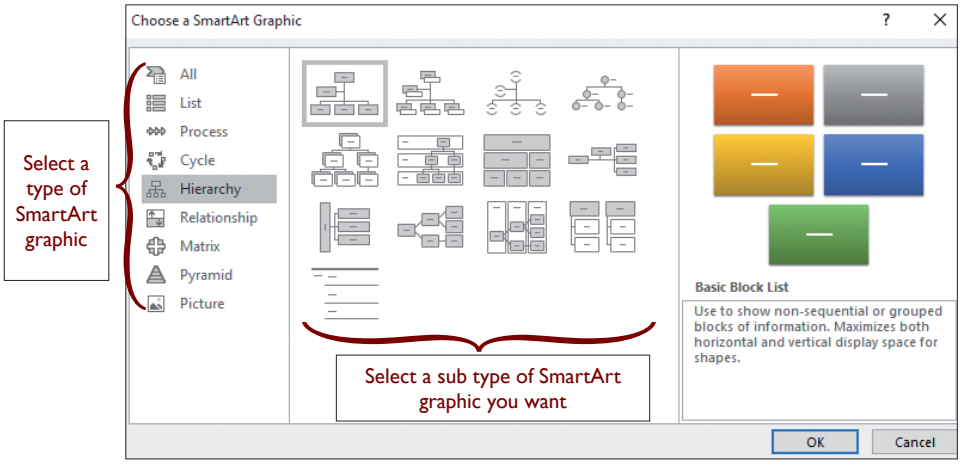
Picture 6.34: The **SmartArt** command in the *Illustrations* group selected on the Insert tab

> **Note:** Alternatively insert a SmartArt using the *SmartArt Graphic* button in the content holder, as shown in picture 6.35.



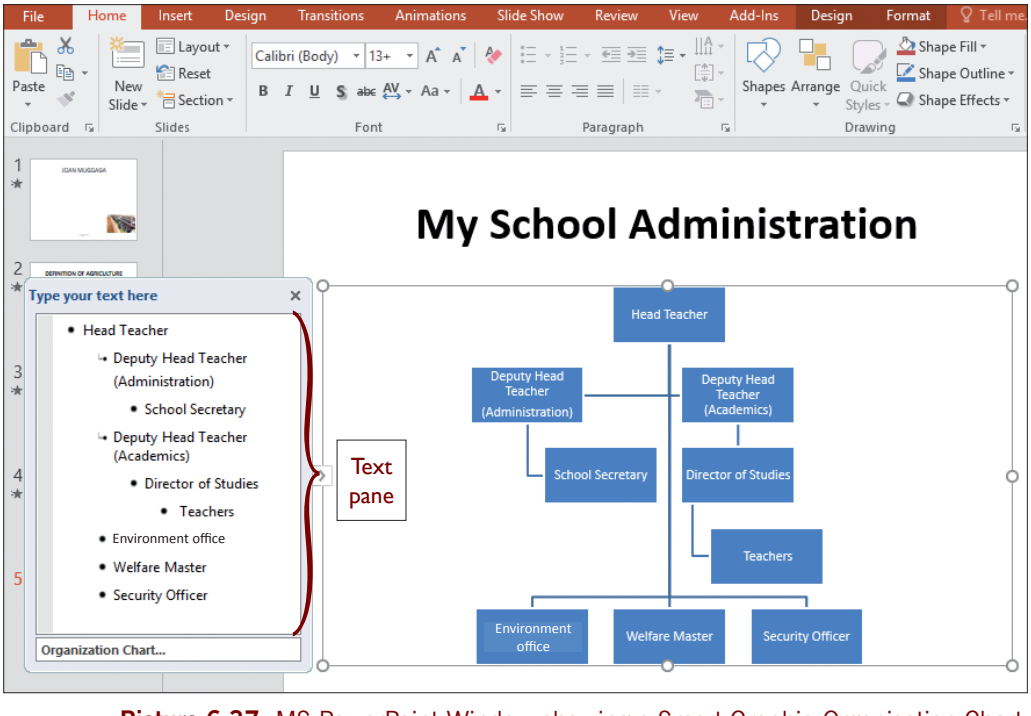
Picture 6.35: Content placeholder on a new slide

Step 3: In the **Choose a Smart Graphic** dialog box that displays, click the type and layout that you want. In our case, we are going to create a **hierachy** of officers in our school.



Picture 6.36: Choose a SmartArt Graphic dialog box

Step 4: Enter your text by either:
Clicking in the text pane (left) and then type your text or clicking directly in the **Smart Graphic** and type the desired text. Afterwards save your file.



Picture 6.37: MS PowerPoint Window showing a Smart Graphic-Organisation Chart on a slide

6.4.7 Shapes

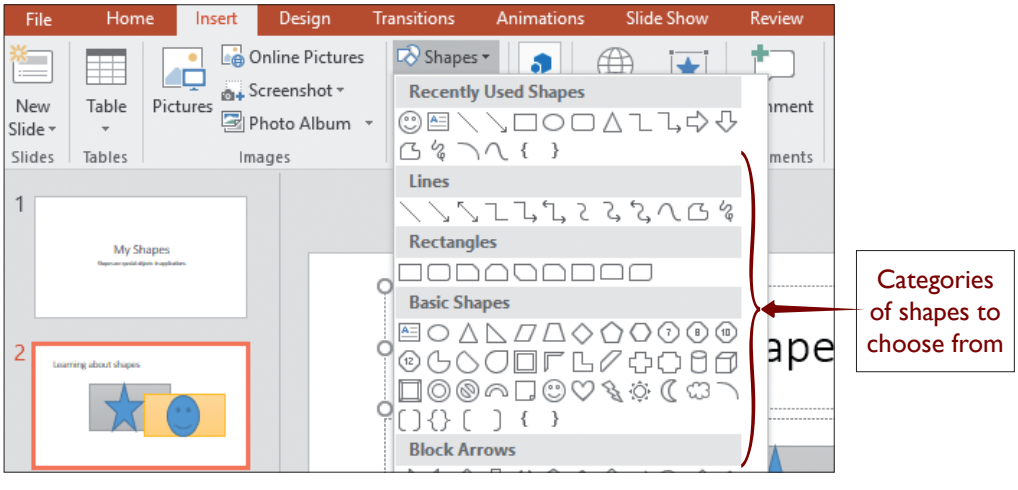
A shape is an outline form of an object. In office applications such as Microsoft PowerPoint, you can add shapes such as boxes, circles and arrows to your slide.

6.4.7.1 Insert a shape

Use the steps given below and insert any type of shape you want. Open Nature-protect file or create a new presentation. In the opened file, create a new slide for your shape(s) as slide 10.

Step 1: Click on **Insert** tab.

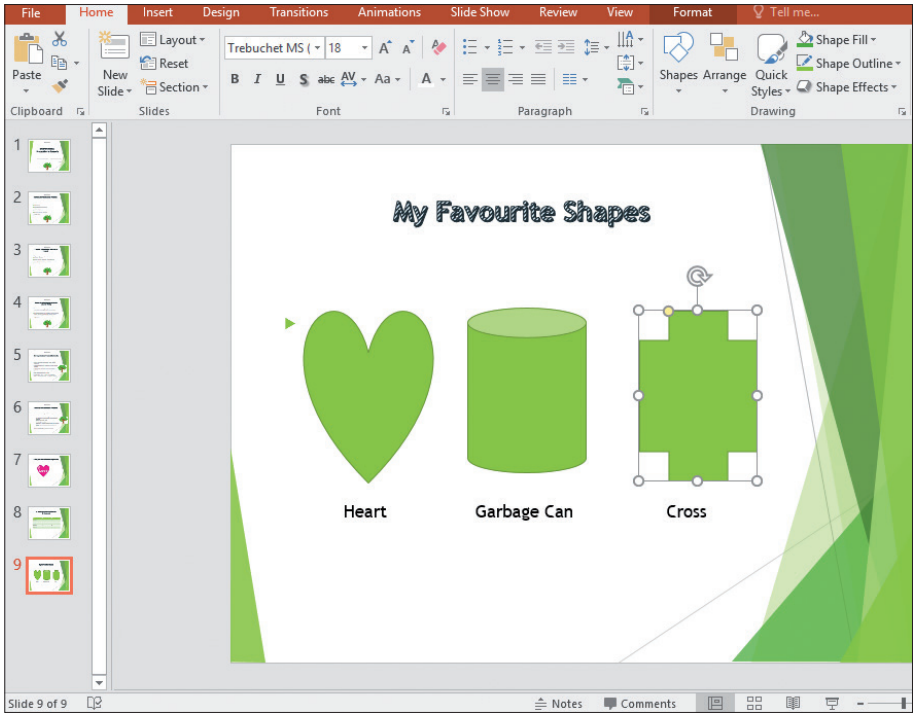
Step 2: Click **Shapes** from the **Illustrations** group.



Picture 6.38: Part of PowerPoint 2016 window showing **Shapes** from the **Insert** tab

Step 3: Select a shape such as a rectangle and then click and drag to draw the shape in the desired place.

After drawing a shape, you can add text, bullets and numbering to them. You can also change their fill, outline and other effects on the Format tab.



Picture 6.39: A slide where shapes are added. Textboxes are used add accompanying text.

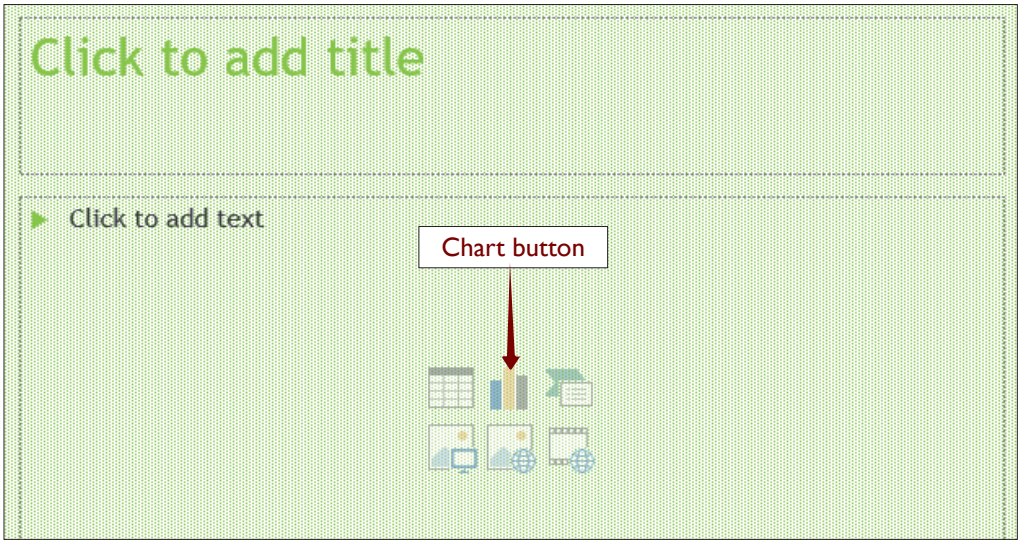
6.4.8 A chart

This is a pictorial representation of numerical data. There many charts that can be created on a slide, but common charts frequently used are: column charts, line charts and pie charts. Using the knowledge from previous units of creating a chart, let's add a column chart in Nature-protect file.

Using the data in the table we inserted on slide 8 of Nature-protect presentation, let's create a column chart.

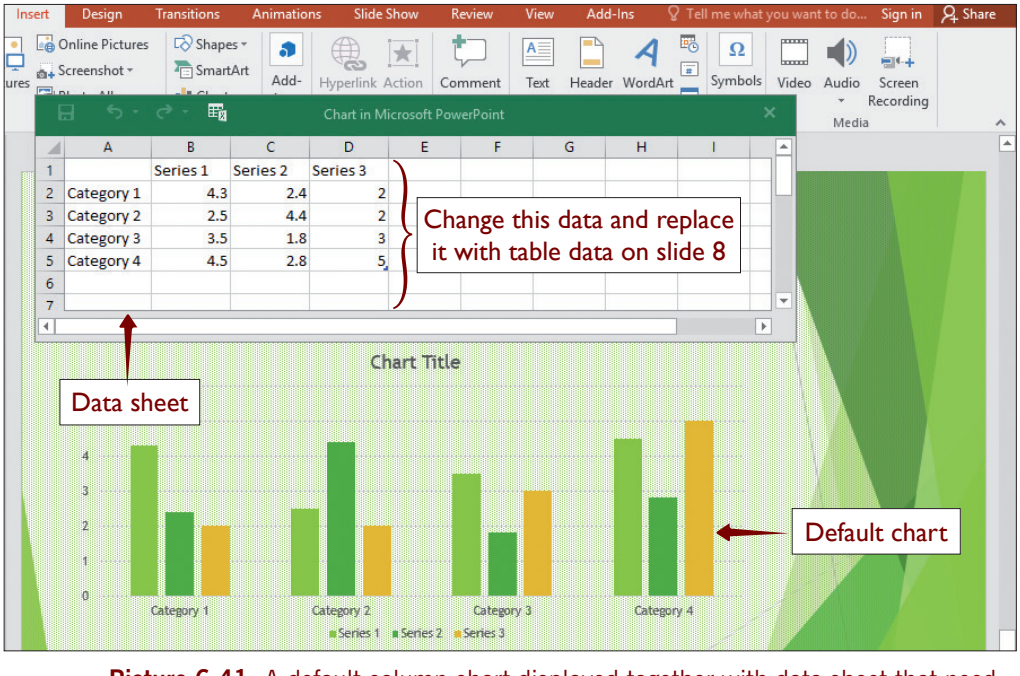
Step 1: Insert a new slide (Title and content layout) as slide 11.

Step 2: Click the **Chart** button in the *content holder* to generate a column chart. Alternatively use Insert tab and click **Chart** button in the **Illustrations** group.



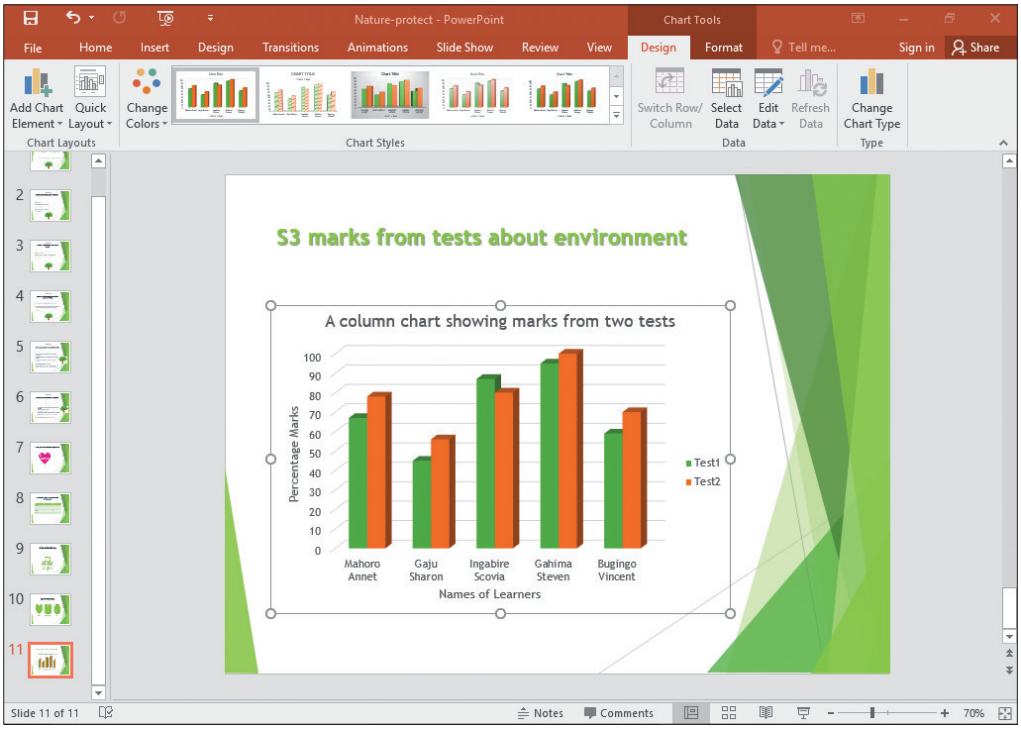
Picture 6.40: Content holder showing various icons for various objects you can insert including chart

Step 3: The column chart appears together with its data sheet that you should edit to suit your chart.



Picture 6.41: A default column chart displayed together with data sheet that need editing

Step 4: Edit data sheet by replacing default data with your data. The resulting chart is shown in picture below if table data on slide 8 is used for charting.



Picture 6.42: A slide with 3D column chart on showing marks from tests

6.4.9 Media clips

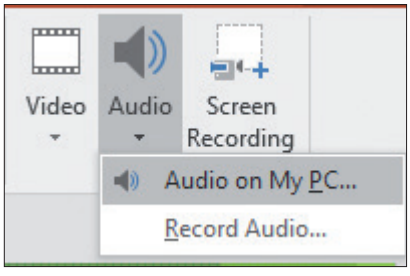
Media clip is a small segment of an electronic media either an audio clip or a video clip.

6.4.9.1 Audio clip

To insert audio clip, follow the steps given below.

Step 1: In Normal view, select the slide where you want to insert an audio clip.

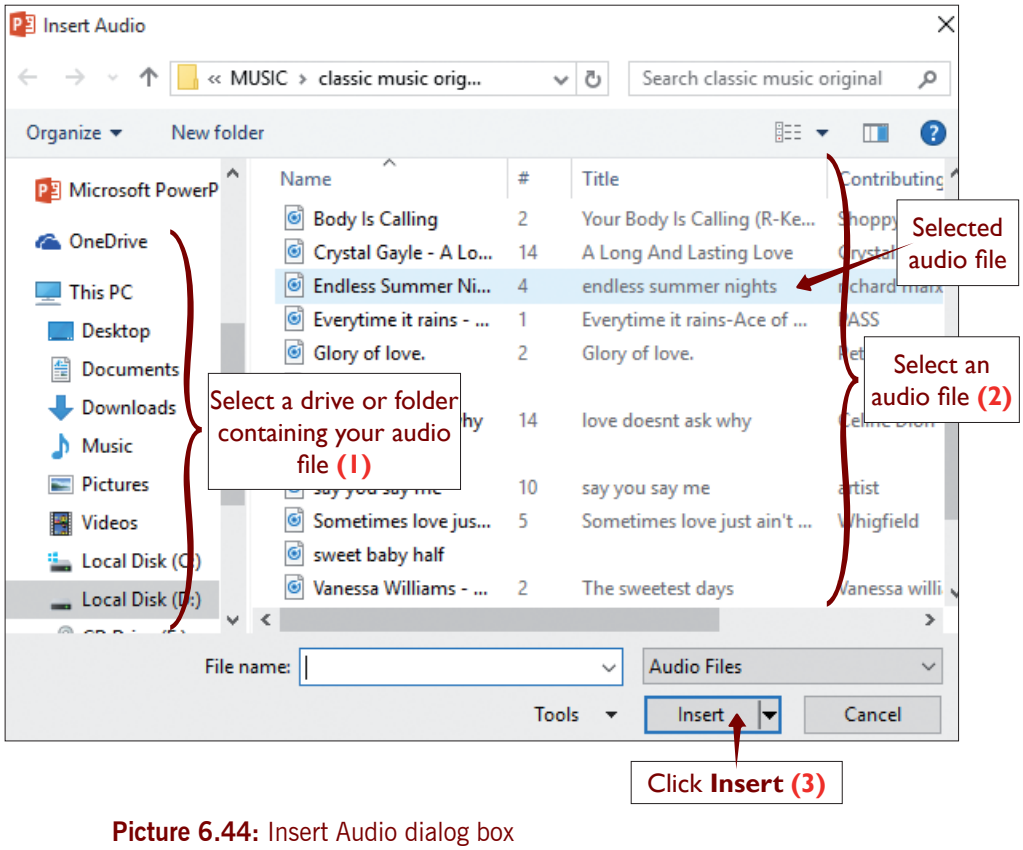
Step 2: On the **Insert** tab, in the **Media** group, click arrow under **Audio**, and then click **Audio on My PC**.



Picture 6.43: Media group buttons displaying Audio menu. Audio on My PC is selected

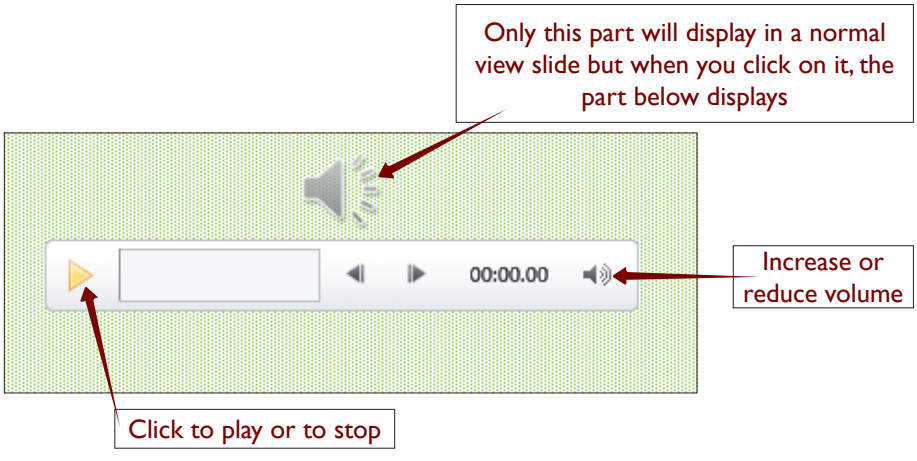
Step 3: In the **Insert Audio** dialog box, select a folder containing the audio you want and then select the audio file.

Step 4: Click on **Insert** button to insert the audio. (See picture 6.44).



Picture 6.44: Insert Audio dialog box

Step 5: The slide where audio has been inserted will have a graphic as shown in picture 6.45. Play using the media buttons displayed.



Picture 6.45: Audio media clip

6.4.9.2 Video clip

There are two ways to insert video i.e. by linking and by embedding a video directly from your PC into your presentation.

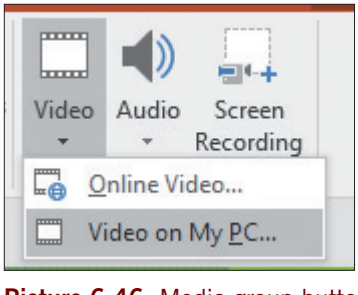
- **Embedded videos** are appropriate but tend to increase the size of your presentation.
- **Linked videos** keep your presentation smaller in size, because links can easily break, copy the video into the same folder as your presentation and create the link from there.

a) **Embed a video clip**

To insert a Video clip by embedding it, follow the steps given below.

Step 1: In Normal view, select the slide where you want to insert video clip.

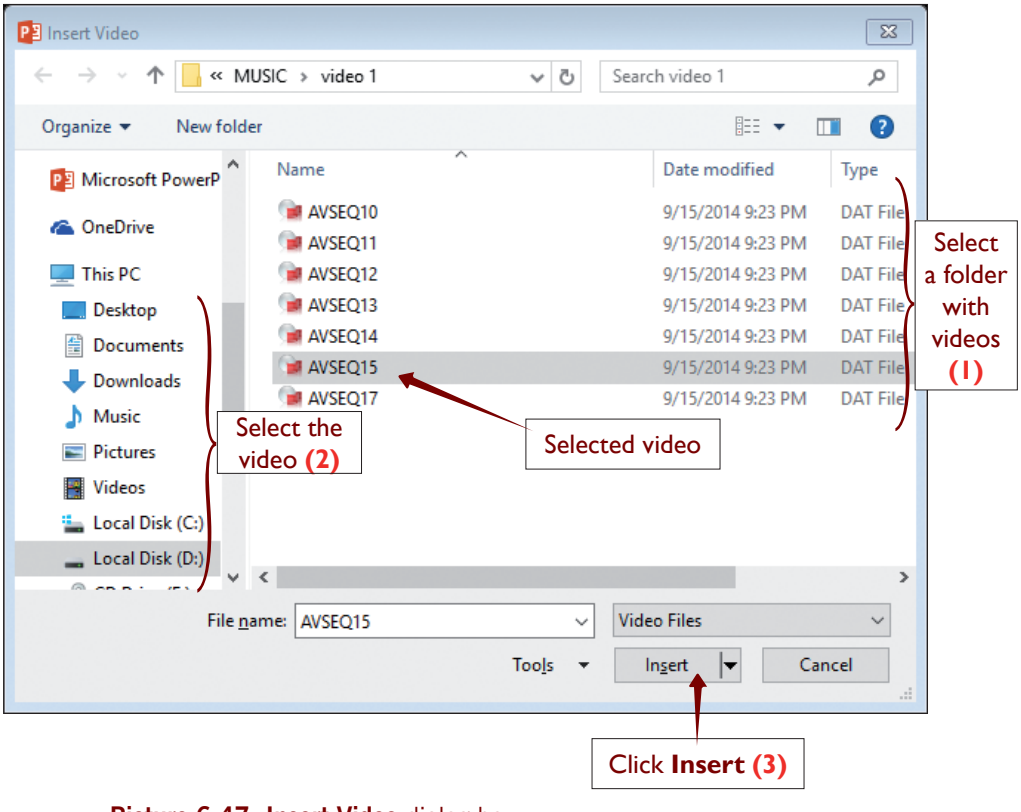
Step 2: On the **Insert** tab, in the **Media** group, click arrow under **Video**, and then click **Video on My PC**.



Picture 6.46: Media group buttons displaying video menu. Video on My PC is selected

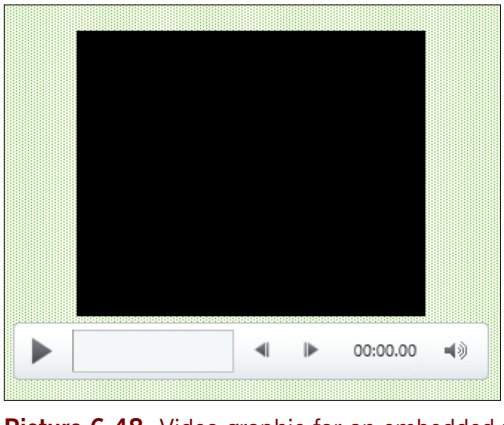
Step 3: In the **Insert Video** box, click the video that you want from a specific folder.

Step 4: Click **Insert**.



Picture 6.47: Insert Video dialog box

A slide with an embedded video will have the graphic as shown in picture 6.48.



Picture 6.48: Video graphic for an embedded video may appear as shown above

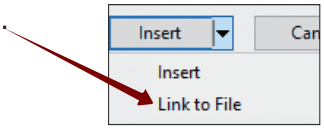
b) **Link a video**

To link to a video on your PC follow the steps given below

Step 1: Follow steps 1 to 2 above (for embedding video clip).

Step 2: In the **Insert Video** dialog box, click the file that you want to link to.

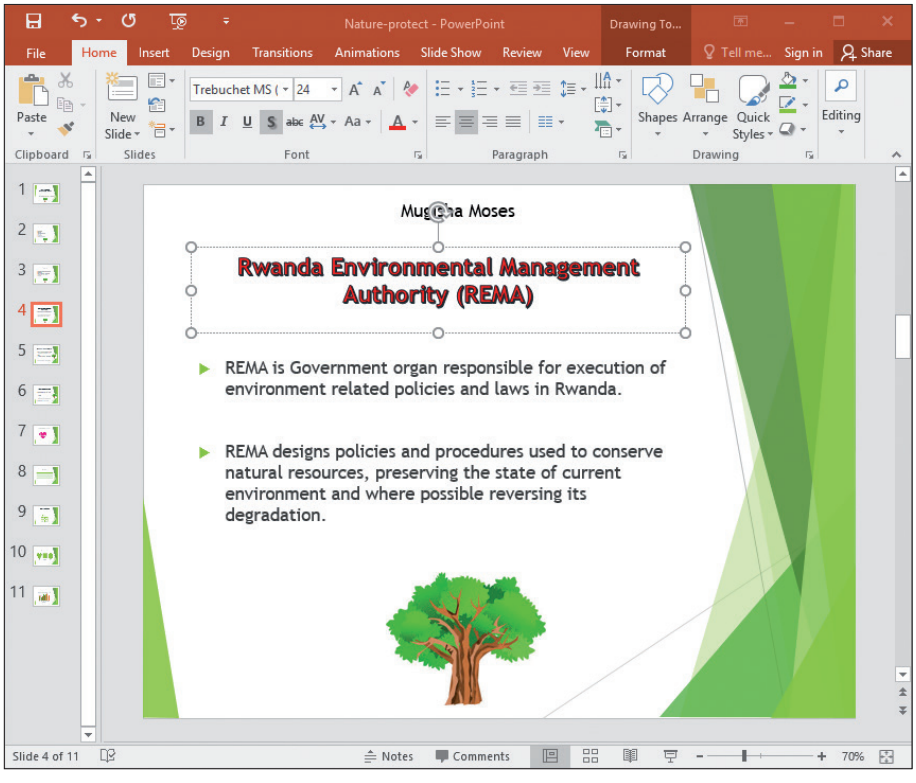
Step 3: Click the down arrow next to the **Insert** button, and then click **Link to File**.



6.5 Formatting a slide

To format a slide is to change the appearance of the slide and or its contents. To make these changes, open "Nature-protect" file and use the following steps:

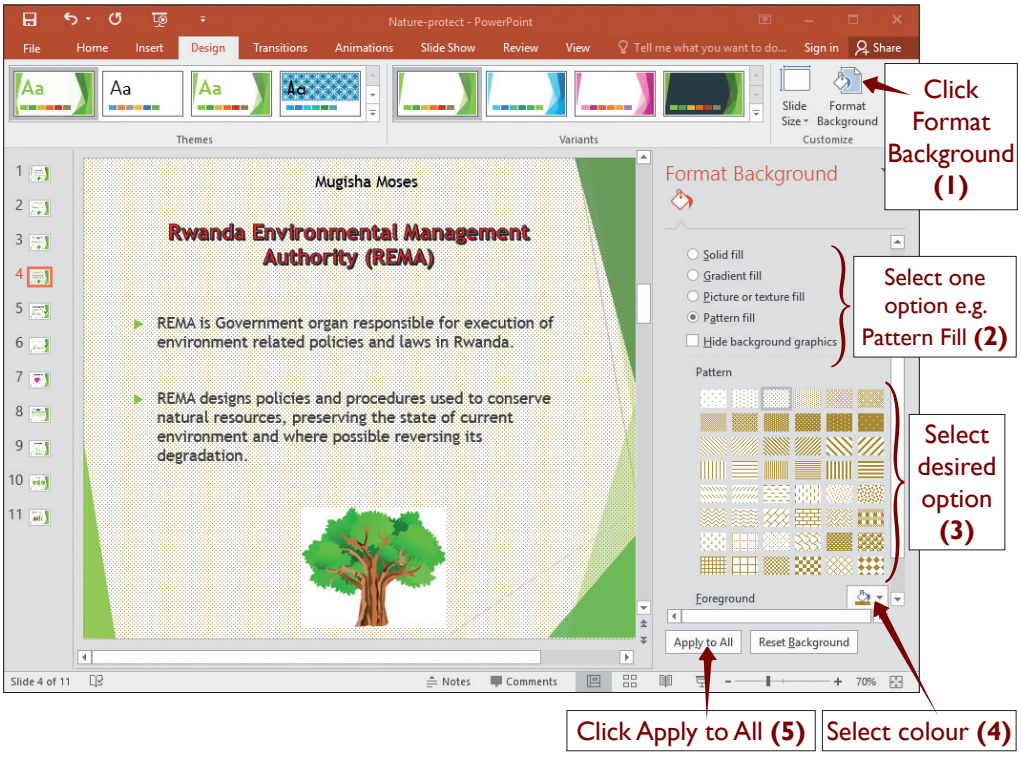
Step 1: Select text to apply a font. **Font** changes font size, colour, style, Shadow, etc.) from the **Home** tab. Apply bold, size 24, red, shadow on all slide titles and size 18 plus shadow to the other text.



Picture 6.49: A slide where formats have been applied to title and subtitle

Step 2: Change **background**

To change the background click on the **Design** tab, then in customize group click on **Format Background** button. Follow the steps as shown in the picture 6.50 and save change to your file.

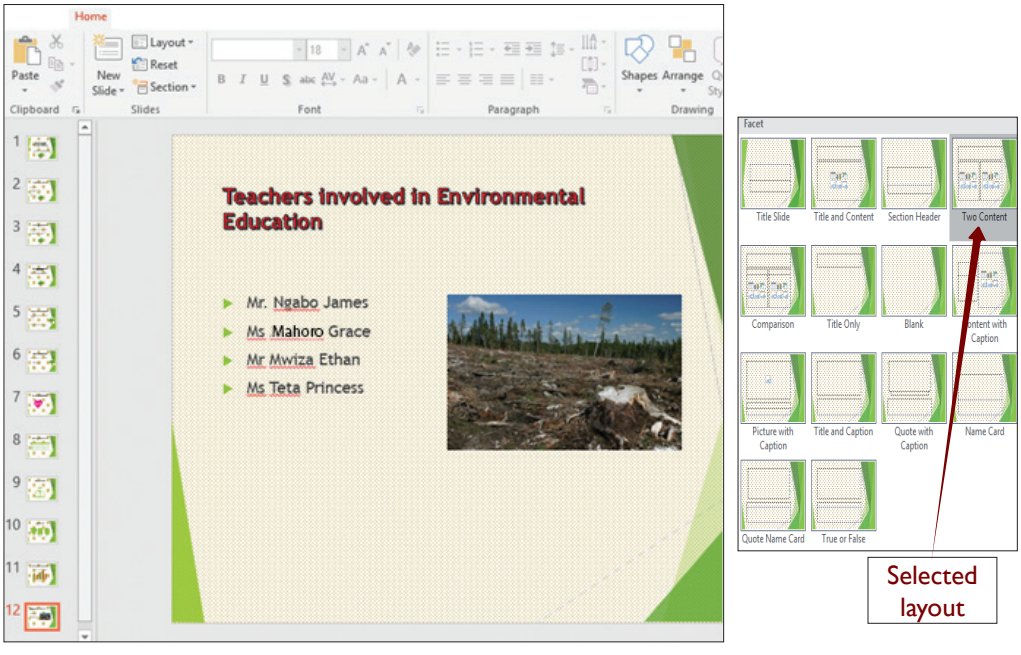


Picture 6.50: A presentation where a design **background** has been applied to all slides

Step 3: Change **slide layout**

In case you need to insert a special type of information on a slide, you need to change its layout. You do this by selecting a suitable layout from the list of **layout**s in the **Slides** group found on the home tab of the menu bar.

In the **Nature-protect** file, insert a new slide after the last slide and then apply a 2-column slide layout. Type in the names of 4 teachers on the left and suitable picture on the right; who are involved in environmental education at your school. The slide may appear as shown in picture 6.51.



Picture 6.51: A slide where a two Content layout has been used

6.6 Animation of a presentation

Animations are presentation features that give motion or life to text or objects in the slide show. Animation effects can be added to text or graphic objects and if well applied, can bring excitement and increase the audience ability to understand your message. If they are not used well, can bring frustration and confuse the message you are communicating.

6.6.1 Applying animations to text or objects in a presentation

Activity 6.8

Open Nature-protect presentation and apply animations to all text and pictures. Apply a suitable transition effect and run the slide show.

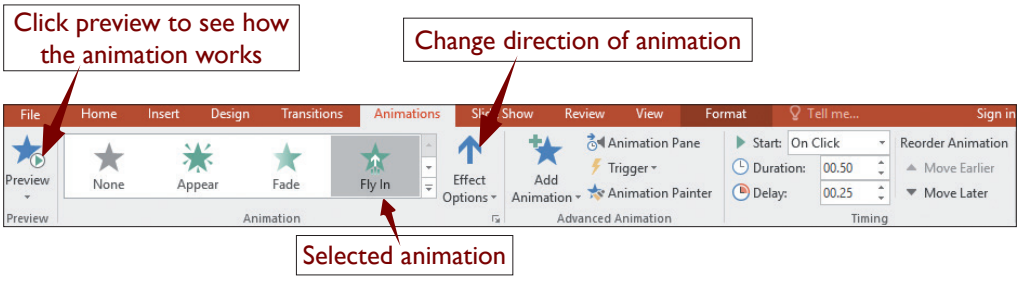
Use the following steps to apply animations you want.

Step 1: Select text or object you want to animate.

Step 2: On the **Animations** tab, in the Animations group, select one animation you want e.g. Fade, Fly, etc.

Step 3: Apply **Timing** to animation, that is, in the **Timing** group, increase or reduce the duration or delay of the animation. See picture 6.52.

> **Note:** To apply **Custom Animation**, use the **Advanced Animation** group as shown in the picture below.



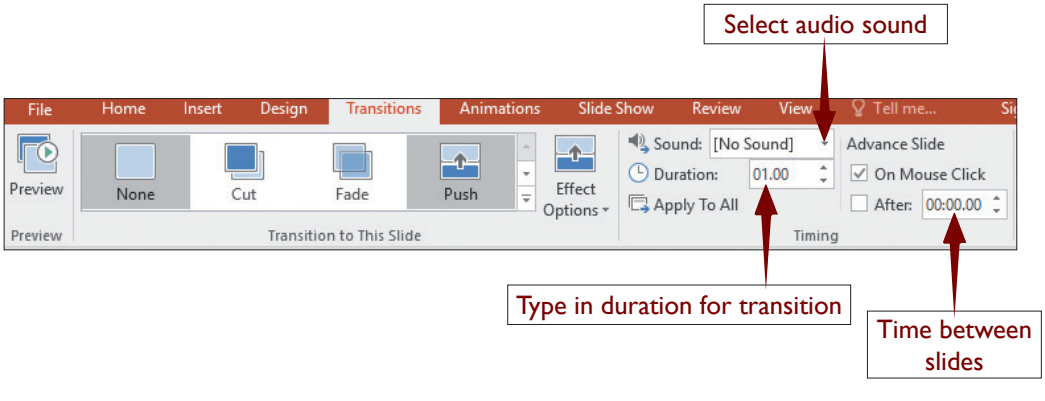
Picture 6.52: The ribbon with Animations tab active. **Fly-In** Animation is selected from Animation group

6.6.2 Apply a slide transition effect in a presentation

Open the file Nature-protect. Use the following steps to apply a slide transition.

Step 1: Click on the **Transitions** tab.

Step 2: Select a *transition effect* of your choice from the **Transition to This slide** group.



Picture 6.53: The ribbon with Transitions tab active, and push transitions effect selected

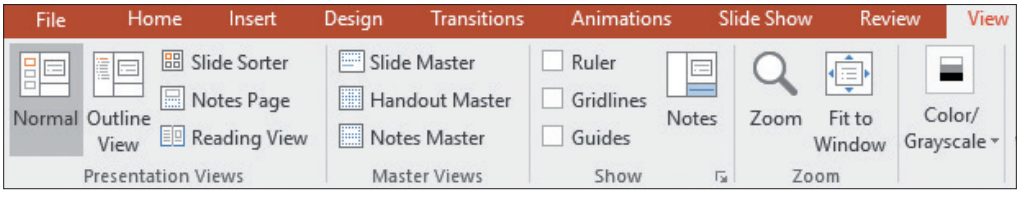
Step 3: Click **Apply to All** in the timing group so that the transition selected is used by all the slides. Doing this will save you time of selecting different transitions for each slide in the presentation.

Step 4: Click **Preview** in preview group to see how the selected transition works.

Step 5: Save the changes to your file by pressing **Ctrl + S** on keyboard.

6.7 Presentation views

When a PowerPoint presentation is being shown to an audience it may have different looks referred to as views. The ribbon below shows different views available in PowerPoint 2016.



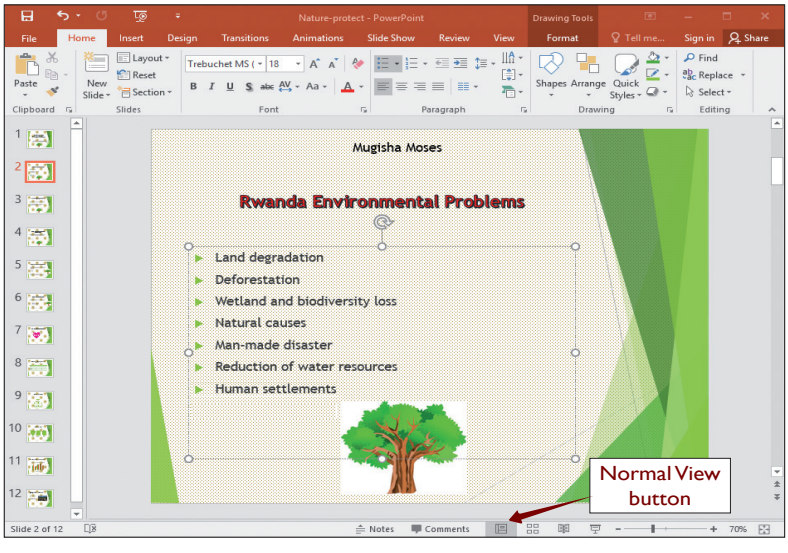
Picture 6.54: The Ribbon displaying **View** tab commands that includes Presentation Views and Master Views

Steps to access all presentation views together

On **View** tab in the **Presentation Views** group, click a presentation view e.g. **Notes Page**.

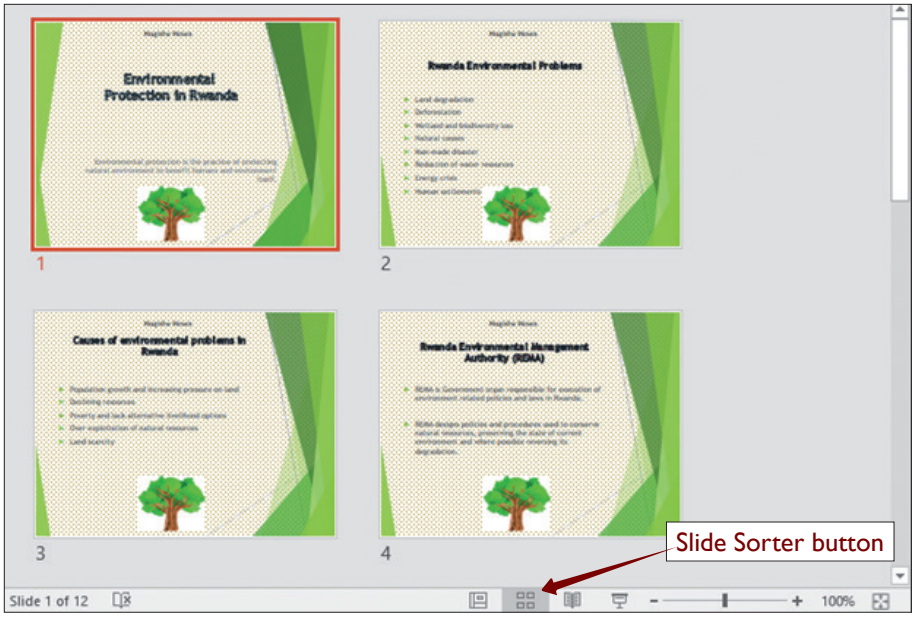
See picture 6.55. You can also access the main presentation views by clicking on the respective buttons on the right of **status bar** (before zoom). The views used for **creating and editing a presentation** are:

(i) Normal View: It is the main working window in the presentation. Every slide is shown full size on the screen.



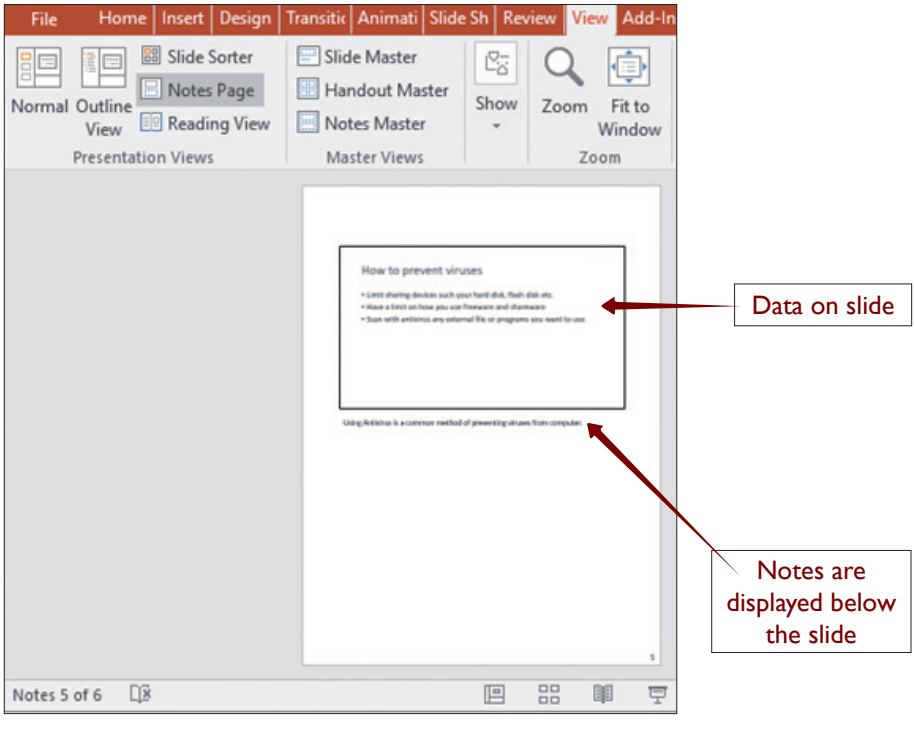
Picture 6.55: A presentation in Normal View. The slide pane is the major working window

(ii) Slide Sorter View: This is a window that displays miniature (small) versions of all your slides, arranged in horizontal rows. This view is very useful when you want to duplicate, delete, hide or reorder slides.



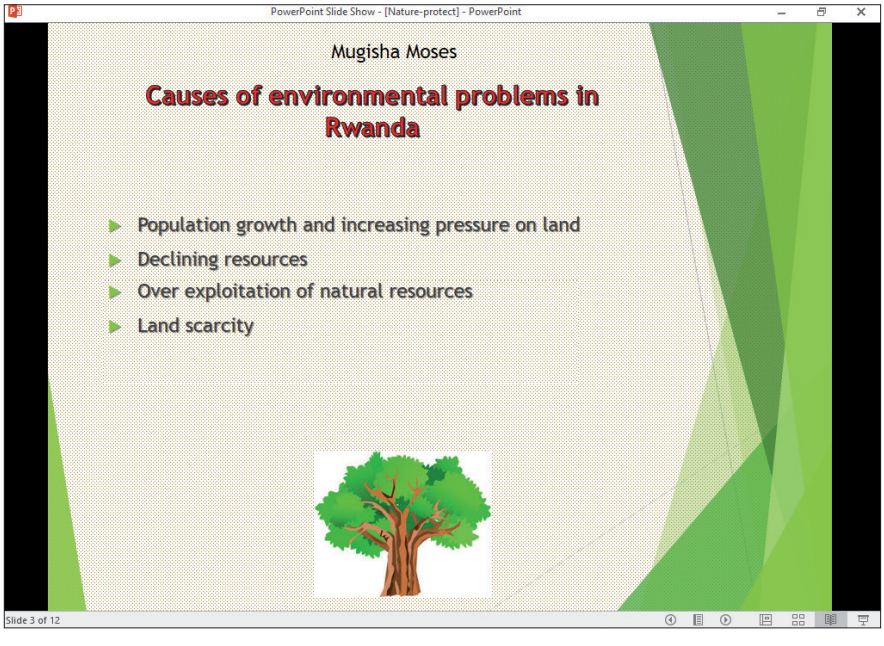
Picture 6.56: A presentation in Slide Sorter View

(iii) Notes Page View: This is located under Slide pane. It shows a smaller version of a slide with an area below for adding speaker's notes. Each slide is created on its own notes page. The speaker can print these pages out to use as a reference while making his/her presentation. The notes do not show on the screen during the presentation.



Picture 6.57: MS PowerPoint window showing slide 5 in **Notes Page View**

(iv) **Reading View:** In this view a slide is shown in full screen mode like it is to slide show view. This difference is that in Reading View you can still see the title bar and status bar at the top and at the bottom of the window respectively.

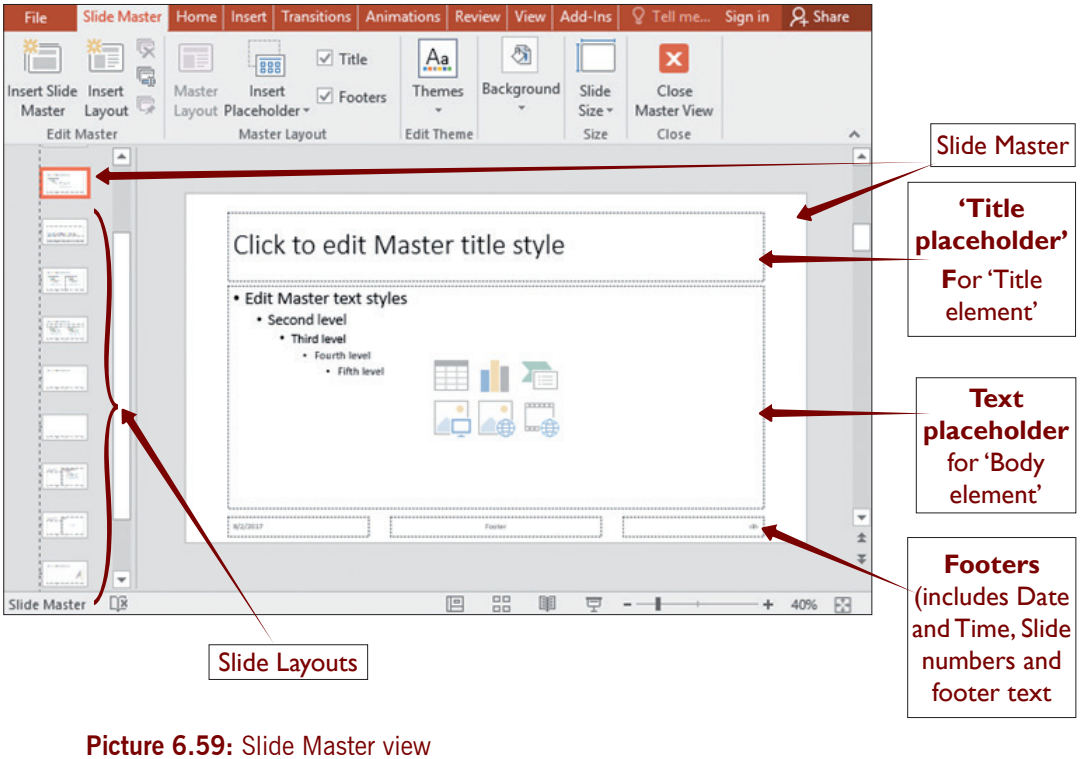


Picture 6.58: A slide in Reading View

(v) Master Views: Master Views are the main slides that store information about the presentation including background, colour, fonts, effects, placeholder sizes and positions.

By using Master views, you can make universal slide changes to every slide, notes page or handout associated with your presentation. These views include:

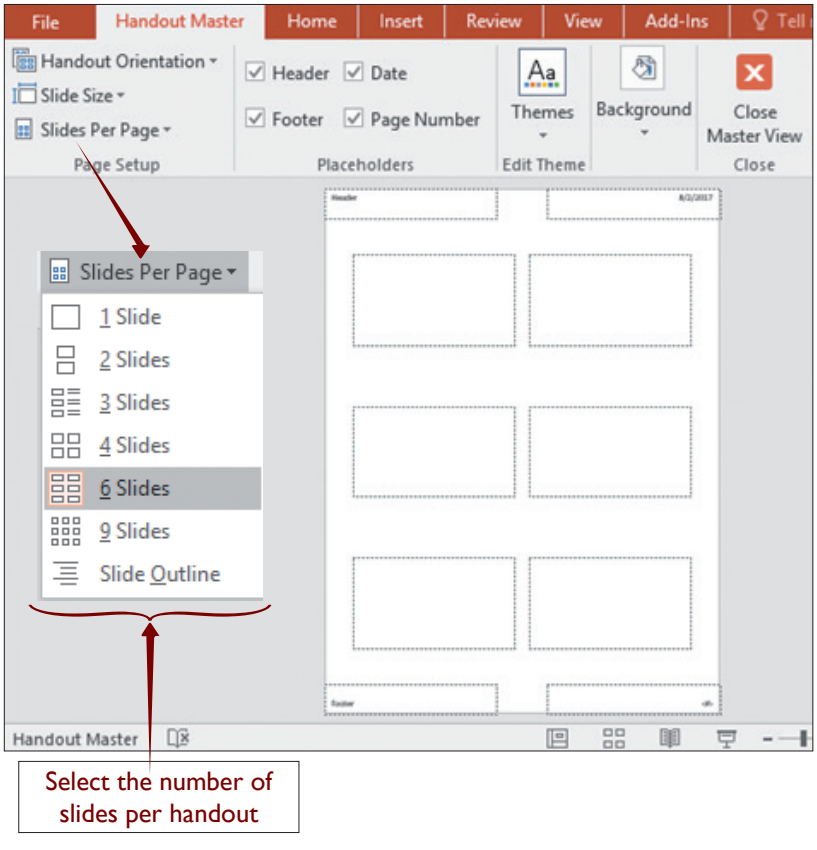
a) **Slide Master:** When you make a change on the slide master, it replicates on all the slide layouts and slides. The **slide layout**s can receive all the formatting, position and common elements from slide master but you can also edit individual slide layouts to differ from the master slide. Any change you make to a slide layout affects only the slides based on that particular layout.



Picture 6.59: Slide Master view

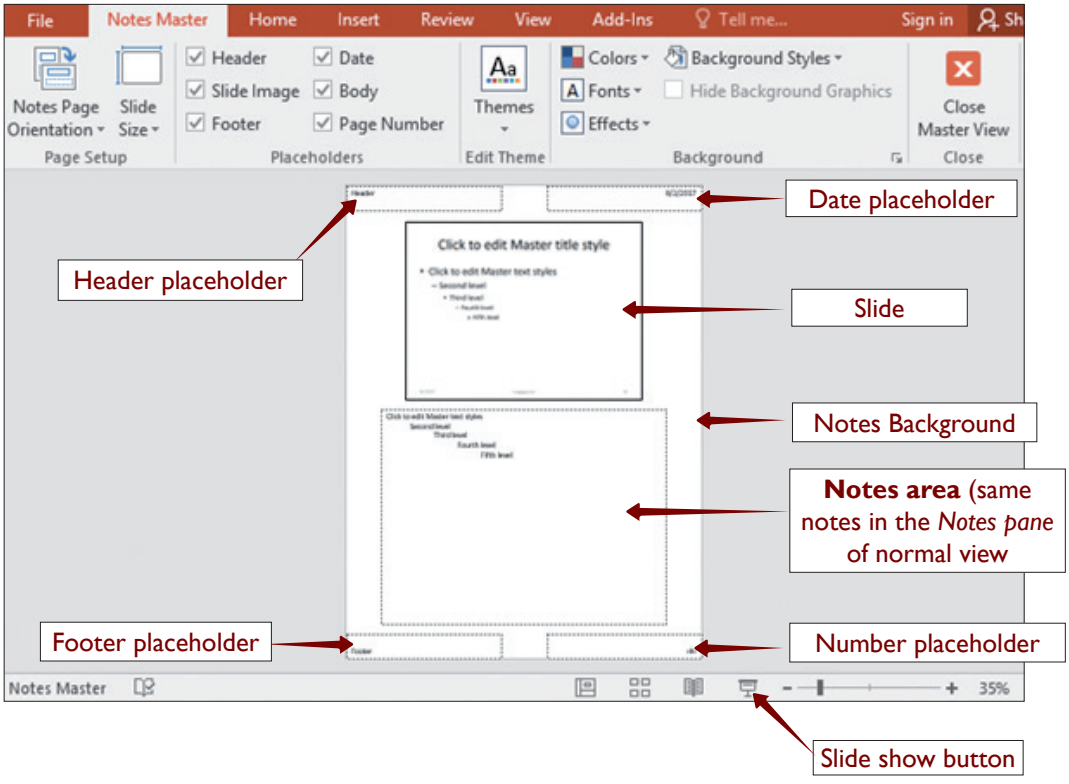
> **Note:** It is important to make modifications to your slide master and slide layouts before adding slides to your presentations. This makes items on the slides to conform to slide master design.

b) **Handout Master:** A handout is a document that you can print from within a PowerPoint presentation. You can have 1 up to 9 slides on a handout page. A handout is created to be printed out. The appearance of a printed handout is determined by the handout master.
To access handout master, click **View** tab on the Ribbon and select **Handout Master** from **Master Views** group.



Picture 6.60: MS PowerPoint 2016 window displaying the **Handout Master** View

c) **Notes Master:** Each slide in your presentation could have notes associated with it and these placed in the **Notes Pane area**. If you want to modify and print these notes, you make use of the **Notes Master**.
To access Notes Master: On the **View** tab, click **Notes Master** in the **Master Views.**

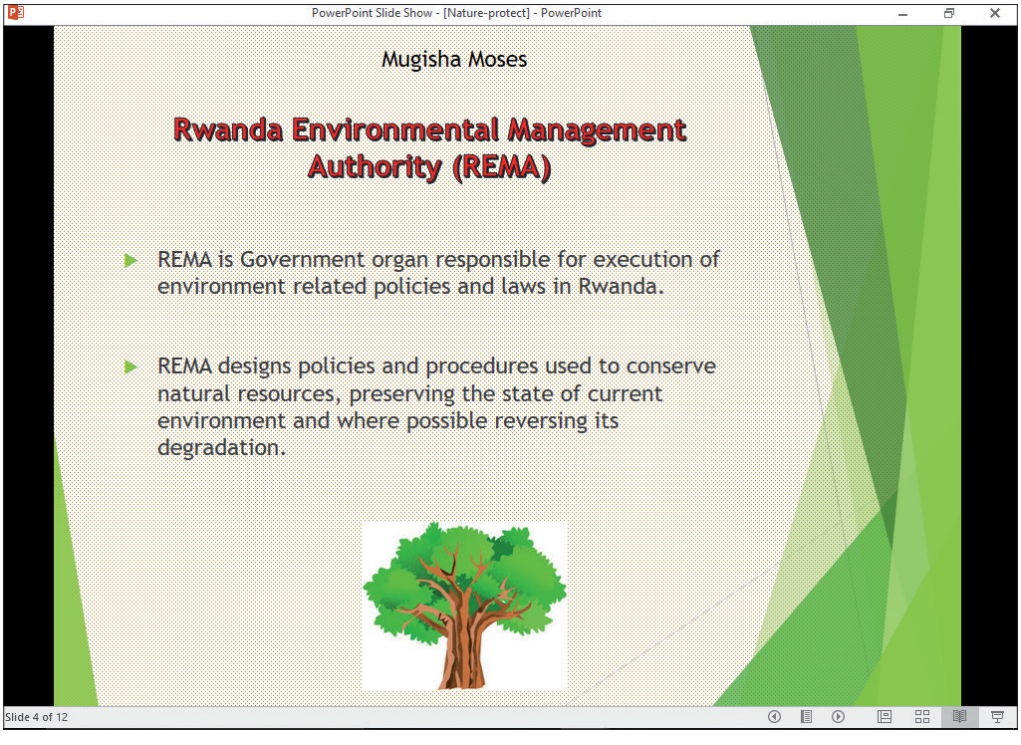


Picture 6.61: Notes Master View

Slide show

This is a window that fills the whole screen when it runs. It displays any animations or transitions added to the slide in the presentation. Each page of a PowerPoint presentation is called a *slide* and the default orientation of the slide is in *landscape* layout.

Slide shows can contain eye-catching text, bulleted lists, charts, graphic objects or be completely covered by a single picture, as in a photo album.



Picture 6.62: Slide show filling the whole screen

End of Unit 6 Assessment

1. Computer viruses are some of the biggest limitations faced by computer users all over the world. As a computer learner, you have been tasked to educate computer users about this threat. Create 6 slides which you are going to use during the presentation to your audience following the guidelines below:

   Slide 1: Should include the title and definition of **Computer virus, your name as presenter and school**.

   Slide 2: Should include **symptoms of viruses on a computer system**. Add an audio clip on this slide.

   Slide 3: Should include the **damage made by viruses in a computer** and its accessories.

   Slide 4: Should include **ways through which viruses spread to computers**.

Slide 5: Should include the **precautions of preventing viruses** from entering the computer.

Slide 6: Should include ways to **treatment of computer viruses.**

Each slide should have the following additional information:

a) Relevant message needed to convey the required information.
b) Apply bold and shadow effects to all slide titles.
c) Your name, class and slide number as **Footer** of each **slide** and on the **Handouts.**
d) Use minimal but relevant effects (animation and transition) to make the presentation entertaining.
e) Search for a suitable online picture about computer viruses and insert it at the top right hand side of each slide using the **Slide Master**. Save presentation as **Virus**.

2. Create a presentation of **six slides** on the topic of **Impact of computers to Rwandans** which will be used to conduct ICT lesson in S3 class.
   a) (i) **Slide 1** should have the title of the topic, **definition** of term *computer* and *Name of presenter* (as Wordart).
      (ii) **Slide 2** should have the **advantages** of computers to Rwanda people. Link a suitable video clip on this slide.
      (iii) **Slide 3** should have the **disadvantages** of computers to Rwanda people.
      (iv) **Slide 4** should have **uses** of computers in Rwanda.
      (v) **Slide 5** should have list of hardware and software or programs used in your school in form of a 2-column table.
      (vi) **Slide 6** should have a column chart about number of computers used by different classes in your school. Use the data in the table below to create a 3D column chart.

Class	Number of computers used
S1	120
S2	150
S3	210
S4	90
S5	75
S6	50

Note: Provide a suitable chart title, axis titles and slide title.

b) Apply minimum **animations** in your presentation.

c) Insert relevant **picture** on the master slide in the lower left of each slide. (Use *view* tab, then *slide master*, click the first slide in the list, insert clip in correct place and close the master view).

d) Insert your name and class as footer on both the slides and Notes and Handouts page.

e) Use a suitable background design of your choice.

f) Insert slide number on all slides.

g) Make your slide to run automatically after 3 seconds.

h) Save your work as **Today's Computer**.

3. a) Create a presentation about Deforestation in Rwanda following the procedure below:
   - On the first slide: Topic and definition
   - On the second slide: Importance of Deforestation
   - On the third slide: Disadvantages of Deforestation
   - On the fourth slide: Areas most affected by Deforestation in Rwanda
   - On the fifth slide: Methods used to reduce Deforestation.

b) Save the presentation as **Deforestation**.

c) Insert a header as 'your name and class on the Handout.

d) Change the background of all the slides to an appropriate format of your choice.

e) Set a slide transition of your choice, with transition time of 6 seconds. Apply an audio sound from your PC on a slide of your choice.

f) Set animation of your choice for all slide titles and other parts of the slides.

g) Make use of relevant graphics or pictures, from your PC or Internet.

h) Insert a summary table slide between the last slide and second last slide with the following data.

Level of Deforestation

Year	Developing Countries	Developed Countries
1950	Very low	Very high
1970	Low	High
1990	High	Low
2010	Very high	Very low

Make use of the Notes pane to add **speakers notes**.

i) Save and print your work as a handout.

APPLICATION SOFTWARE

Graphics and Multimedia

Unit 7

Introduction to Computer graphics

Key unit competence

Create graphics using basic graphic elements and edit predefined graphics.

7.1 Introduction

Sketch something on paper (a man or a house). Changing what you draw can be easy or hard: you can erase pencil or charcoal marks easily enough, and you can scrape off oil paints and redo them with no trouble; but altering watercolours or permanent markers, swapping colours or resizing your picture is more complicated.

That's why it is more efficient to draw a picture on a computer screen and what you have is a piece of digital information (your picture is stored as a series of numbers). Change the numbers and you can change the picture, in the blink of an eye or even quicker. It's easy to shift your picture around the screen, scale it up or down, rotate it, swap the colours, and transform it in all kinds of other ways. Once it's finished, you can save it, incorporate it into a text document, print it out, upload it to a web page, or email it to a client or work colleague, all because it's digital information.

7.2 Definition

7.2.1 Computer graphics

This is the use of a computer and specialised programs to produce and manipulate images.

The purpose of creating computer graphics is mainly for: Animation, business presentation and scientific research.

There are two very different ways of drawing digital images on a computer screen, known as **raster** and **vector** graphics.

7.2.2 Bitmap/ Raster graphics

A bitmap (or raster graphic) is a digital image composed of a matrix of dots. A bitmap graphic is composed of many tiny parts, called **pixels**, which are often many different colours. It is possible to edit each individual pixel.

When you take a photograph using a digital camera or scan an image from a magazine, you are creating a bitmap graphic.

Since the computer has to store information about every single pixel in the image, the file size of a bitmap graphic is often quite large. When you resize a bitmap graphic, it tends to lose quality.

7.2.3 Vector graphics

Vector graphics are graphics stored and drawn with instructions rather than grids of pixels. Vector images are mathematical calculations from one point to another that form lines and shapes. If you zoom into a vector graphic it will always look the same.

7.2.4 Comparing Raster graphics and Vector graphics

Vector graphics	Raster (Bitmap) graphics
Mathematical calculations that form shapes.	Pixel-based.
Vector programs best for creating logos, drawings and illustrations, technical drawings. For images that will be applied to physical products.	Raster programs best for editing photos and creating continuous tone images with soft colour blends.
Can be scaled to any size without losing quality.	Do not scale up optimally - Image must be created/scanned at the desired usage size or larger.

Resolution-independent: Can be printed at any size/resolution.	Large dimensions & detailed images equal large file size .
A large dimension vector graphic maintains a small file size.	It is more difficult to print raster images using a limited amount of spot colours.
Number of colours can be easily increased or reduced to adjust printing budget.	Some processes cannot use raster formats.
Vector art can be used for many processes and easily rasterised to be used for all processes.	Depending on the complexity of the image, conversion to vector may be time consuming.

Table 7.1: Comparison table between vector graphics and raster graphics

7.2.5 Resolution

Resolution is the total number of pixels that make an image. In general, the more pixels used when capturing an image, the sharper the stored image is. This is called resolution, it is measured in dots per inch (dpi).

7.2.6 2-Dimensional computer graphics

2-Dimensional computer graphics are mainly used in applications that were originally developed upon traditional printing and drawing technologies. In those applications, the two-dimensional image is not just a representation of a real-world object, but an independent artifact with added semantic value. Two-dimensional (2D) models are therefore preferred because they give more direct control of the image than 3D computer graphics, whose approach is more similar to photography than to typography. 2D images are in an x-y plane.

7.2.7 3-Dimensional computer graphics

3D graphics, compared to 2D graphics, are graphics that use a three-dimensional representation of geometric data. For the purpose of performance, this is stored in the computer. This includes images that may be for later display or for real-time viewing.

7.2.8 Core elements of computer graphics

- **Modelling** is the process of developing a mathematical representation of any three-dimensional surface (3D) of an object (either living or non-living) via specialised software. The product is called a 3D **model**.
- **Rendering** is the process of converting automatically 3D wire frame models into 2D images with 3D photorealistic effects or non-photorealistic rendering on a computer.
- **Animation** a process that uses computer generated images to create **animated** scenes. An animated scene starts with one picture, which is referred to a frame.
- **Interaction** is a technique of using a physical input/output device to perform a broad task in a human-computer dialogue.

7.3 Graphic file format

7.3.1 Definition

Graphic images are stored digitally using a small number of standardised graphic file formats such as:

- **BMP:** Limited file format that is not suitable for use in prepress. It is a file extension for **Bitmap** file.
- **GIF:** Graphic Interchange Format mainly used for internet graphics.
- **JPEG:** Joint Photographic Experts Group which is used for internet graphics, photos, etc.
- **TIFF:** Tag Image File Format a popular and versatile bitmap file format.
- **PNG:** Portable Network Graphics.

7.4 Areas of graphics use

Graphics are visual elements often used to point readers and viewers to particular information. They are also used to supplement text in an effort to aid readers in their understanding of a particular concept or make the concept more clear or interesting.

- **Entertainment:** Animated pictures, audio – videos, and TV shows, Computer games.
- **Advertisement:** Graphics are among the primary ways of advertising the sale of goods or service e.g. creating logos.

- **Book illustrations:** To produce illustrations which summarise various kinds of data. E.g. it is used to illustrate themes and concepts such as human anatomy in Biology and diagrams in mathematics.
- **Magazines:** Magazines contain graphic materials in abundance to attract readers.
- **Education**: As learning and teaching aid.
- Computing designing computer games, web sites.

7.5 Graphics software

Graphics software are better at creating and manipulating bitmaps or vector graphics.

7.5.1 Bitmap/Raster graphics software

This software includes Microsoft Paint and Adobe Photoshop.

Microsoft Paint

A paint program is a software graphics program that allows the user to draw or paint bitmapped images on a computer.

Adobe Photoshop

This is a professional software used in photography, design and video editing. It is a program that can edit images of any type. It was developed by Adobe systems. Photoshop is mainly a raster graphics editor. Photoshop is used in a similar way as Paint but in a more professional style. More information about Adobe is provided at the end of the unit.

Vector graphics software

Vector graphics software commonly used include: Adobe Illustrator, Adobe FreeHand, CorelDraw, Paintshop Pro.

7.5.2 Microsoft Paint

Windows operating system comes with a basic, easy-to-use image creation program called Microsoft Paint which is a basic raster graphics program capable of creating, opening, and basic editing of image files, including BMP, JPG, GIF, and PNG. The default bitmap file type for Paint is BMP.

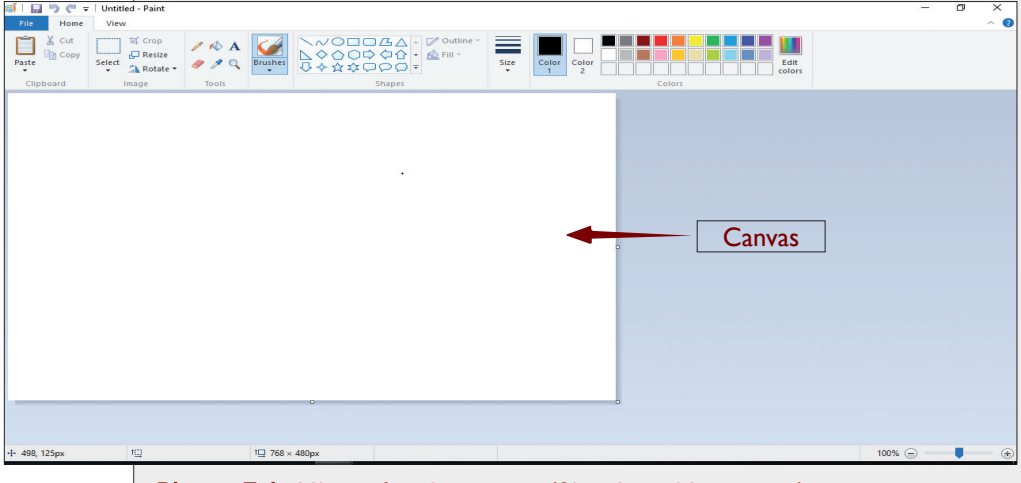
Activity 7.1

Launch MS Paint program on your computer

Follow these steps to open Ms Paint:

- Click the start button, all programs.
- From windows accessories, choose Paint.

The following window appears.

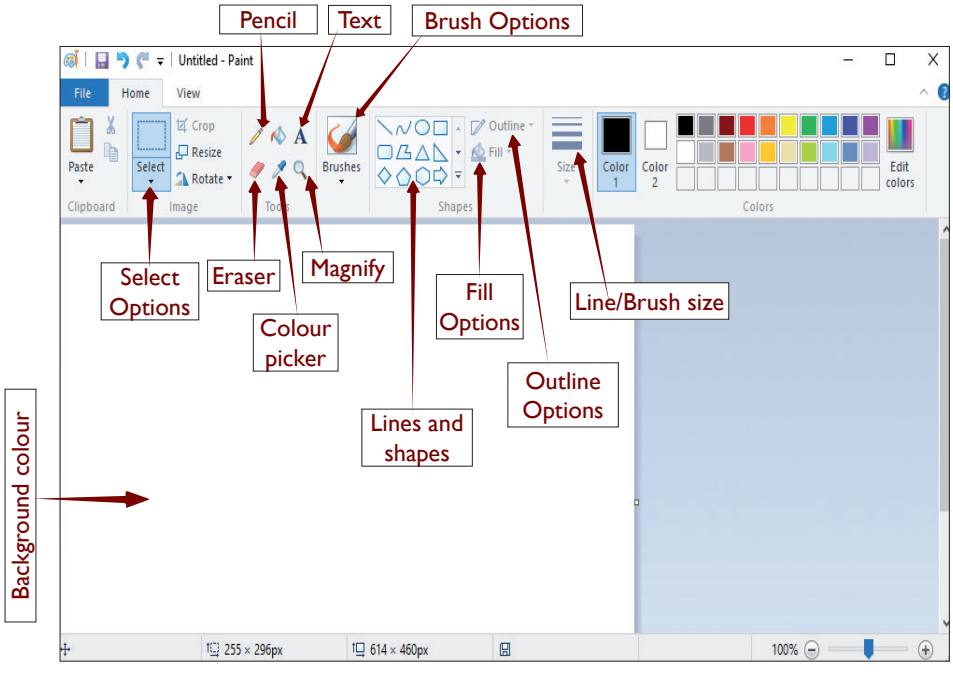


Picture 7.1: Microsoft paint at start (Showing white canvas)

Understand the canvas

When Paint launches, you'll see a white "canvas" appear on the screen. Imagine this canvas as a piece of paper for you to draw or write on. You can adjust the size of the canvas before you start creating your masterpiece.

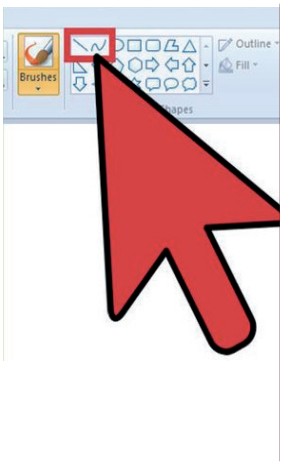
7.6 Basic graphic elements (with MS Paint)



Picture 7.2: MS Paint with its Ribbons showing graphics elements

7.6.1 Line and curve tools

Using the already open paint program, you are going to locate and use the following tools;



Picture 7.3 (a): Part of MS Paint showing line and curve tools

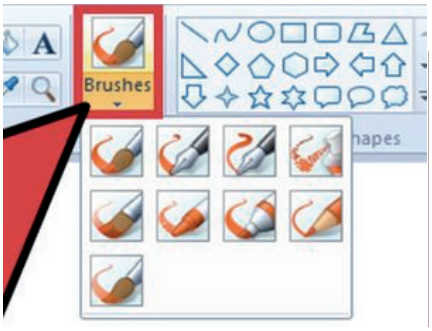
Line

- Click the Straight Line tool, then choose a colour from the palette.
- Click anywhere in your canvas.
- While holding down the mouse button, drag the mouse away in any direction.
- Release the button when the line is as long as you want it to be.

Curved line

- Click the Curve icon (a squiggly line).
- Draw a line as you would with the straight line tool.
- When you lift your finger from the mouse button, click somewhere on the line and drag it in any direction.
- The straight line you drew will curve in that direction.

7.6.2 Paintbrush tool

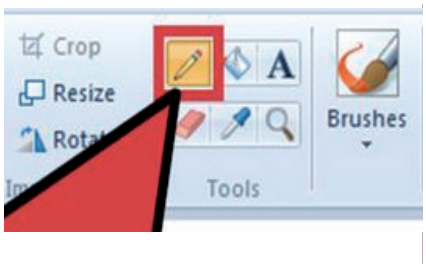


Picture 7.3 (b): Paint brush tool highlighted

The Paintbrush is more versatile than the Pencil, as you can choose different brush "tips" for more unique lines.

- Click the down-arrow beneath "Brushes" and
- Choose one of the brush tips. You can adjust the size of each brush tip by clicking the "Size" icon.

7.6.3 Pencil tool



Picture 7.3 (c): Pencil tool highlighted

The pencil is a freehand drawing tool, much like an actual pencil. The width of the line can be adjusted by clicking the Size menu and selecting a different line width.

- To draw, simply press the mouse button as you move the mouse on the canvas.

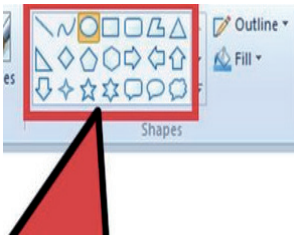
7.6.4 Spray can

Picture 7.3 (d): Airbrush highlighted

This tool works similarly to the Paintbrush tool, but the look is more in line with that of spraycan paint. This tool is located in the "Brushes" menu.

- Click the icon that looks like a can of spray paint.
- Draw as you would do with the pencil or brush tools.

7.6.5 Shapes (circles, ovals, squares, rectangles, etc.)

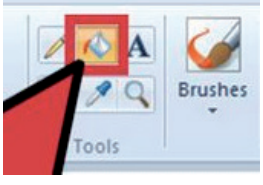


Picture 7.3 (e): Shapes that can be drawn in MS Paint

Select any shape from the toolbar to draw that shape. Once you've chosen a shape, you'll notice some options for the shape's appearance.

- Click the "Outline" and "Fill" menus to view your options.
- Select your preferred outline and fill options, then click the canvas where you'd like to place your shape.
- Hold down the mouse button as you drag the cursor to enlarge the shape. Let go of the mouse button when you reach the desired shape size.
- If you choose a shape with an outline, the colour of the outline will be the current foreground colour. If your shape has a solid filling, the fill colour will be the background colour.

7.6.6 Fill tool



Picture 7.3 (f): Fill tool button-highlighted

Also known as the "Paint Bucket," the Fill tool will paint an entire defined area with a single colour.

- Click the icon that looks like a spilling paint bucket, then choose a colour from the palette. Now, click the canvas to fill it with the colour you selected.
- The Fill tool will fill the space between all closed lines. Create a square or circle with the shape tool in one colour, then use the Fill tool to change their inside colour.

Activity 7.2

Use an ellipse tool to create a basketball with a suitable background.

7.6.7 Ellipse tool

To get a round shape that has a black outline and an orange interior, use the following steps:

Step 1: Choose the Ellipse tool.

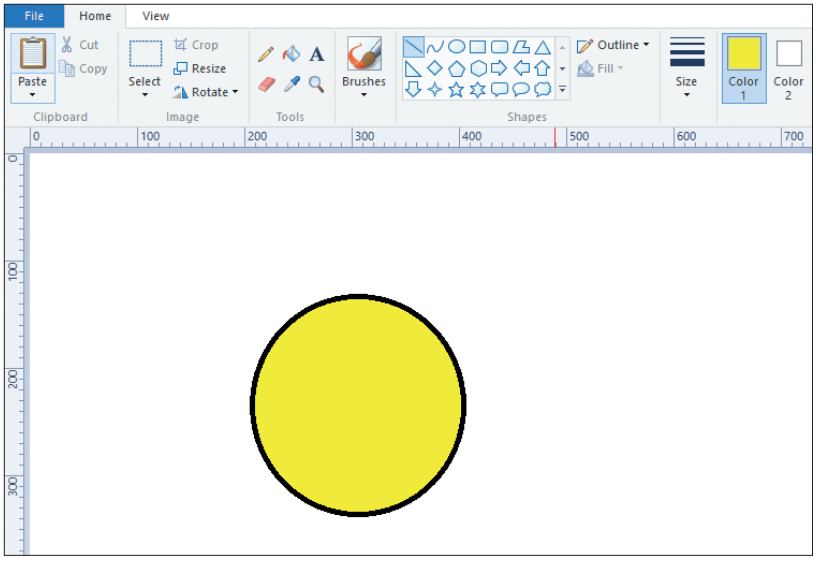
Step 2: In the Fill options area, choose ▼ then select Solid colour.

This will set foreground colour for the outside, and set background colour for the inside.

Step 3: Click the foreground Colour box, and then click black to set the foreground colour.

Step 4: Click the background Colour box, and then click orange to set the background colour.

Step 5: Click and hold the left mouse button and drag the mouse to form the oval.

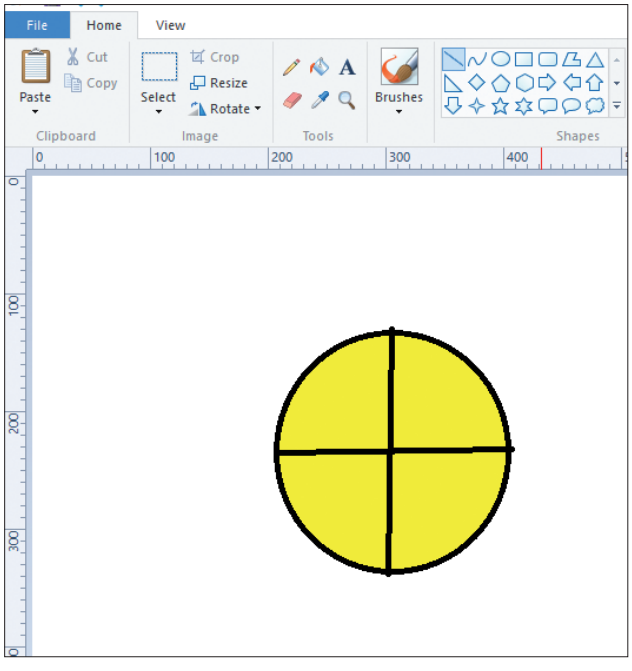


Picture 7.4: Circle shape drawn and filled with colour

Tip: To make it perfectly round, hold down the Shift key as you drag the mouse.

Step 6: Use line tool.

- Now choose the Line tool,
- Then set size, and draw the vertical /horizontal lines, by dragging the mouse.



Picture 7.5: Lines are drawn in circle to make 4 quarters

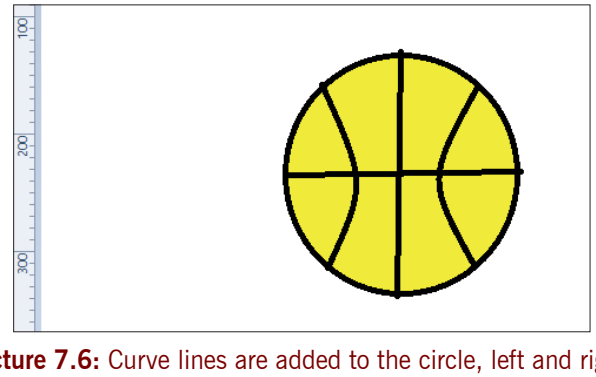
Tip: To make the lines perfectly straight, hold down the Shift key as you drag.

Step 7: Curve tool.

- Now, choose the Curve tool.
- Draw a straight line to the left of your vertical line.
- Click in the middle of the new line and drag it toward the vertical line to curve it.

IMPORTANT: To lock in the new shape, click on some other tool, like the selection tool.

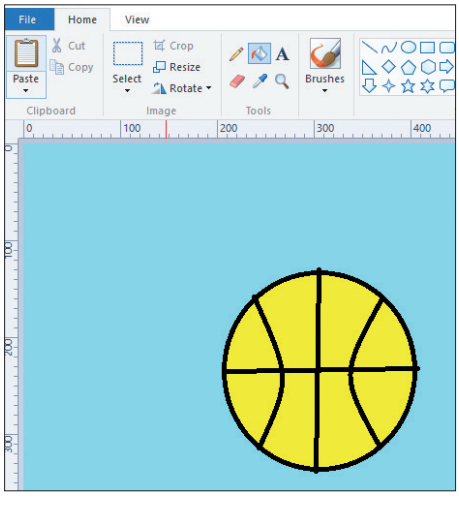
- Now, choose the Curve tool again.
- Draw a straight line to the right of your vertical line.



Picture 7.6: Curve lines are added to the circle, left and right

Step 8: Fill tool.

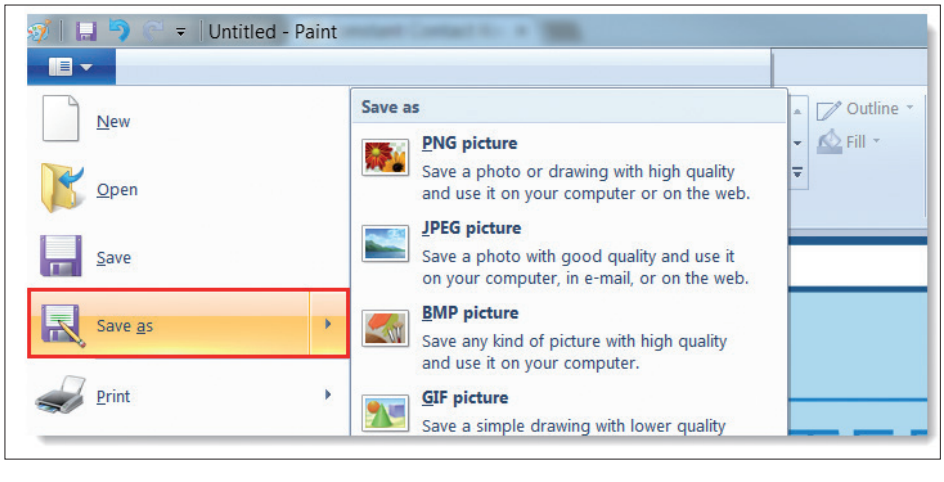
- Now, go ahead and fill the white canvas with a different colour.
- The Fill with colour tool will flood a connected area with the colour you choose.
- The final product should look something like this:



Picture 7.7: A background is added using Fill with colour tool

Step 9: Save your work.

- From File menu, choose Save as.
- From a dialog box, choose **BMP picture**.



Picture 7.8: Saving MS Paint file

- Choose the location where you want to save.
- Type the name you wish to use **(ball)** make sure it will be saved as a 24 bit Bitmap – this will add .bmp to the filename for example: **ball.bmp.** We shall use this file later on.

7.7 Graphic features

In order to use graphics features well, you should learn to select images or parts of the image to be affected/changed by the graphic feature. To select is to choose an option from two or more available options. Practice selecting image parts you may need to cut, copy or fill with colour.

7.7.1 Selection tools

There are two different tools you can use to select parts of your image:

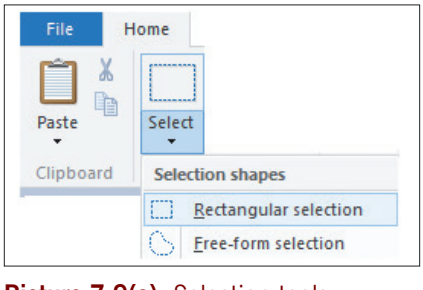
- Rectangular Selection (a dotted outline of a rectangle).
- Freeform Selection (a dotted outline of oval shape).

Free-form selection allows you to draw your own freehand selection line around an image, while the **rectangular selection** tool lets you draw a rectangle around an image.

Steps to select an image

Step 1: Click the arrow beneath the "**Select**" button.

Step 2: Choose "**Rectangular**" or "**Freeform**." See picture 7.9(a).



Picture 7.9(a): Selection tools

Step 3: To use either tool selected, start by clicking at the top left corner of your image, then hold down the mouse button as you trace your way around the image. Then release the mouse.

7.7.2 Copy and paste (a selected image)

Follow the steps given below to copy your image:

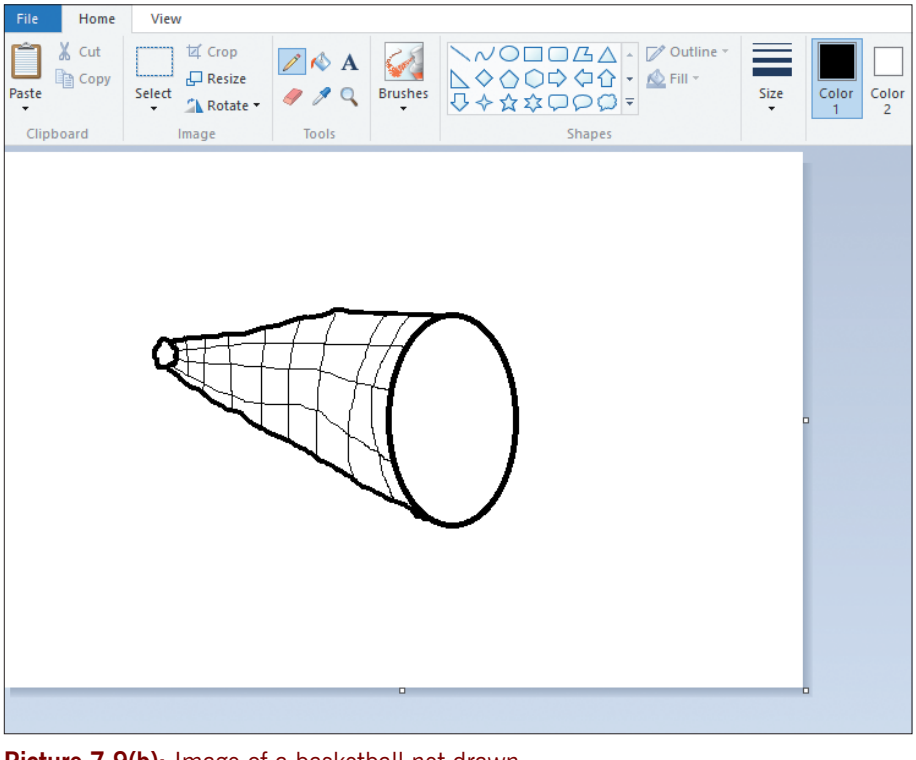
Step 1: Select **Image** and make sure the image is highlighted with dotted rectangle.

Step 2: Copy the selected area by pressing **Ctrl+C** or click **Copy** command from the **Home** tab.

Step 3: Paste the image using **Ctrl+V** or **Paste** command on the **Home** tab.

> **Note:** You can paste the copied selection in the same file in Paint or in other compatible programs, like Microsoft Word or Microsoft PowerPoint.
>
> If the image you want to copy has a background colour that you don't want to be a part of your selection, then:
> - Check "**Transparent Selection**" in the Select menu.
> - And to disable this later, click back to the top selection icon.

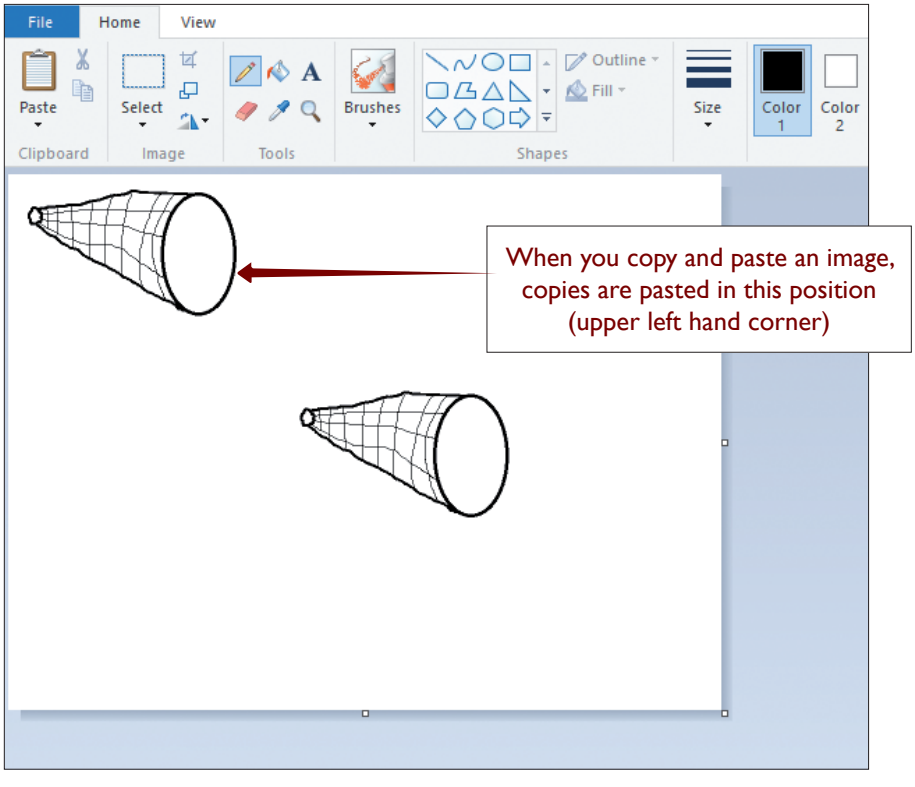
Let us draw an image of a basketball net as shown below. By so doing we are to learn the following tools; copy and paste, move, resize, flip, skew, rotate, cutout, trim. These actions are repeated in this unit for purposes of learning more about paint in respective sections.



Picture 7.9(b): Image of a basketball net drawn

Copy and paste

Follow steps 1 to 3 in section 7.7.2 to copy and paste the image. The results may appear as shown in picture 7.9(c).

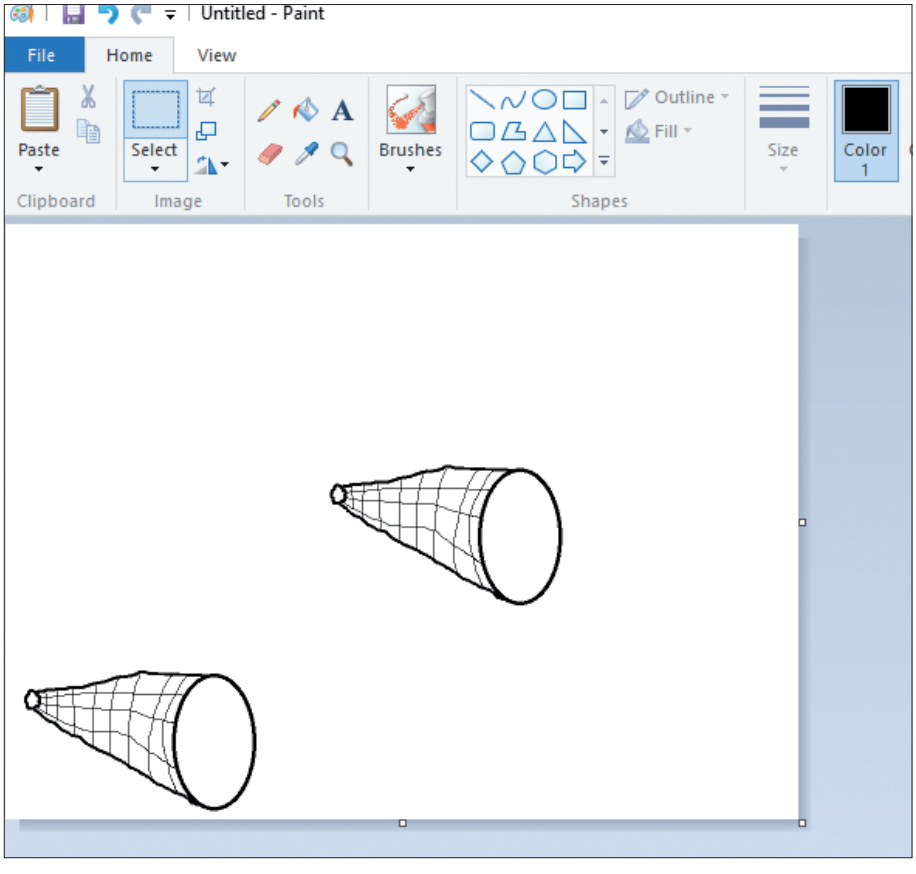


Picture 7.9(c): An image has been copied and pasted in Paint

7.7.3 To move an image

Step 1: Select the image to be moved.

Step 2: Click on the selection and drag to a new position. See picture 7.9(d), the pasted copy has been moved to lower left corner.



Picture 7.9(d): The pasted copy of the original image has been moved to the lower left corner of the canvas

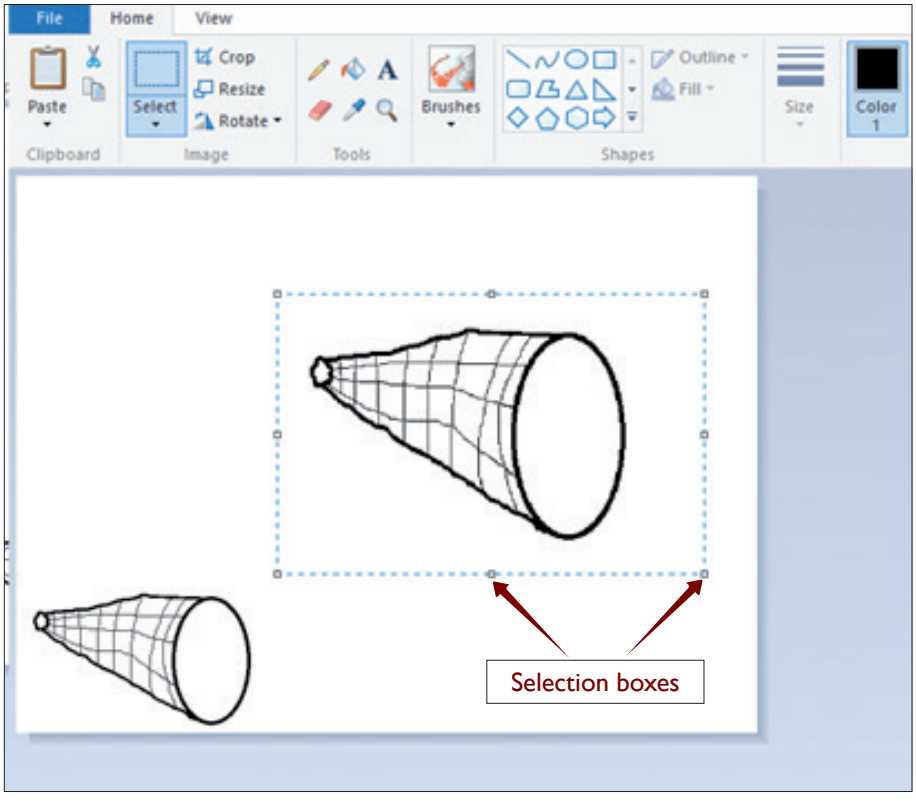
7.7.4 To resize an image

We are going to use original image and we resize it manually.

Use the following steps to resize an image:

Step 1: Select the image

Step 2: Click in any of the selection boxes and drag inwards (to reduce size) or drag outwards (to enlarge its size). See picture 7.9(e).



Picture 7.9(e): Original image has been resized manually

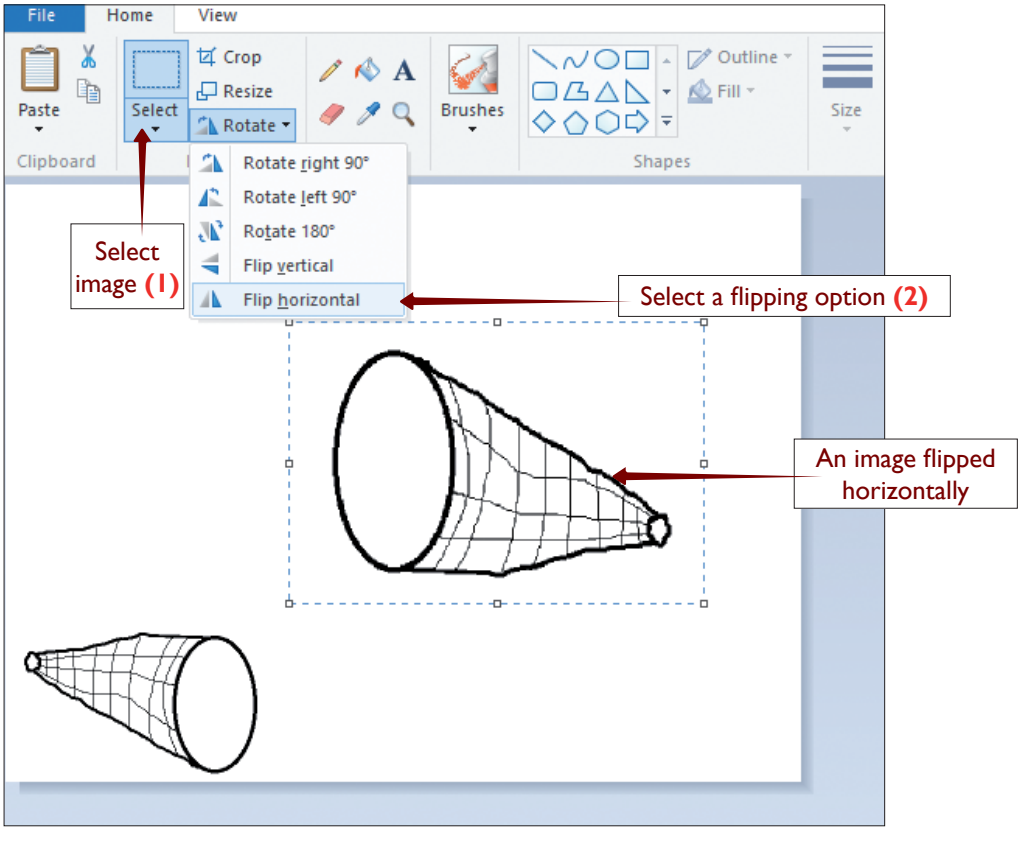
Note: You can also resize the image using the resize tool in the image group. This is covered later on in this unit.

7.7.5 To flip an image

Flipping an image is to change its direction. Use the following steps to flip an image:

Step 1: Select the image to be flipped.

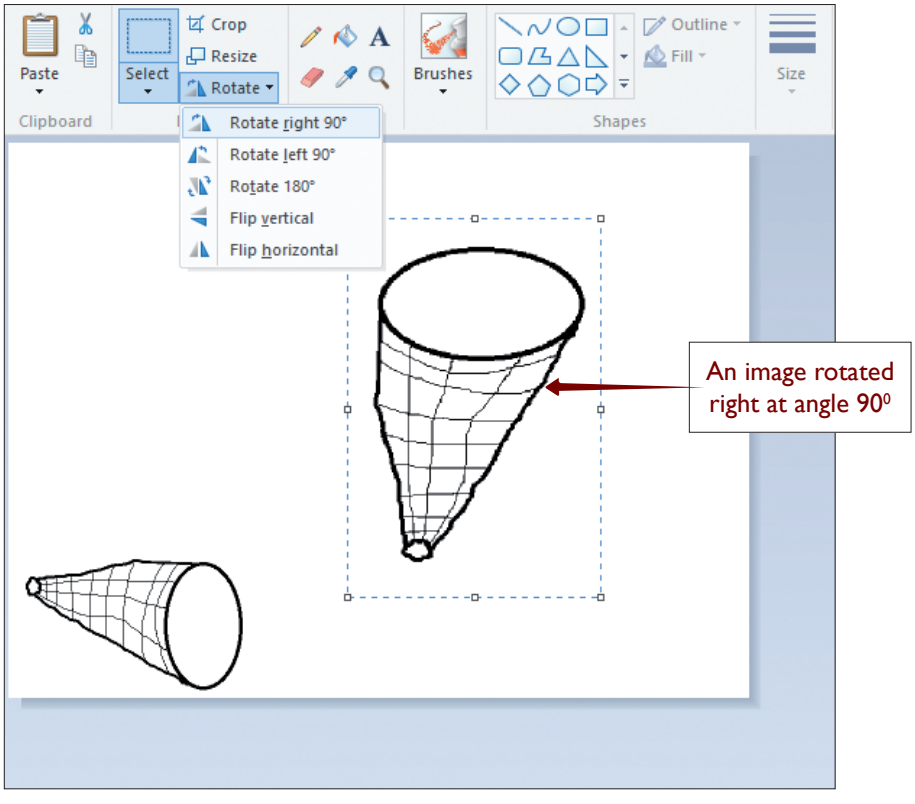
Step 2: In the **Image** group click **Rotate tool** and then select Flip vertical or Flip horizontal. See picture 7.9(f), how the resized image is flipped horizontally.



Picture 7.9(f): The resized image has been flipped horizontally

7.7.6 To rotate the image

Steps: Repeat steps 1 and 2 of part (d) above but instead of selecting a flipping option, select a rotate option e.g. **Rotate right 90⁰**. This task is repeated in other activities later in this book.



Picture 7.9(g): The selected image is rotated right at angle 90^0

7.7.7 To skew an image

Step 1: Select an image.

Step 2: Click **Resize tool** in the Image group.

Step 3: In the **Resize and Skew** dialog box, use section down for skew and type in **Degrees** for skewing the image.

7.7.8 Cut-out or trim an image

Step 1: Select a part of the image you want to cut-out or trim.

Step 2: Press delete key on keyboard.

Activity 7.3(a)

a) Draw the shape of a heart and fill it with red colour.
b) Move the shape to the left side on the page.
c) Copy and paste any half of the shape and move the pasted copy on the right side of the page.

d) Type a Green bold text of font size 26 in the pasted copy as "Divided heart" and "One Heart" text in the original image.
e) Erase a small part of the original shape that you want.
f) Apply a suitable background to the shapes and save your file as 'Our Hearts'.

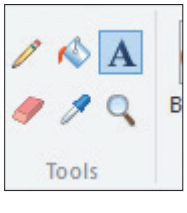
Follow the steps given below to perform this activity

- Open MS Paint.
- Pick the Heart shape and draw it in an appropriate size. Use rectangular selection and move the shape towards the left margin.
- Select **Red** colour from the **Colours** group – Home group or colour palette.
- Select **Fill with colour** button from **Tools** group – Home tab.
- Use Rectangular Selection option on Select menu and draw a rectangle covering half of the heart.
- On the Home tab, click **Copy.**
- Click **Paste** button.
- Click the pasted copy and drag to a new position you want towards the right margin.
- Click on the **text** button and draw a textbox over the pasted copy and type your text. Repeat the same action and type text in the original image as required.
- Pick **Eraser** tool and remove any small part of the original heart.
- Pick **green** colour and select **Fill** with colour button. Then click any part outside the shapes.
- Save your file with a name. (See results of this activity in picture 7.12).

7.7.9 Add text

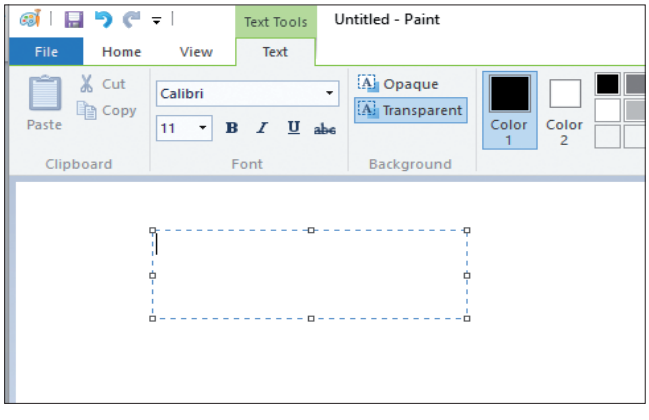
To add text, follow the steps given below:

- Select the Text tool, which is signified by the letter "A," then,
- Double-click somewhere on the canvas to start typing.



Picture 7.10: Add text button highlighted

- Make sure the text in the textbox is exactly the way you want it before switching to another tool (you will be unable to edit text after closing the textbox).
- To increase the textbox size (which will give you more room to type). Hold the mouse over one of the square corners until the cursor turns to an arrow, then drag the box to a larger size.
- Choose a font face and size from the top of the screen and begin typing.
- To change the colour, size or face of the text after you type, highlight the text, then choose the new colour, size, etc. When you are typing, click somewhere outside of the textbox to leave the tool.



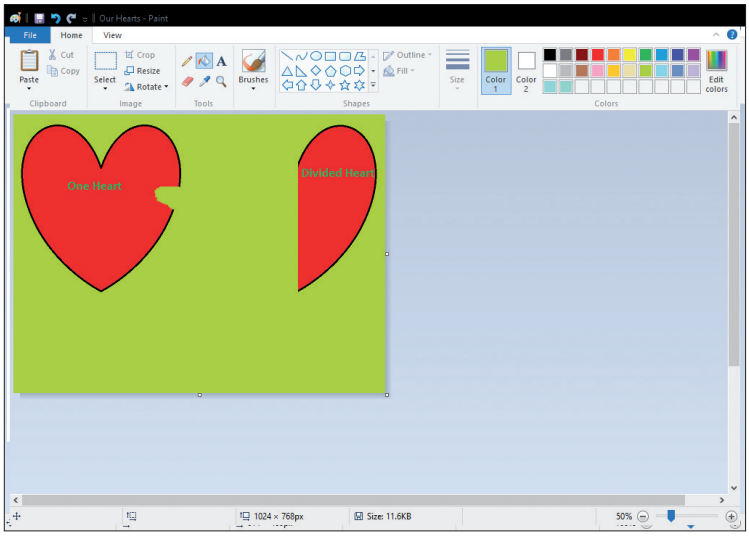
Picture 7.11: Add Text tool used to draw a Textbox as shown

7.7.10 To erase something you have drawn with Eraser tool

Follow the steps given below;

- Click the **Eraser** icon (see picture 7.12(a))
- Drag over the area you would like to disappear several times until it disappears.

> **Note:** Like other tools, you can adjust the width of the eraser with the Size menu.



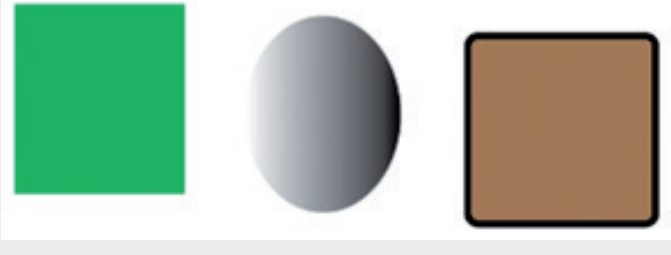
Picture 7.12(a): Paint window showing possible results of Activity 3

7.7.11 Vector Graphics

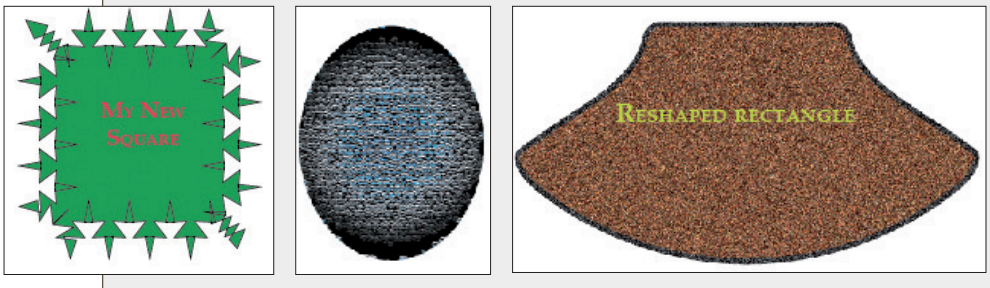
To create and edit or reshape vector graphics suitably requires you to use a vector graphics software such as Adobe Illustrator, Adobe Freehand or CorelDraw. You can also introduce a Raster graphic into a vector graphics software and edit by converting it to vector graphic. For our case we use Adobe Illustrator. With Adobe Illustrator, you can design logos, T-shirt design, posters and flyers as vector graphics.

Activity 7.3 (b)

a) Using Adobe Illustrator, create the following vector graphics or shapes as they appear and save the project as **Better shapes**.

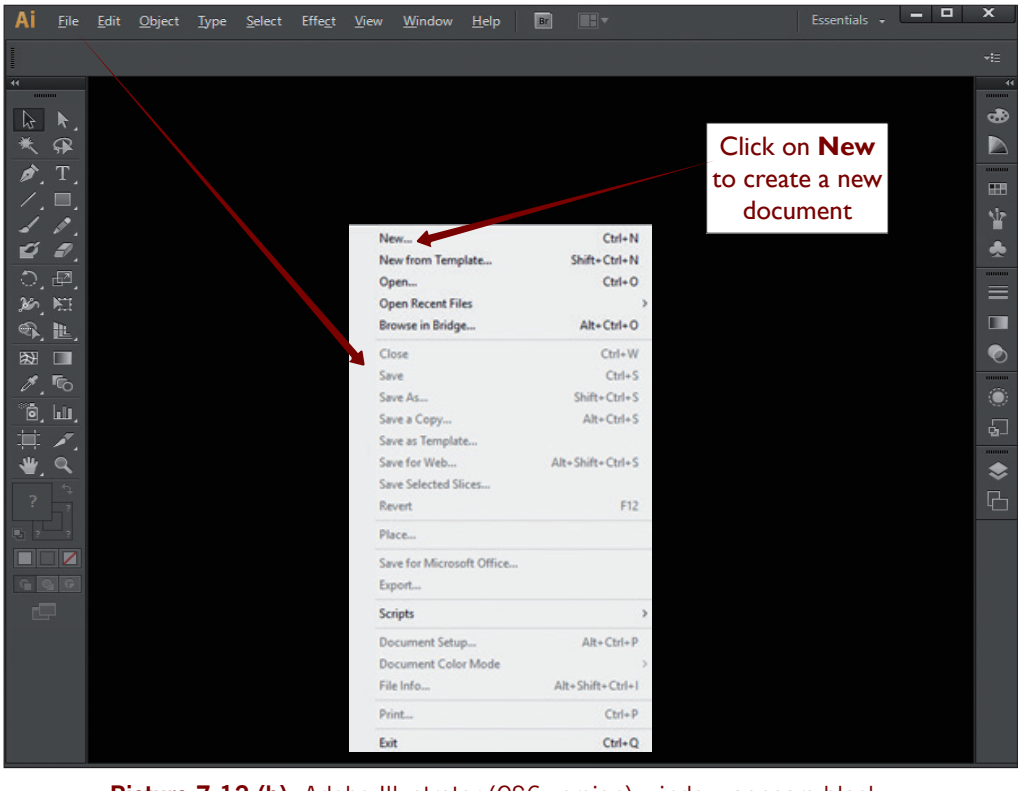


b) **Reshape or edit the graphics** drawn in (a) above to appear as shown below.



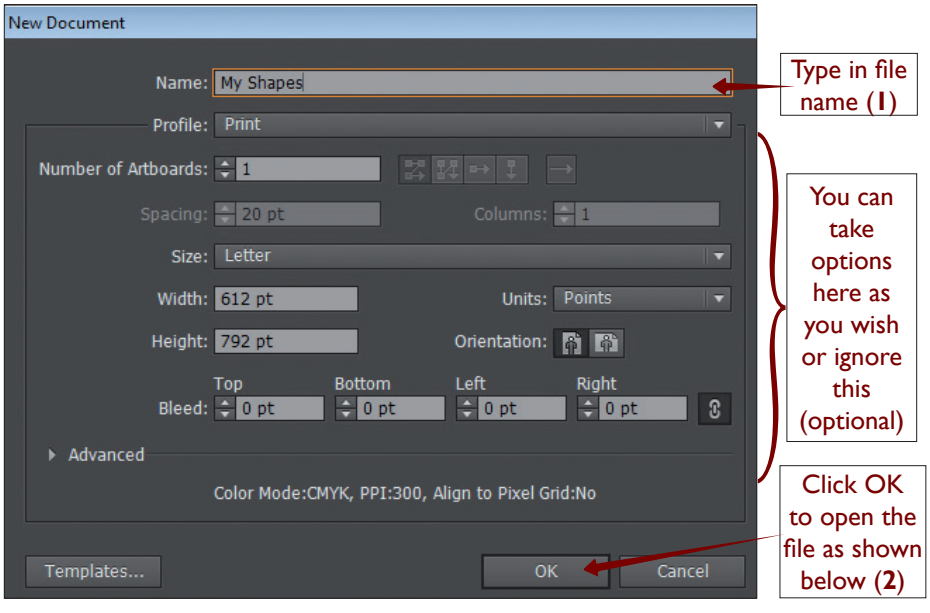
Follow the steps given below to perform this activity.

Step 1: Open Adobe Illustrator, a vector graphics software. The window for Adobe Illustrator appears below.

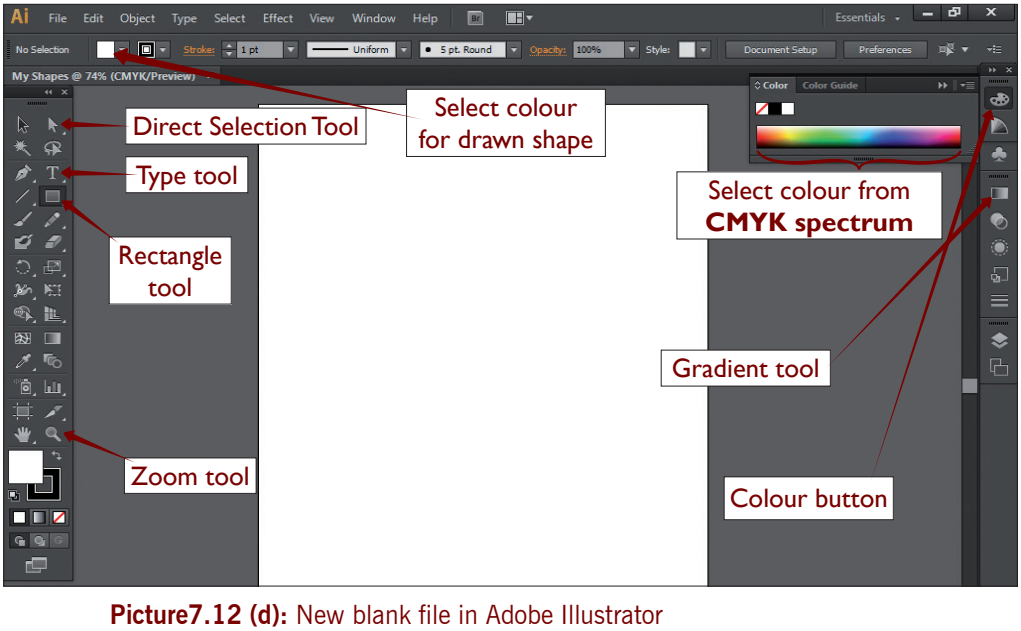


Picture 7.12 (b): Adobe Illustrator (CS6 version) window appears black

Step 2: Click on **File** menu and select '**New**' button to get a new document dialog box (shown below). Name your file as **My Shapes**.



Picture 7.12 (c): New document dialog box

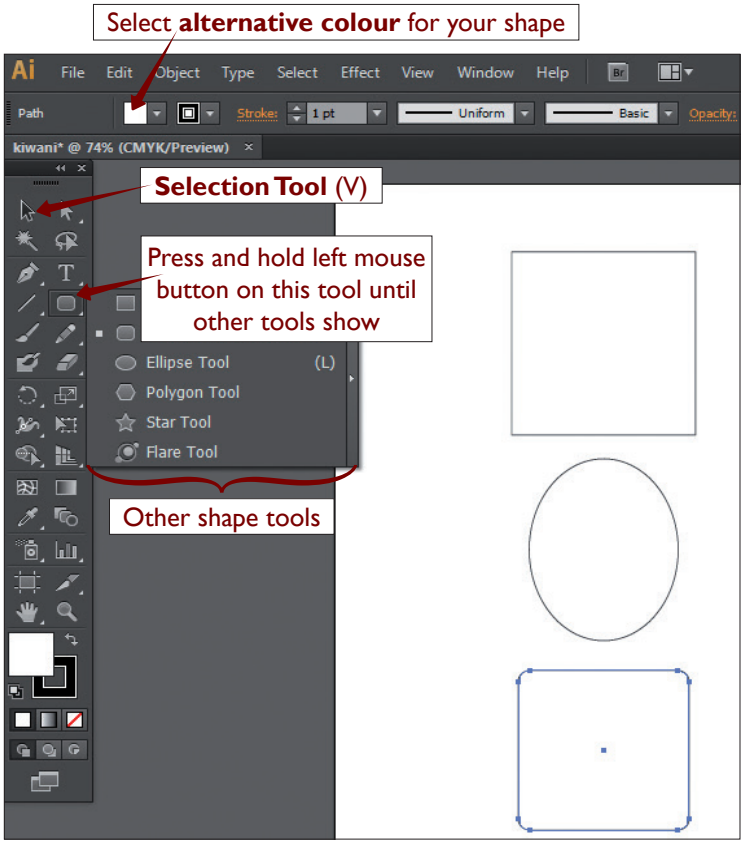


Picture7.12 (d): New blank file in Adobe Illustrator

Step 3: Start creating the shapes using various tools

To create the square: click the **Rectangle Tool** on the toolbox and then drag in the white background to draw the square.

To draw other shapes, click on white graphic near the rectangle tool to display other shape tools. Then click on the **ellipse tool** to draw the circle/oval shape and afterwards click on the **rounded rectangle tool** to draw the rounded rectangle.



Picture 7.12 (e): Illustrator window showing newly created shapes

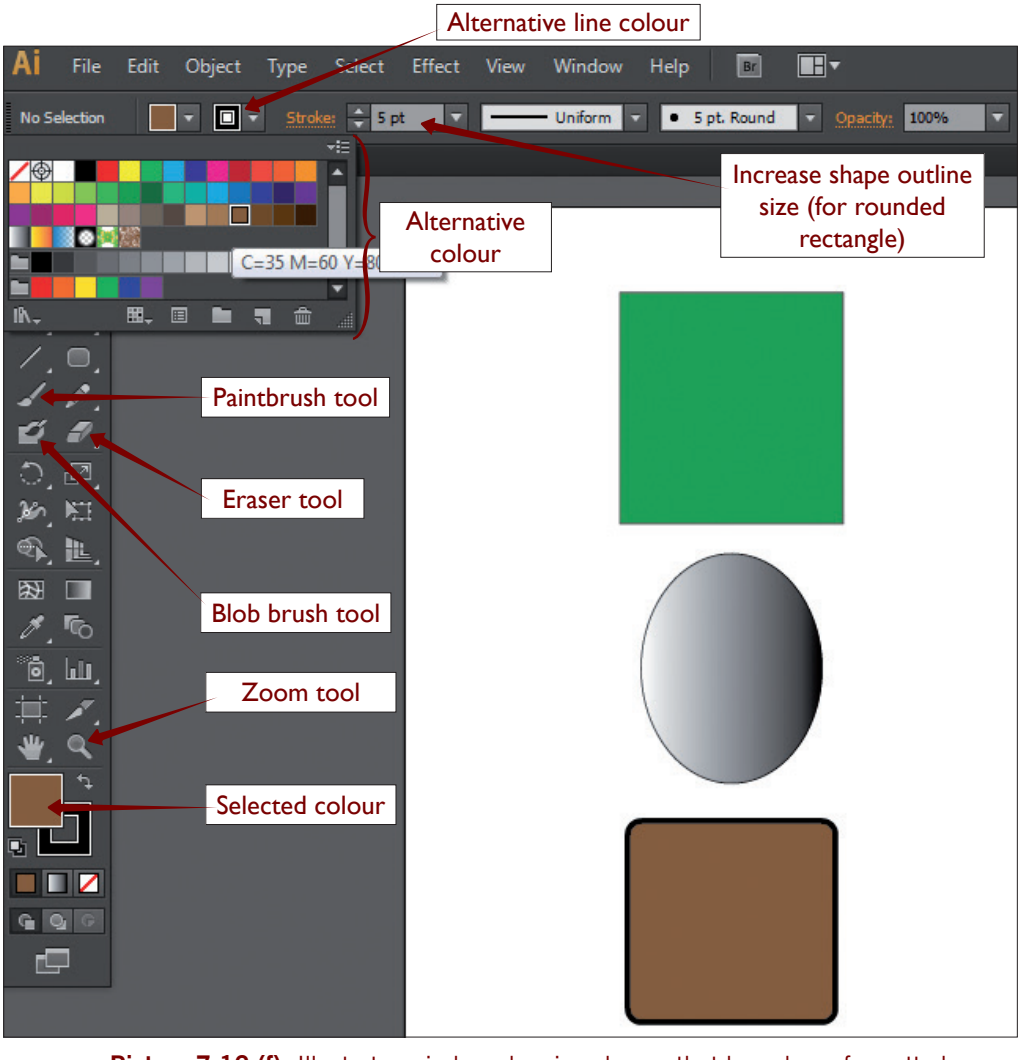
Step 4: Fill the square with green; the circle with gradient fill and rounded rectangle with brown colour and increase on its shape outline.

To **fill green** colour in the square, select the square using the **selection tool**, click where there is green colour on the CMYK spectrum on the right of the window (or from alternative colour button on toolbar).

To fill gradient in the circle/oval, select the circle and then click on the **gradient** button.

To fill the rounded rectangle with brown colour, select it first, then click on the alternative colour button on the toolbar.

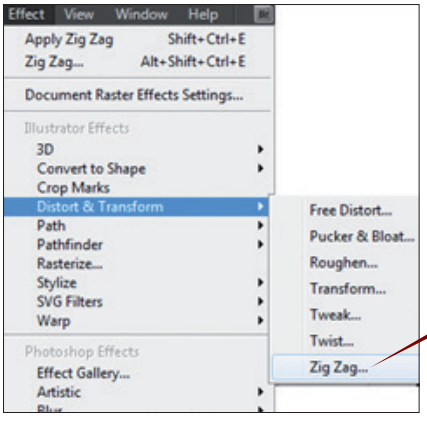
Increase the outline of the rectangle by increasing points in the shape outline size.



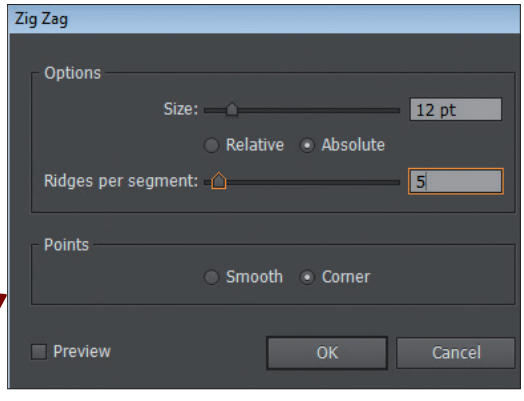
Picture 7.12 (f): Illustrator window showing shapes that have been formatted

b) To reshape or edit the graphics

Step 1: **To reshape or edit the square**: Select the square, click on **Effect** menu and on the menu click **Distort & Transform** and then select the **zig zag**… effect. In the Zig Zag dialog box, adjust the size to be **12 pts** and ridges to be **5**. Then click **OK**.

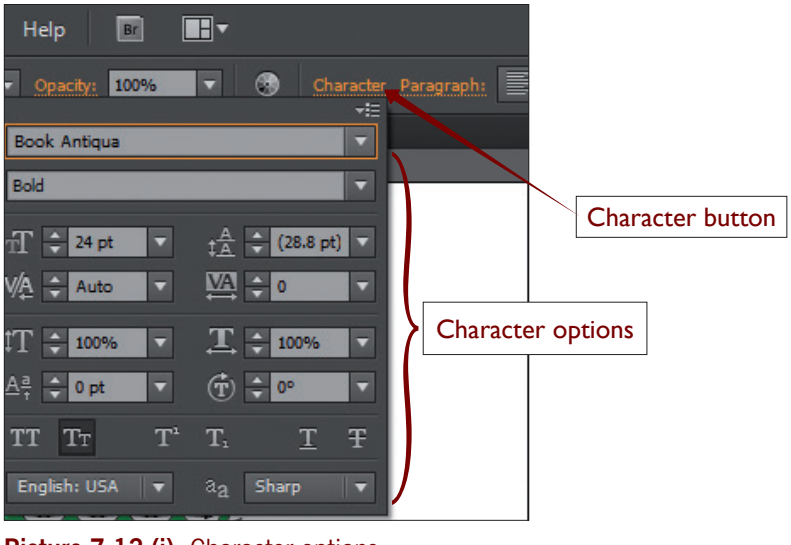


Picture: 7.12 (g): Effect menu showing Distort and Transform effect



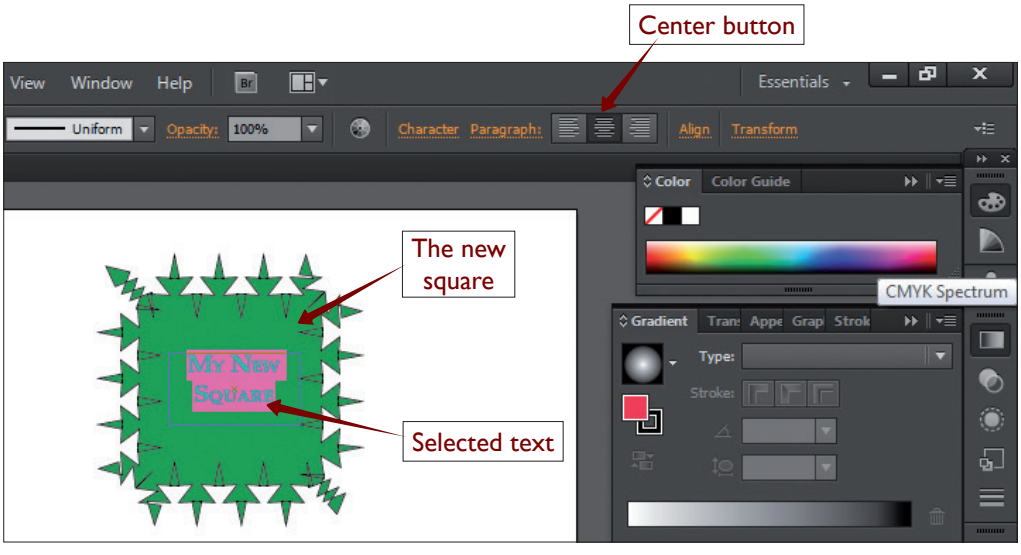
Picture 7.12 (h): Zig Zag dialog box

To insert text in the square; select **Type Tool** on the toolbox and draw a box in shape where you can type text. Type in the text in the shape. Change font size to **24pt**, **Book Antiqua**; using the **Character** button on the upper toolbar. See picture 7.12(i).



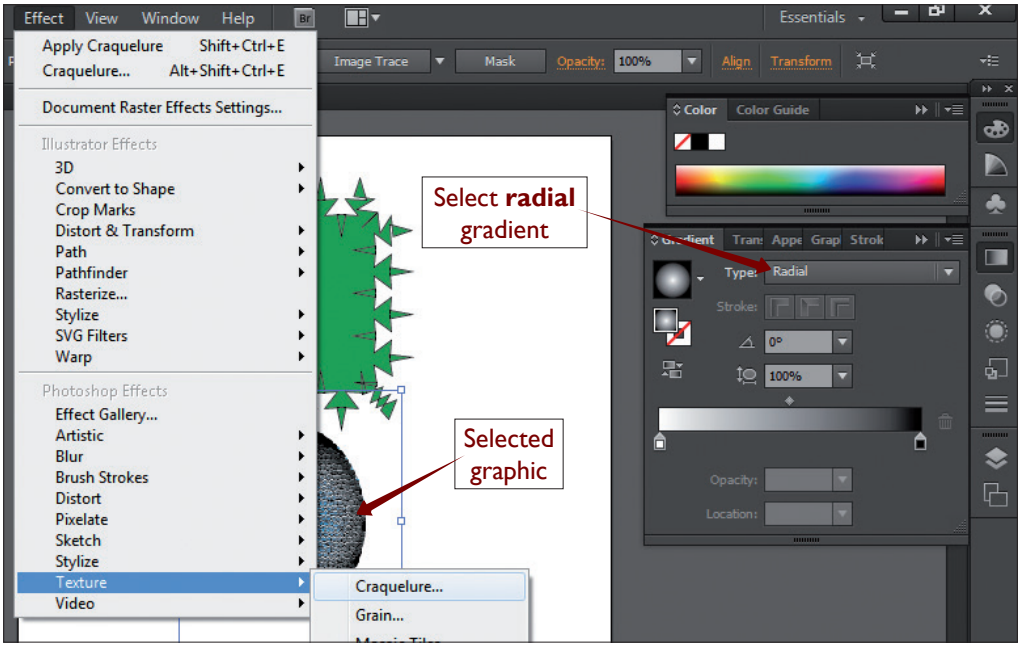
Picture 7.12 (i): Character options

To change text colour, select typed text and click on **red** colour from the *CMYK spectrum* colours on the right of the window or using alternative option on the upper toolbar. Lastly click the center button on the upper toolbar.



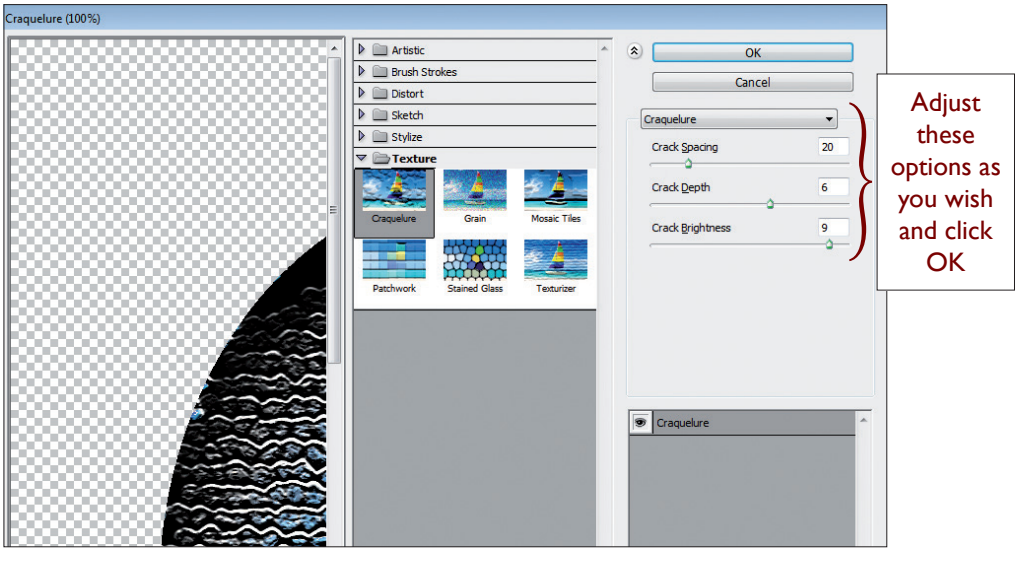
Picture 7.12 (j): Edited or reshaped square graphic

Step 2: **To edit circle oval;** select it and on the **effect** menu click **Texture** and then **Traquelure**. See picture 7.12 (k). In the *Traquelure dialog box* that displays, (you can adjust the crack spacing depth and brightness as you like), click **OK**. Select **radial** gradient on the right.



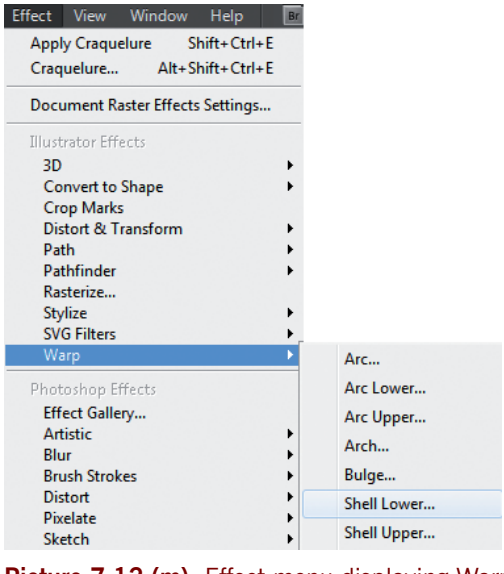
Picture 7.12 (k): Adobe Illustrator window showing how to access texture effects

The Traquelure dialog is shown below



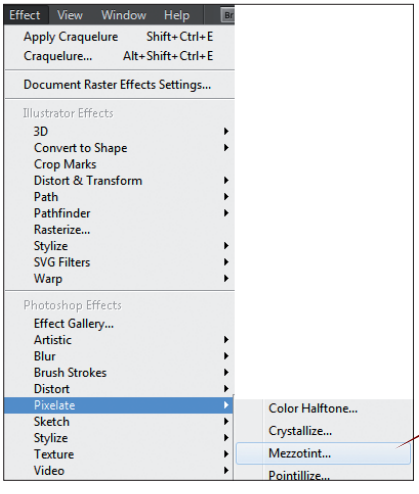
Picture 7.12 (l): Traquelure dialog box

Step 3: To reshape the rounded rectangle, select it and click **Effects** menu. On the menu, click **Warp** and select **Shell lower** in the sub menu.

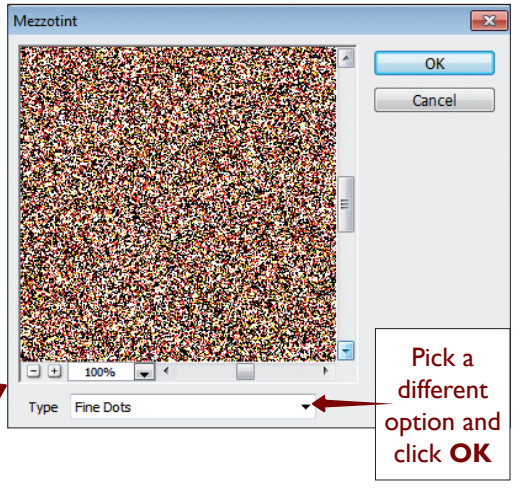


Picture 7.12 (m): Effect menu displaying Warp effects

To add special fill effects, click **Pixelate** on the **effects** menu and then select **Mezzotint**.



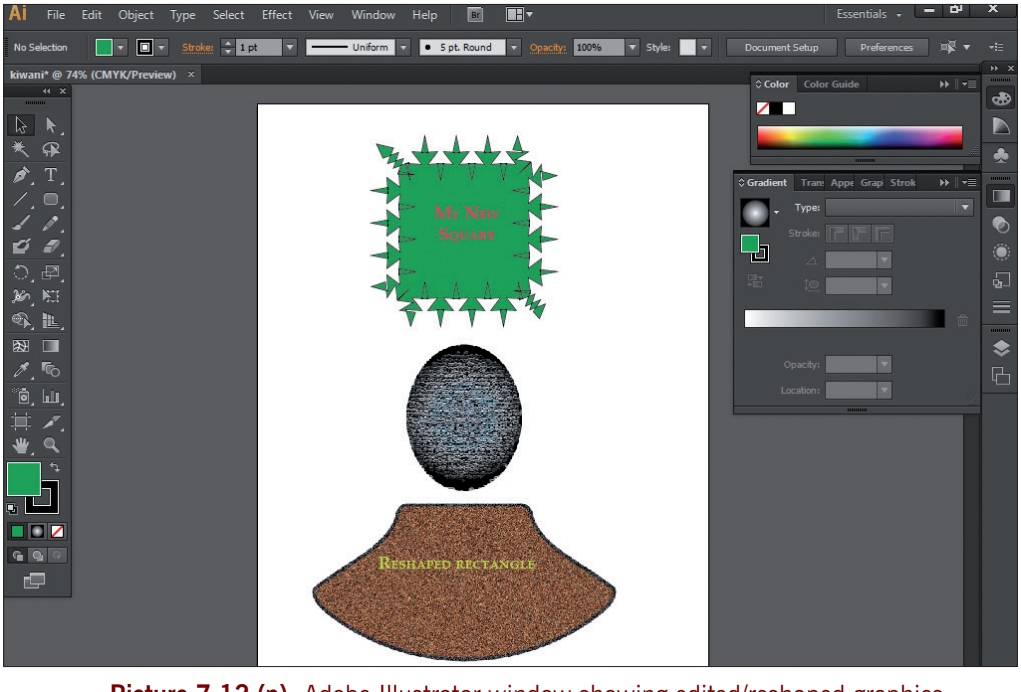
Picture 7.12 (n): Mezzotint dialog box



Picture 7.12 (o): Location of Pixelate effects on the menu

To add text to the rounded rectangle, repeat as done in step 1 above.

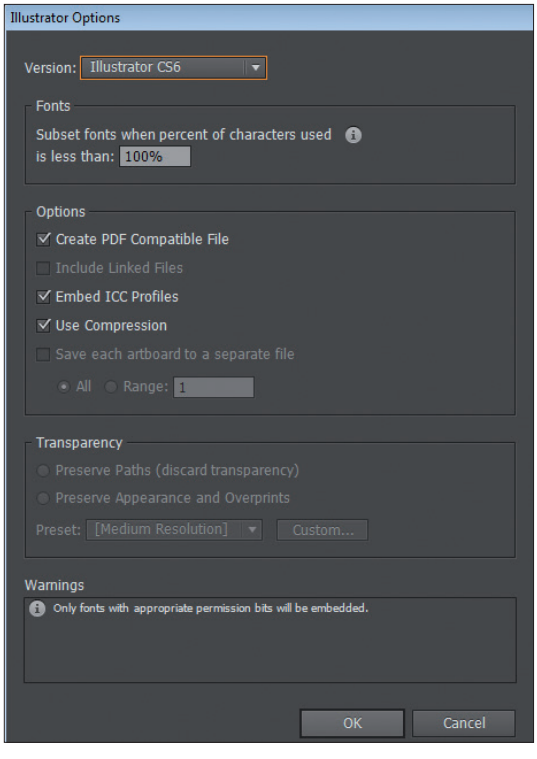
The suggested answers for the **activity** are shown in picture below.



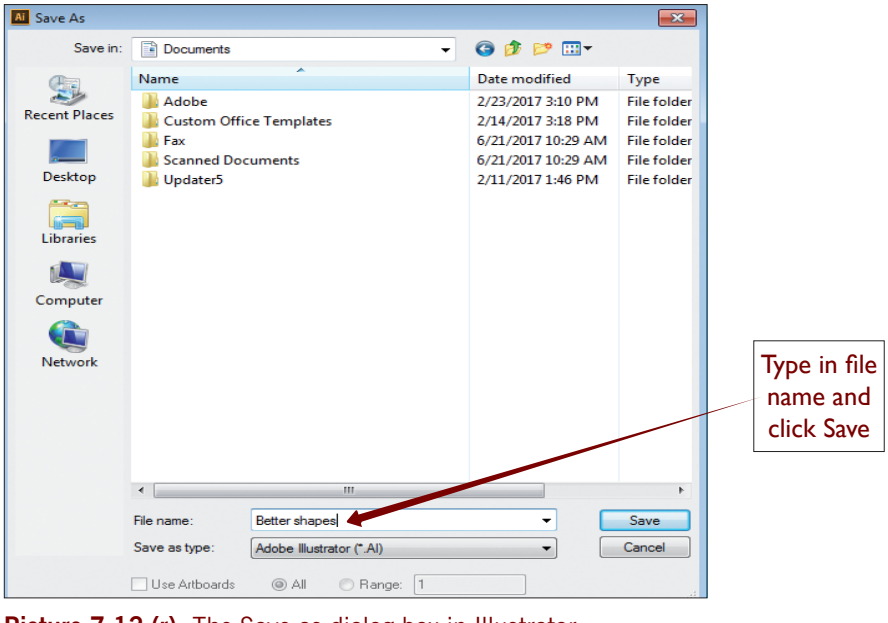
Picture 7.12 (p): Adobe Illustrator window showing edited/reshaped graphics

Saving a project

Click on **File** menu and select **Save As.** The Illustrator options dialog box displays as shown below. Click OK. The Save dialog box displays. Type in the file name and click on '**Save'** button.



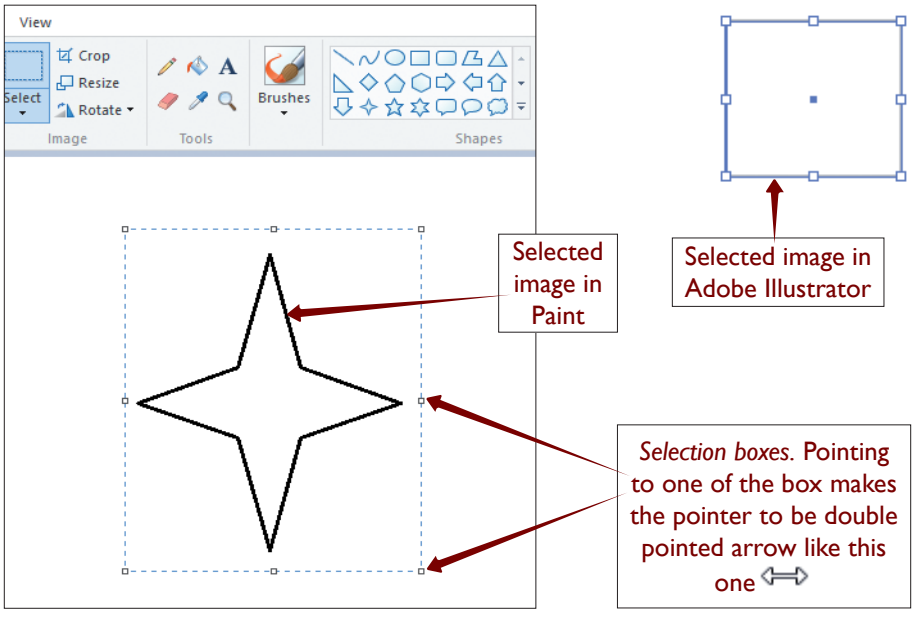
Picture 7.12 (q): The Illustrator options dialog box



Picture 7.12 (r): The Save as dialog box in Illustrator

7.7.12 Manipulate nodes and control points

These are the selection boxes and circles that appear when you select an image for reshaping. Point on one of the node or point until the pointer changes shape of double pointed arrow. Then click and drag inwards or outwards to reduce size or enlarge its size respectively.



Picture 7.12 (s): Selected image showing selection boxes around it

7.8 Graphics formatting

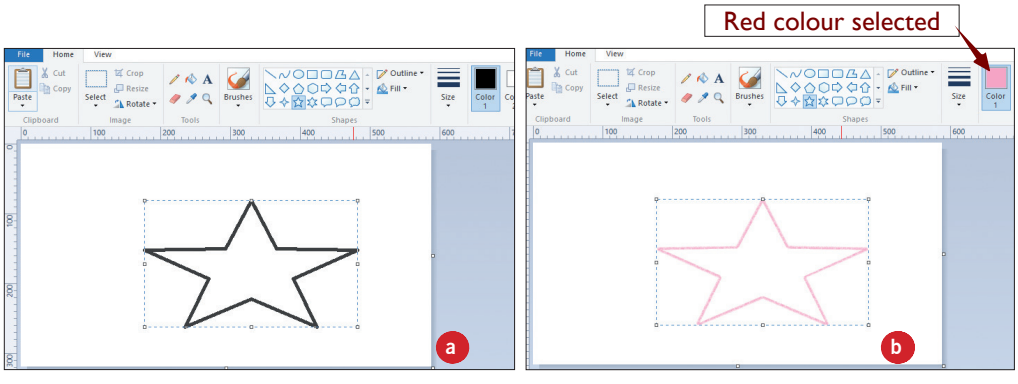
Activity 7.4

a) Create a new Paint file and draw a star object (another object of your choice).
b) Fill the object outline to colour red and fill colour to green (or light green).
c) Insert text as "Star" in the Star shape. Adjust the font size to a suitable size.
d) Save the file as 'Green star'.

Follow the guidelines given below

7.8.1 Colours for the outlines and fill of objects

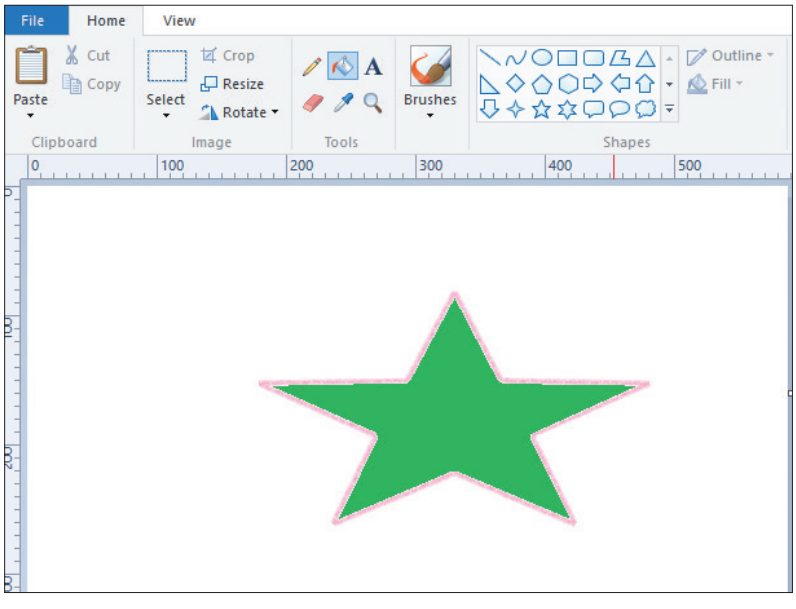
- Select a pencil or a shape to use.
- Click the Outline button from Shapes, select the option you want eg. (no fill, marker, crayon,..).
- click the desired colour.
- Drag the mouse to draw the object, then resize the object.



Picture 7.13: Star shape drawn with black outline (a) and the outline colour is changed to red (b)

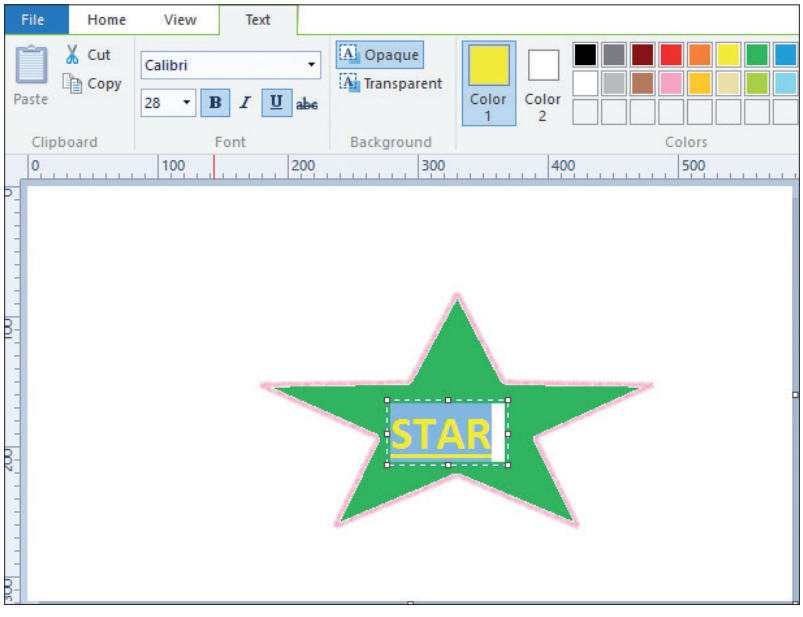
7.8.2 Create shading and fill objects with patterns and textures

- Click on Fill With colour tool, then choose the desired colour.
- Click inside the object.



Picture 7.14: Star shape is filled with green colour

- Fonts as part of the graphic design.



Picture 7.15: A Textbox is drawn inside the shape. Text is typed in the textbox

7.9 Edit image

To edit image means to make changes that make an object more meaningful. You can edit a newly created image or an existing image.

Opening an image file

Paint can open up many different image types, including *.bmp, .gif, .jpg/.jpeg, .tif/.tiff, and .png. To open a file in Paint,

- Click **"File,"** then **"Open."**
- Navigate to the folder where your image file is stored and click "Open."

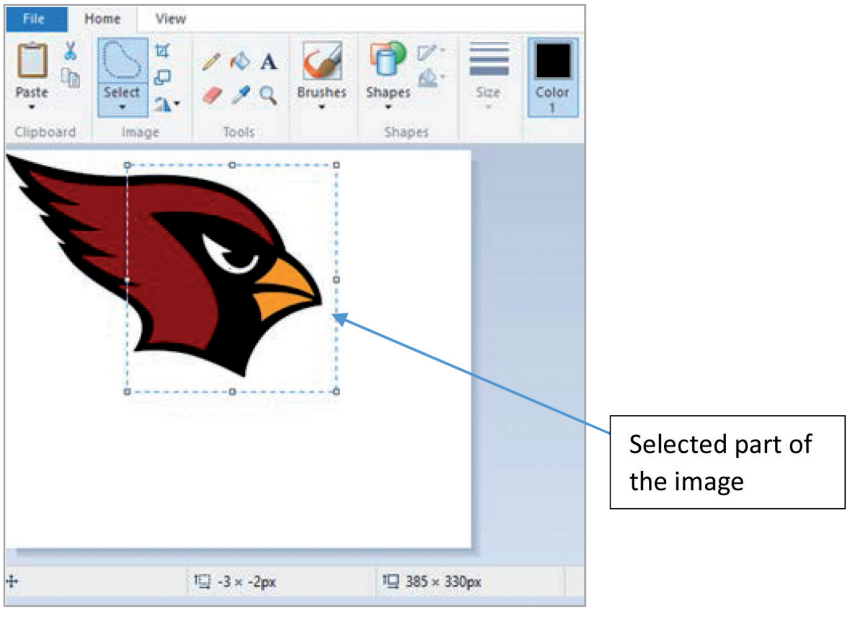
Activity 7.5

a) Open Microsoft Paint and add an image of a bird from your computer or from Internet (you may also opt to use any other image you already have).
b) Crop part of the image and save it as 'cropped'.
c) Resize the image by 150% horizontally and vertically.
d) Rotate the original image by 'Flip Horizontally'.
e) Using rotated image, zoom into the eye of the bird. Afterwards you can zoom out.

7.9.1 Crop an image

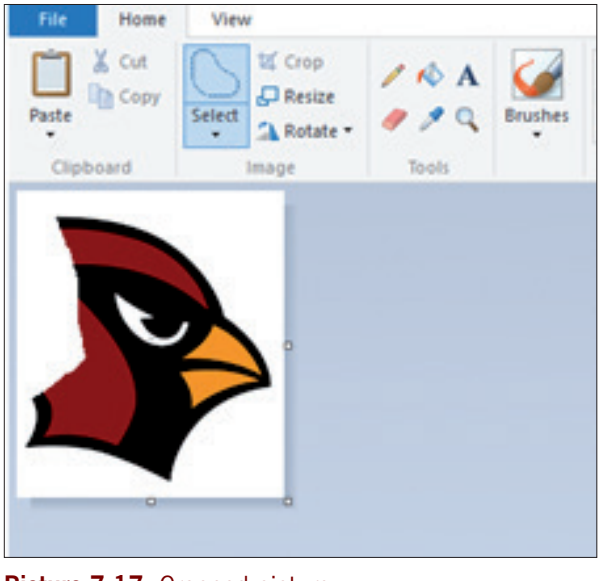
With an image open in Paint,

- Click the **"Select"** tool at the top of the screen.
- Highlight the area you want to crop by clicking and dragging with the cursor. Everything inside the dotted lines is your new image, that you can save or transfer to another location in the document.



Picture 7.16: Select tool used to mark part of the image to be cropped

- Click **"Crop".**

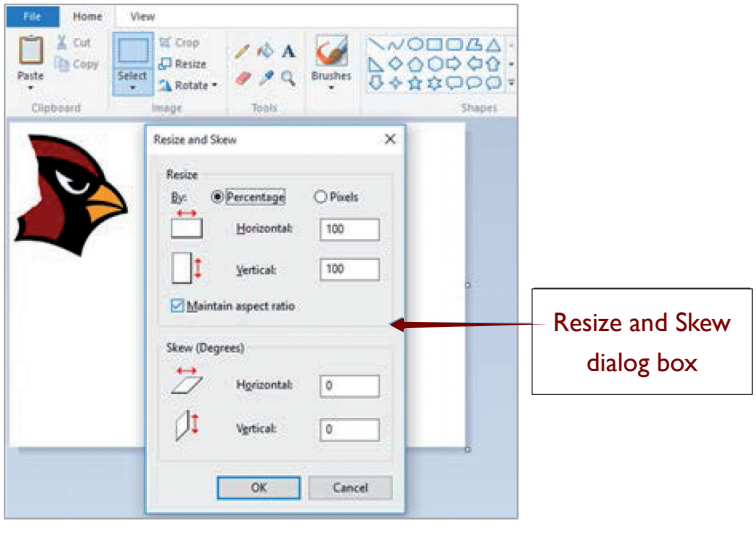


Picture 7.17: Cropped picture

- You will remain only with the selected part.

7.9.2 Resize an image

- Click "**Image**," then select "**Resize**".
- Type a new size (in pixels, or by percent, as you did when creating the canvas) to increase or decrease the image size.

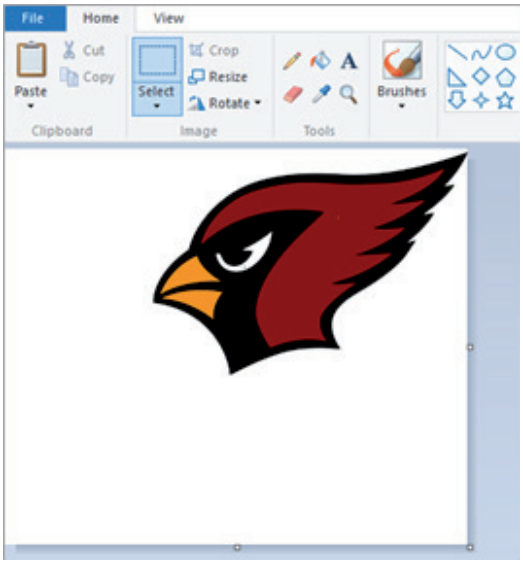


Picture 7.18: Changing size of the image using percentage resize

7.9.3 Rotate an image

To flip an image upside down (or some other direction), use the Flip and Rotate tools.

- On the toolbar, click "**Rotate**" and choose a direction in the menu.



Picture 7.19: Rotated image

7.9.4 Magnify an area of a picture/Zoom

- Click the magnifying glass icon to enable the Zoom tool.
- To zoom in, click anywhere on your image with the left mouse button.
- To zoom out, click with the right mouse button.

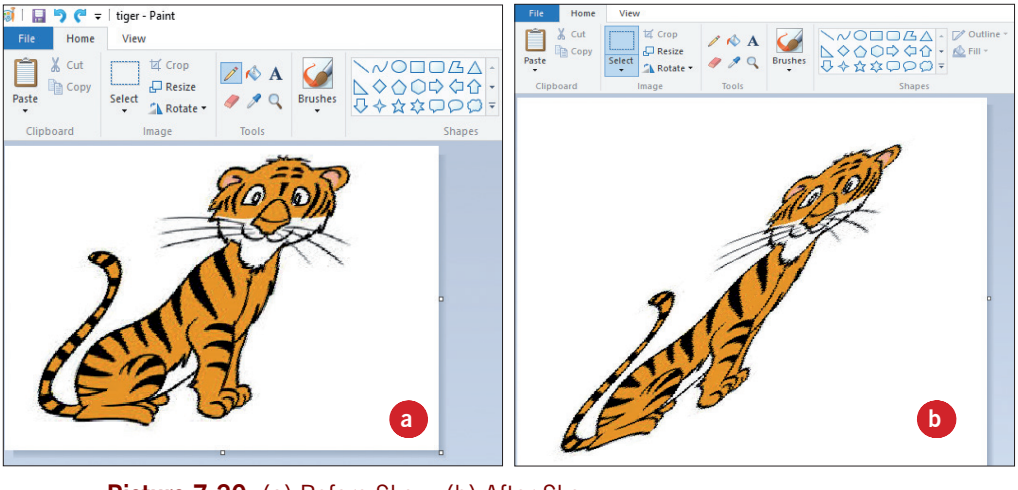
Alternatively,

- Use the keyboard shortcuts **Ctrl+ PgUp** to zoom in and **Ctrl+ PgDn** to zoom out.

7.9.5 Stretch or skew an image

You can distort an image with the "skew" feature.

- Click "Image," then select "**Resize/Skew**".
- To stretch/distort the image by degree, type a number (in degrees) in the boxes marked "horizontal" and "vertical", in the **Resize and Skew** dialog box.
- Given that you earlier used a different image like this in 7.20 (a) below, you would skew it by **20 degrees** and it changes as shown in 7.20(b).

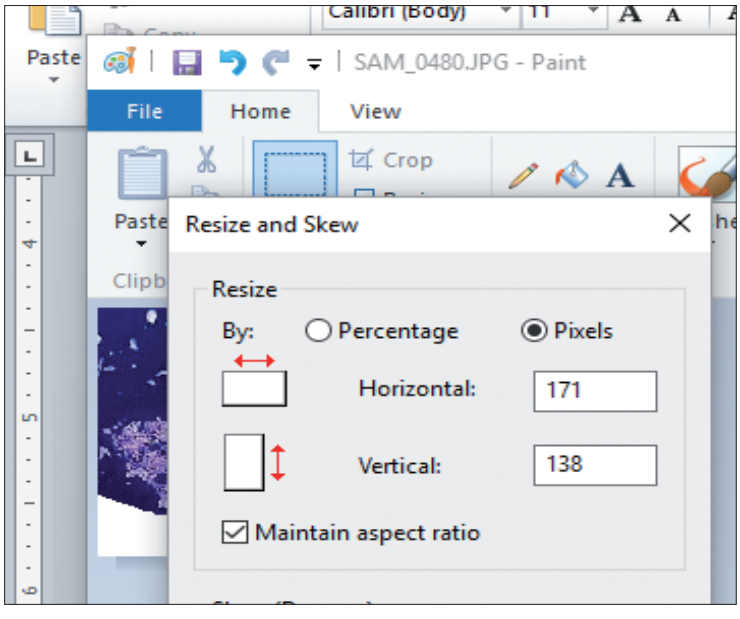


Picture 7.20: (a) Before Skew, (b) After Skew

7.9.6 Changing pixels

If you want to resize the image, and you don't care if it gets a bit stretched, then:

- Select **Pixels**.
- Uncheck the **Maintain aspect ratio** checkbox.
- Enter a width (Horizontal) and a height (Vertical) in Pixels.
- Click **OK**.

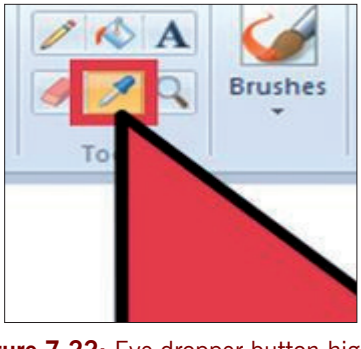


Picture 7.21: Resizing an image using Resize and Skew dialog box

7.9.7 The Colour Picker

The small eyedropper icon represents the **Colour Picker** tool.

- Click this tool, then
- Click somewhere in your drawing. The area you click will now become the foreground colour for your next tool of choice.

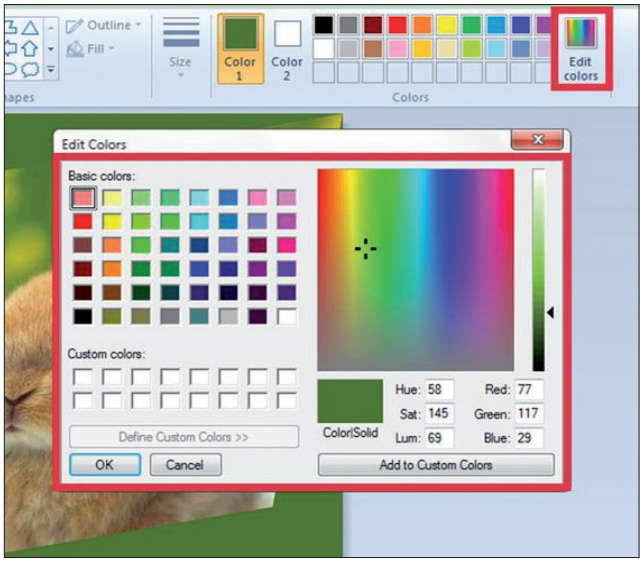


Picture 7.22: Eye dropper button highlighted

7.9.8 Change colour

You can edit any of the colours by adjusting their hue, brightness and other options in the Paint colour mixer.

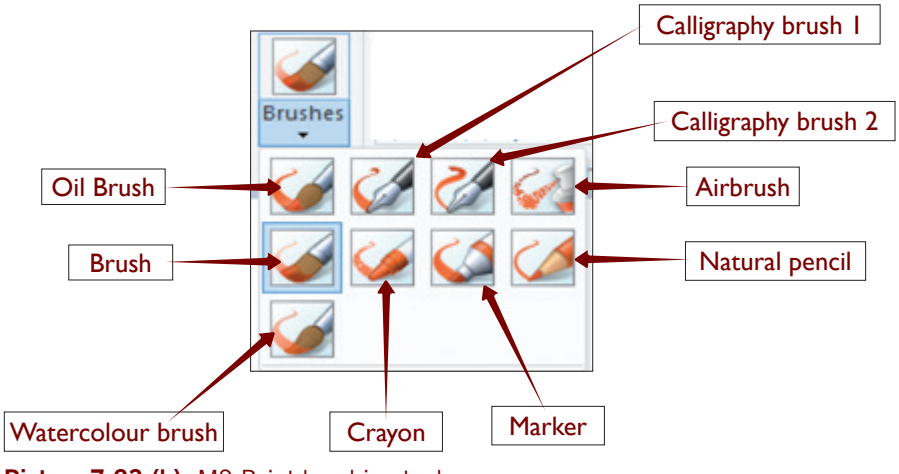
- Click "Edit colours" or "Define Custom Colours" to enter the colour mixer.
- After you have decided on a colour you like, click "Add to Custom Colours."



Picture 7.23 (a): Edit Colours dialog box for changing colour combination

7.9.9 Brushing Tools

MS Paint has several brushing tools you can use to make your image artistic in appearance. Below is an image showing collection of all the brushes in paint.



Picture 7.23 (b): MS Paint brushing tools

Here below is a table showing the effect of each of the brushes.

Brushing tool	Brushing tool effect
Brush	
Oil brush	
Water brush	
Crayon	
Marker	
Natural pencil	
Airbrush	
Calligraphy brush 1	
Calligraphy brush 2	

Table 7.1: Brushing tools and their drawing effects

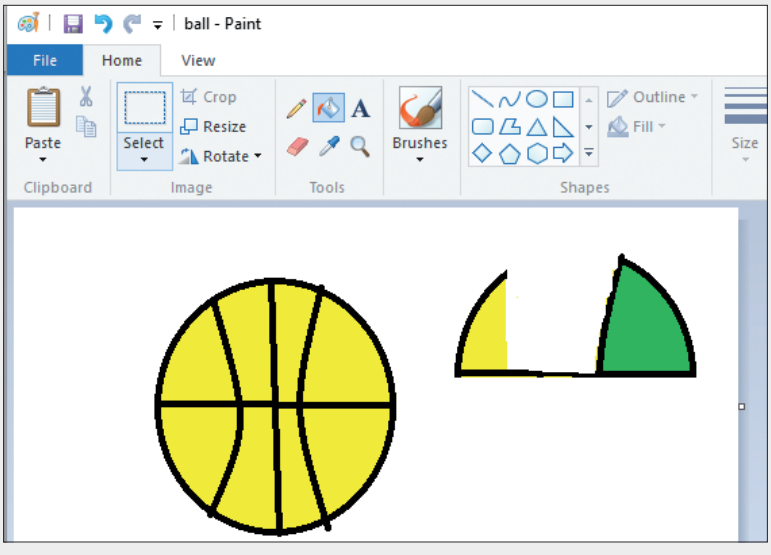
Note: apply these brush effects on your pictures the way you like.

Activity 7.6

Editing image

- Open **ball.bmp** file that you created earlier when saving files.
- Crop the upper part of the ball and paste it at the right of the entire ball.

- Use eraser and fill with colour tools to come up to the following result.



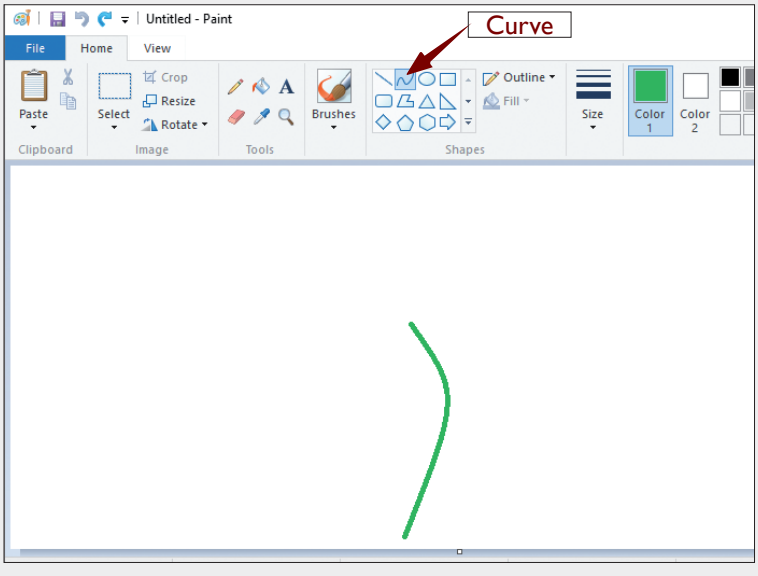
Picture 7.24: Cropped ball-part pasted on the right and erazed

Activity 7.7

Drawing a flower

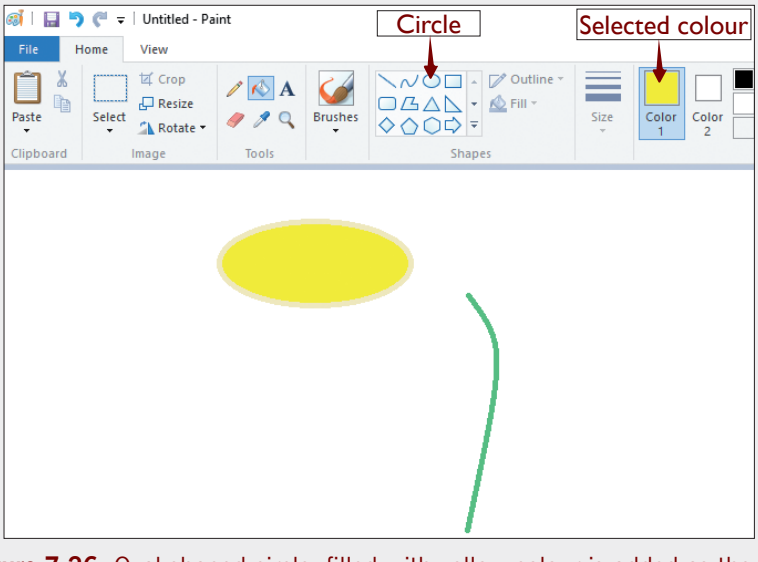
1. **Open up Microsoft Paint** from the Accessories folder in your Start Menu.
2. **Drawing the stem using the wavy line tool**, draw a curved and dark green line of medium-thick thickness in a position like in the picture. In order to curve the line, draw a straight line and then click and drag where you want to curve it. You can curve each line twice.

- Click Fill with colour tool, choose yellow from **colours** group.



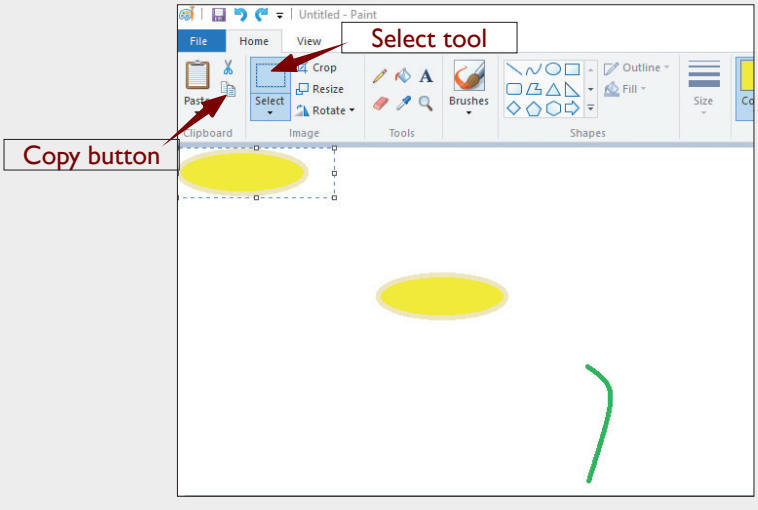
Picture 7.25: Green curved line drawn as stem

3. Choose the **circle tool** with a light yellow outline and a light yellow fill to draw a petal.
   - Choose circle, then from outline choose mark then you click light yellow.
   - Make an appropriately sized oval in the top left corner.
   - Then fill the circle.



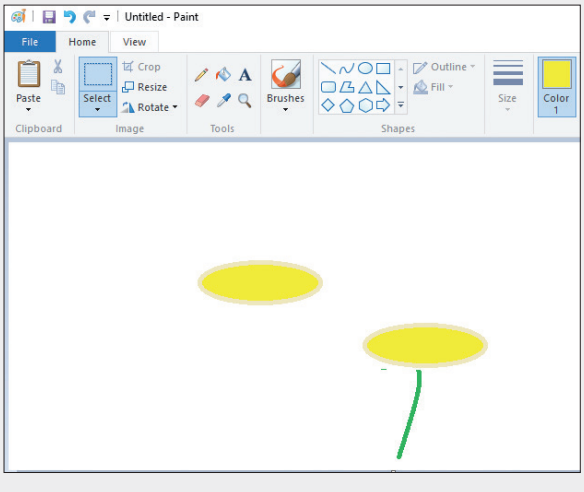
Picture 7.26: Oval shaped circle, filled with yellow colour is added as the petal

4. Select the petal, copy it and then **paste in another petal**.



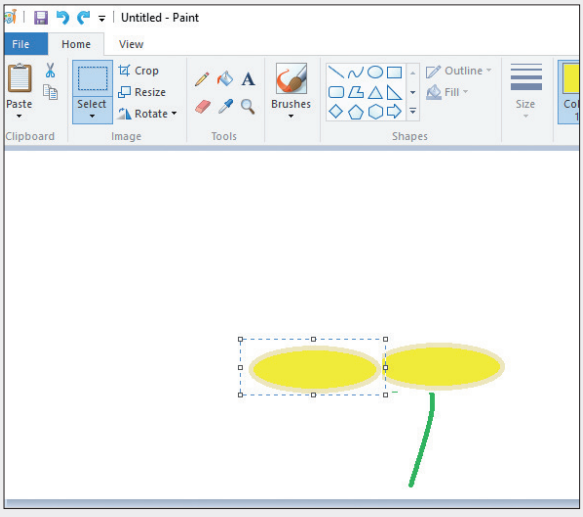
Picture 7.27: Duplicate copy of the petal is added using copy and paste tools

5. Drag the petal down to the end of the stem.



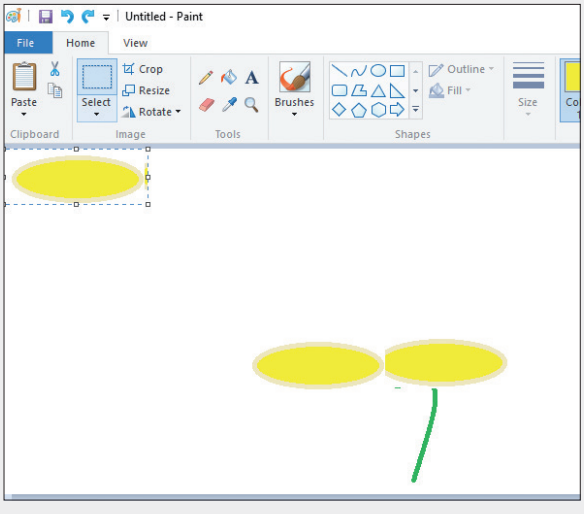
Picture 7.28: The petals are dragged towards the stem

6. Re-select the other petal using the box tool and then drag the petal down to the left side of the stem. Make sure that the second option is selected on the sidebar under the main tools as it will make sure not to overlap any of your previous work.



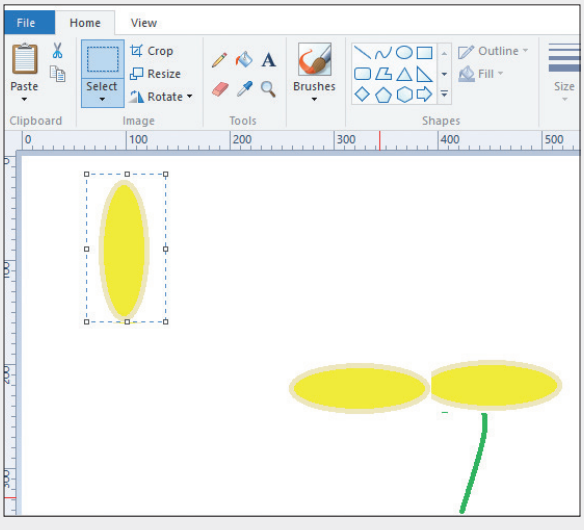
Picture 7.29: The duplicate petal placed on the left of the stem

7. Hit **Ctrl-v** to create another petal.



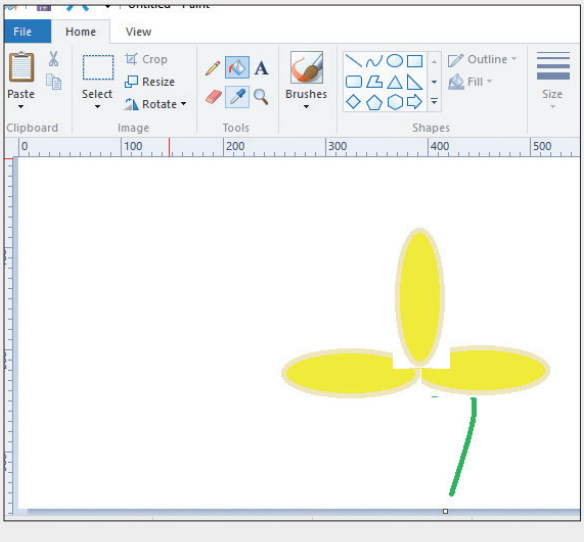
Picture 7.30: Another duplicate petal is pasted

8. Click Rotate, then choose Rotate right 90°.



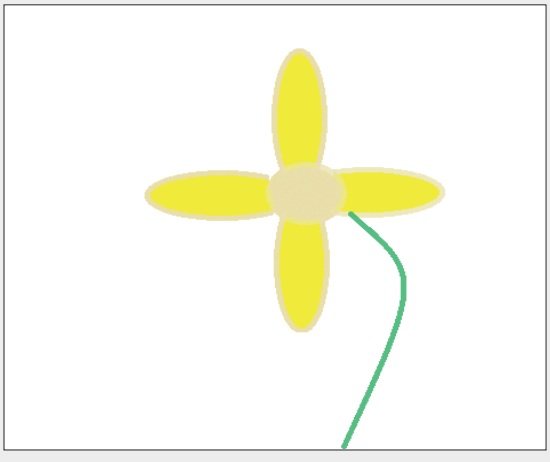
Picture 7.31: The petal is rotated vertically (Right 90°)

9. Move the petal down onto the flower.



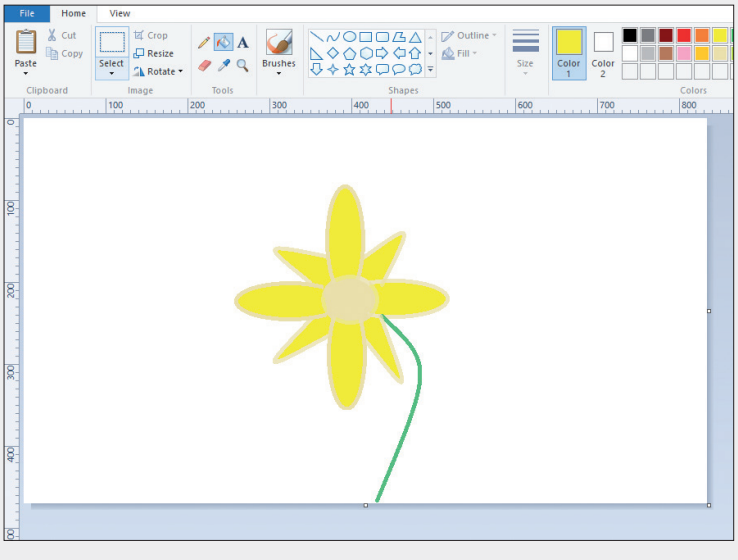
Picture 7.32: The petal is moved to build a flower

10. Copy and paste the vertical petal, then drag it and draw a circle and fill light yellow as shown in picture 7.33.



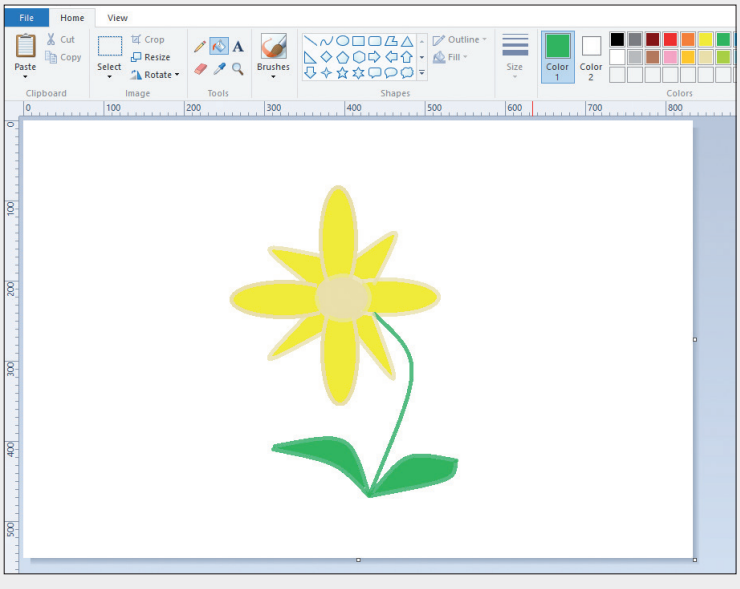
Picture 7.33: The vertical petal is copied, pasted and dragged below the flowers

11. Use curve line to add small petals and fill with yellow.



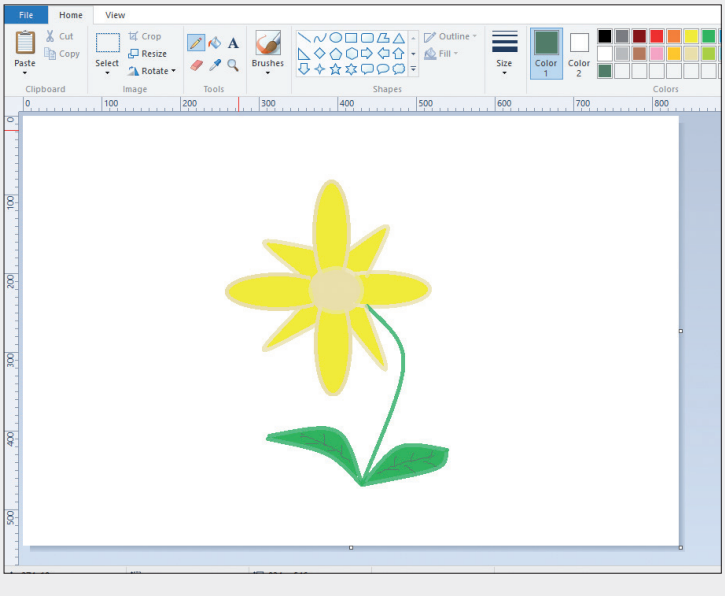
Picture 7.34: Well drawn flower

12. Starting at the base of the stem, draw the leaves on both sides.
    - Use a pencil to draw leaves and fill them with green colour.



Picture 7.35: Flower with base drawn as leaves on both sides

13. Use Pencil tool to add in some veins and make the leaves look more realistic.



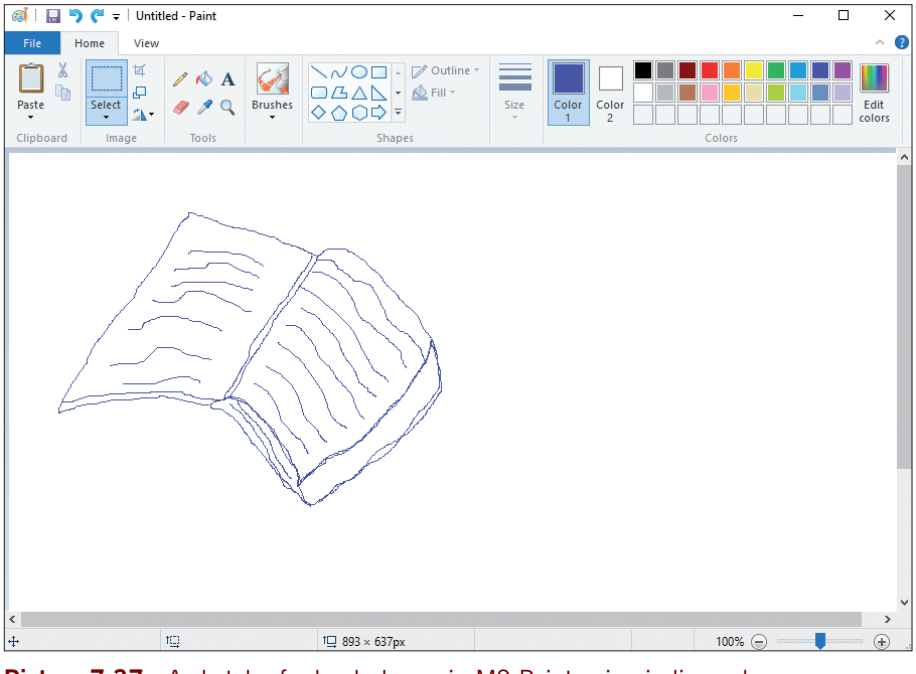
Picture 7.36: Pencil is used to add some veins to leaves on flower

7.9.10 Working with layers in MS Paint

Steps for working with layers in Paint

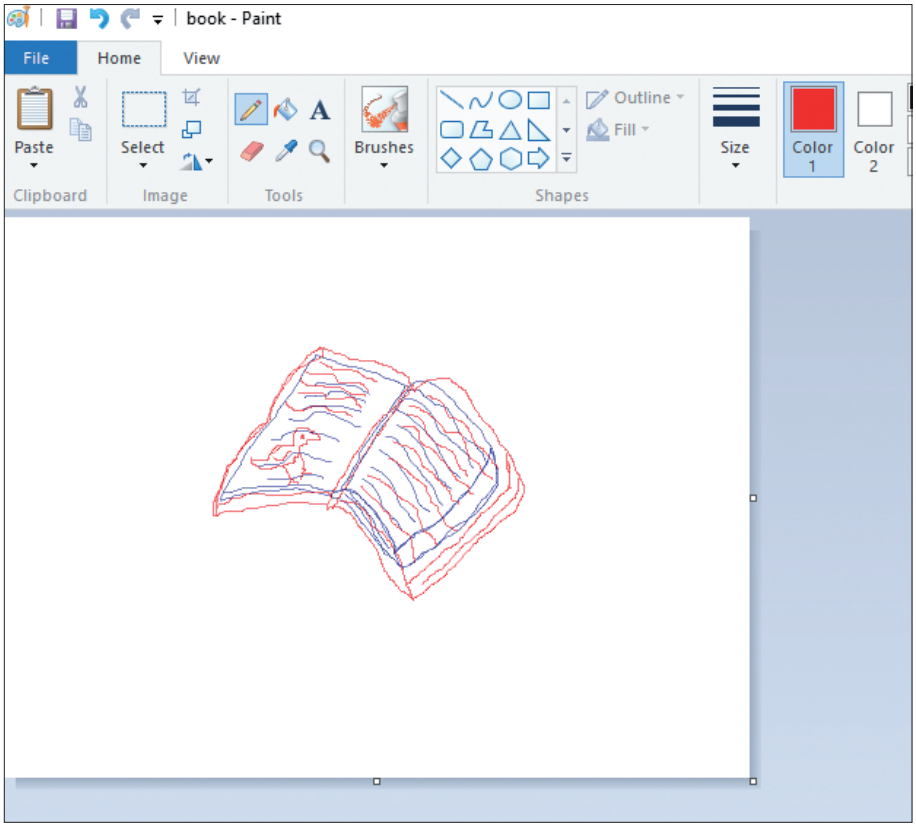
Step 1: Draw an image (initial sketch) you want using a colour you do not want to be its final. In our case we are going to draw a book. Let us use Indigo colour pencil.

> **Note:** Make sure the colour you make your sketch is not the same colour you want your final drawing to be.



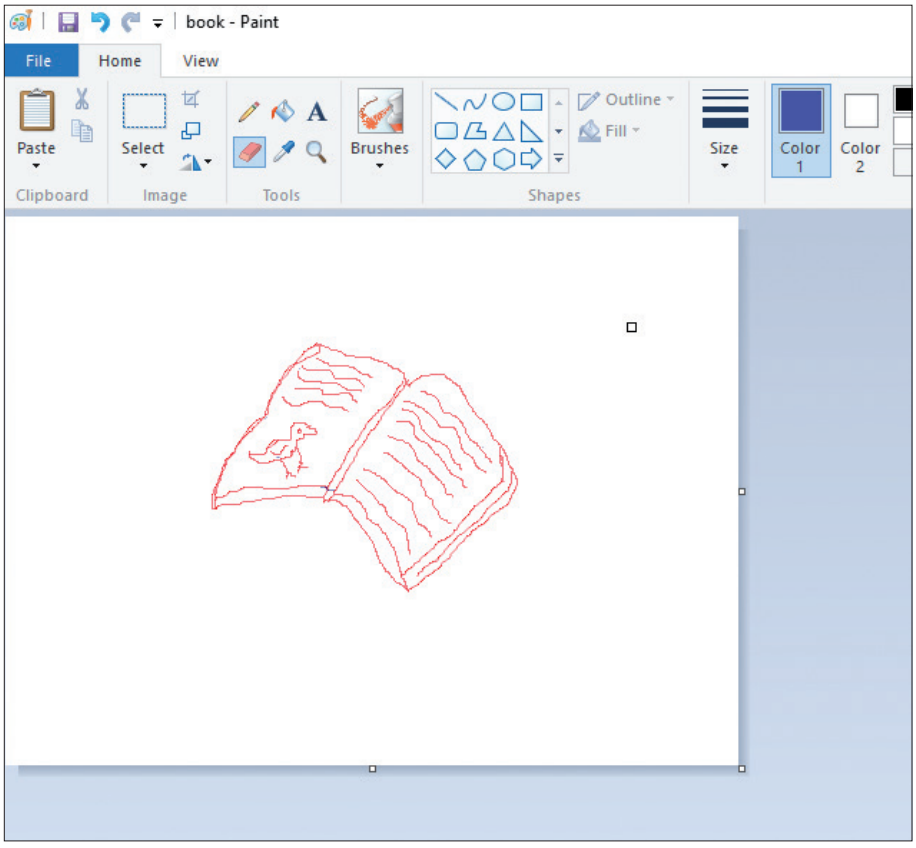
Picture 7.37: A sketch of a book drawn in MS Paint using indigo colour

Step 2: Select your final line-art colour you want and put it in the **Colour 1** slot, leaving **Colour 2** slot with **white** colour. In our case let us use red colour. Trace over your sketch using colour 1 slot. Save your file as **book**. The sketch may appear as shown in picture 7.38.



Picture 7.38: A sketch of a book redrawn using our favourite colour red by tracing over original image

Step 3: Put your initial sketch colour(Indigo) in Colour 1 slot, leaving colour 2 slot white. Click on the Eraser button and then RIGHT-CLICK while erasing your drawing. This action will remove the original colour.



Picture 7.39: An image of a book where the original layer of line-art is erased

Step 4: Repeat step 2 and step 3 to get many different versions of the book. Save each different version you create and compare later. You can also fill in colours.

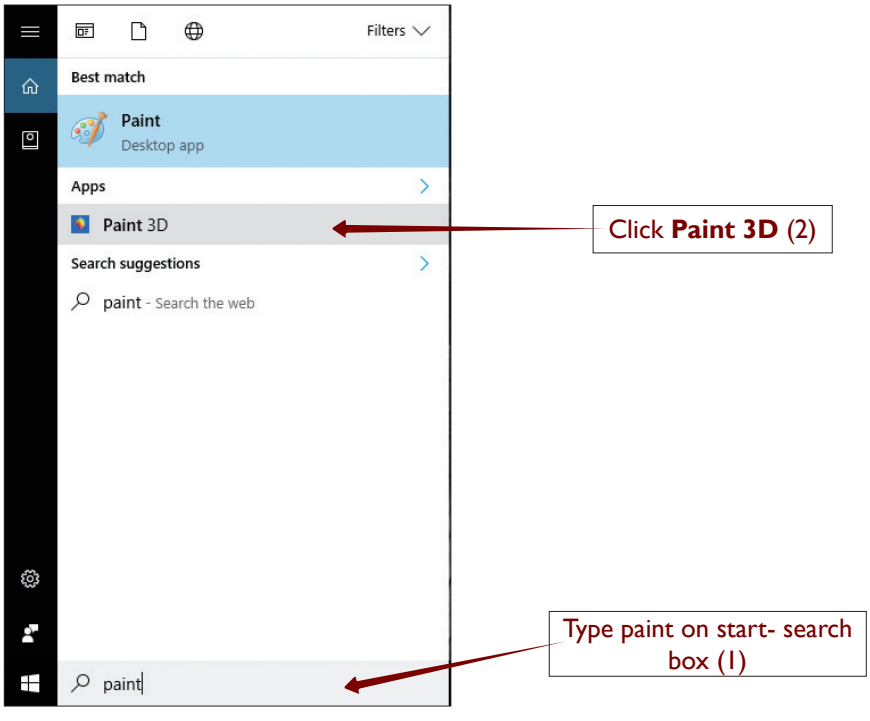
7.9.11 Microsoft Paint 3D

Microsoft Paint 3D is a new application (app) in Windows 10 Creators Update, designed for working with 3D graphics. It replaces the old Microsoft Paint program that allows users to sketch objects in 2D. It is a new version of MS Paint. MS Paint 3D comes with newer versions Windows 10 and it is meant to make 3D scenes, cartoony 3D objects much of fun.

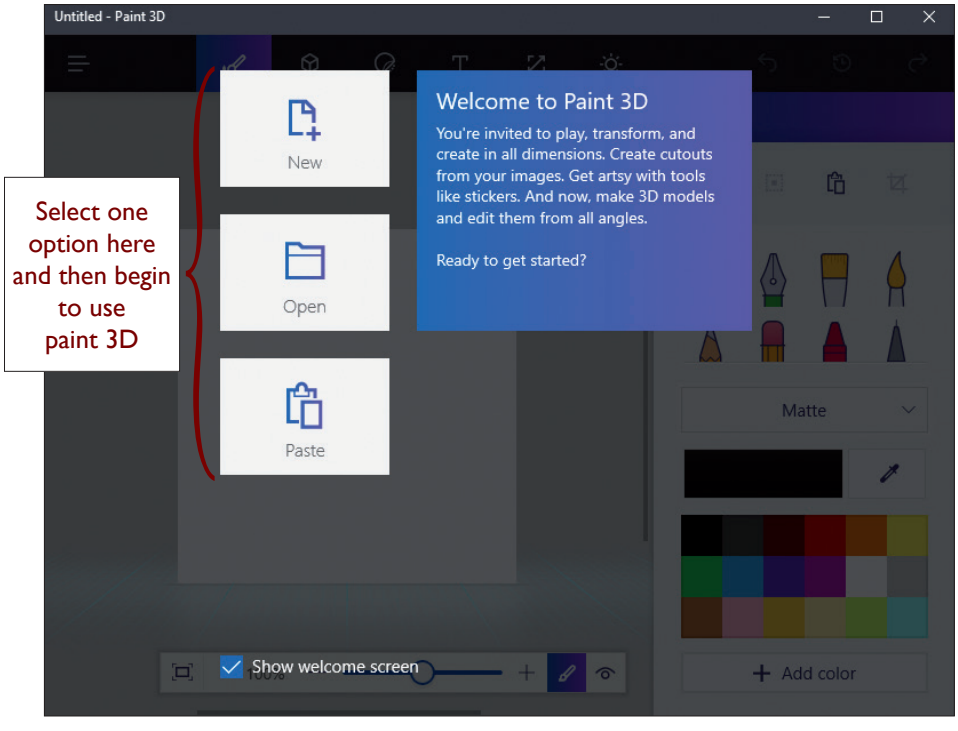
You still have the opportunity to use both Paint and Paint 3D on your computer. You can use Paint 3D to turn photos into 3D models, add colours and textures to models you make from 3D.

Starting Paint 3D

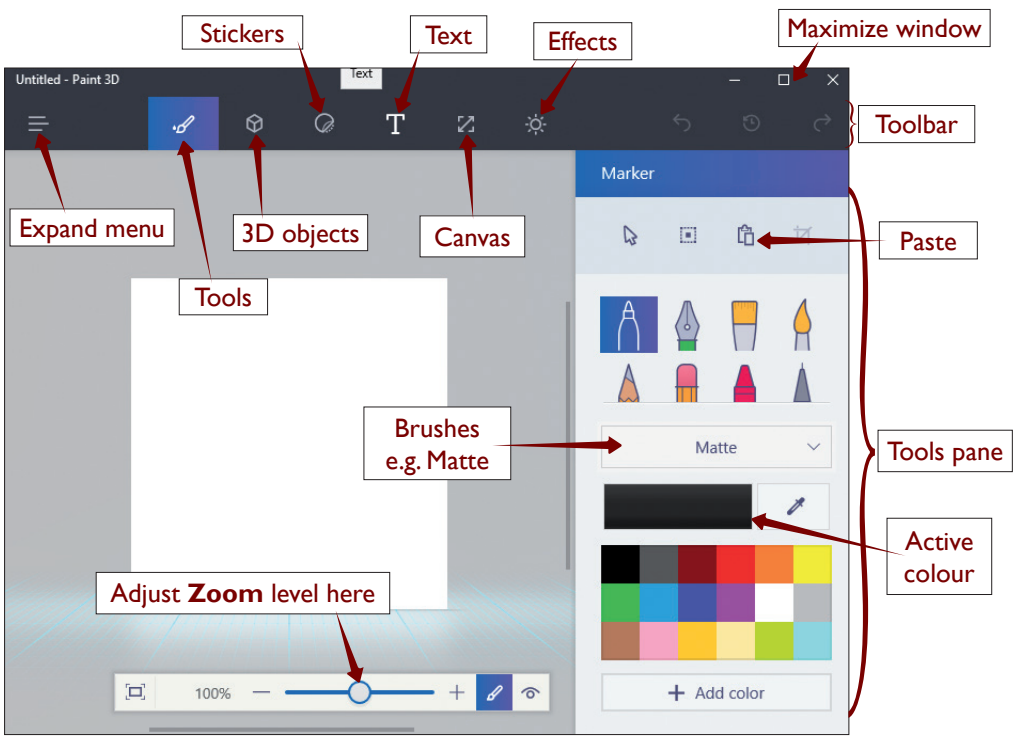
Click Start and type paint in the search box. Paint 3D is one of the items listed, click on it to open. See picture 7.10. Eventually paint 3D opens with a welcome screen.



Picture 7.40: Launching Paint on the Start –search box



Picture 7.41 (a): The welcome screen for Paint 3D where you can select option to have a New file, open existing file or paste an object.



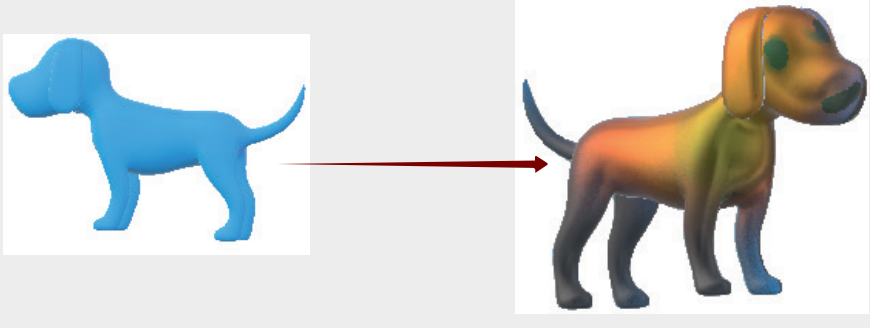
Picture 7.41 (b): Paint 3D new blank document (untitled)

Paint 3D interface has the canvas, a flat, 2D digital backdrop for your scene. The canvass is an empty white background and appears behind your 3D image. See picture 7.40.

Activity 7.8 (a)

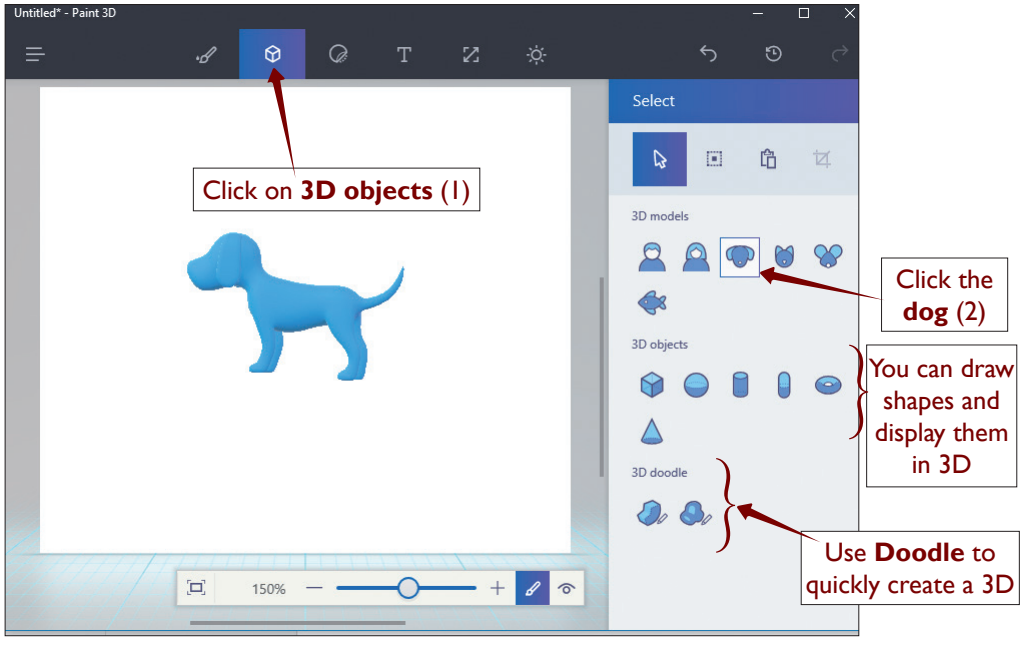
Using MS Paint 3D, create the dog as shown below. Then apply changes that will make dog A appear as shown by dog B. Use orange, green and dark grey colour plus a polished metal brush. Apply a spearmint effect, type the text "My dog is nice" on your model and save it as **my dog**.

Dog A **Dog B**



Use the following steps to perform activity 7.8 (a).

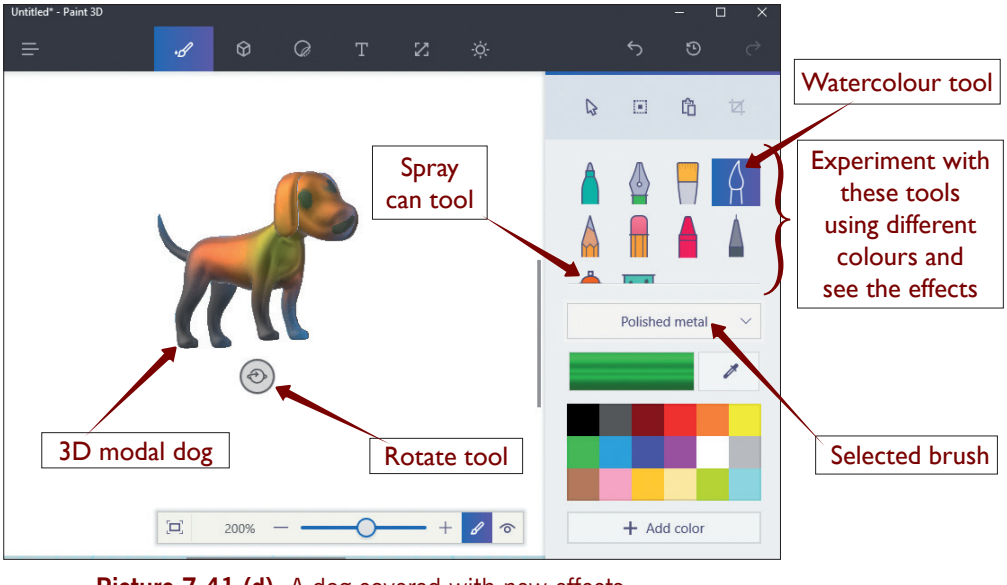
Step 1: Click on **3D objects** on toolbar. On the **Tools pane,** select **dog** button and drag in the canvas to draw the dog. See picture 7.41 (c).



Picture 7.41 (c): A dog drawn as 3D model

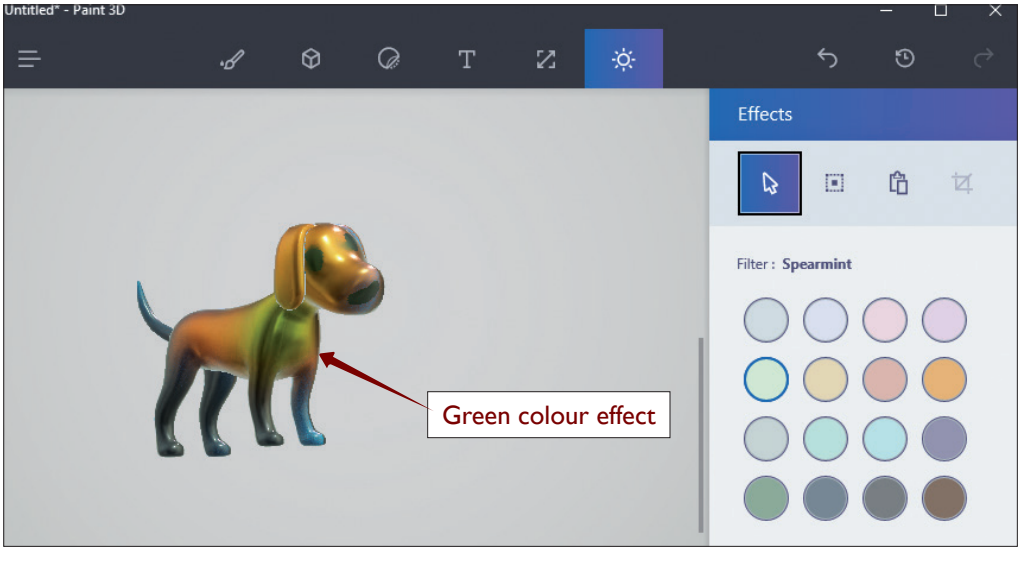
Step 2: Click **Tools** on the toolbar and select a desired tool. In this case will select **spray can** tool and then select **orange** colour. Click on the parts of the dog to fill them. Rotate the dog using the floating rotate tool and apply orange colour.

Select *gray* colour and apply on tail, legs and mouth parts. Select water colour and *green* colour and apply on neck parts of the dog. See picture 7.41 (d).



Picture 7.41 (d): A dog covered with new effects

Step 3: Click on the **Effects** button on the toolbar and select the **spearmint** effect in the tools pane. The results appear as shown in picture 7.41 (e).

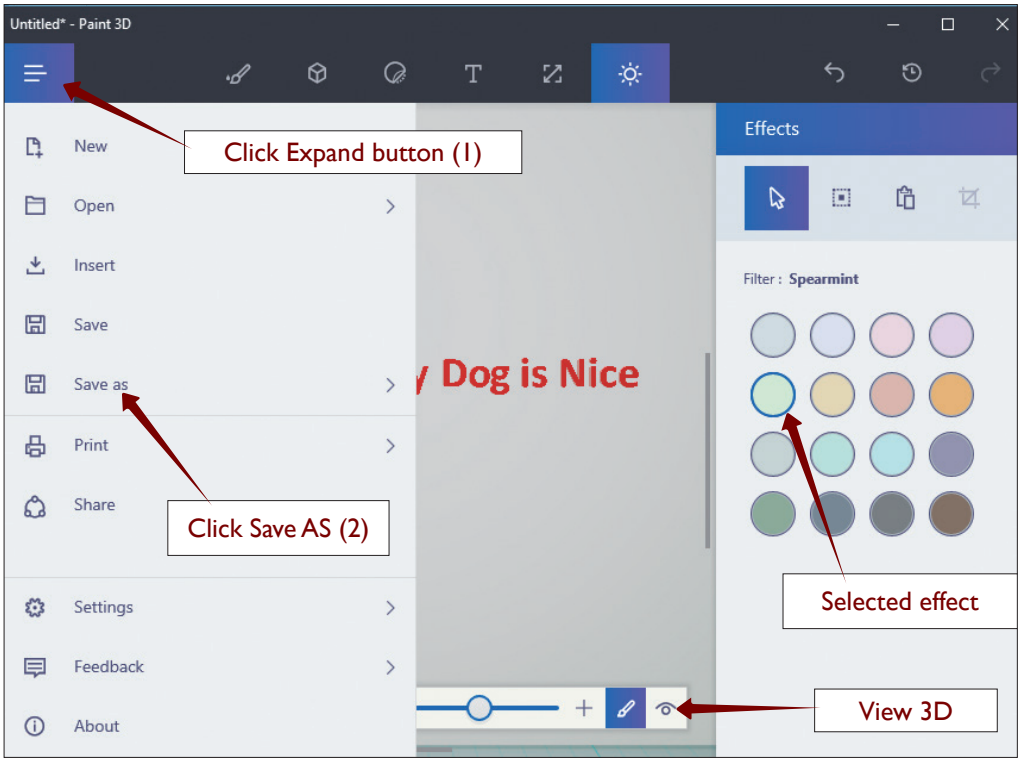


Picture 7.41 (e): Paint 3D showing spearmint effect on the 3D graphic

Step 4: Type text **"My dog is nice".** Select the text tool on the toolbar and draw a box where you want in the canvas and then type the desired text.

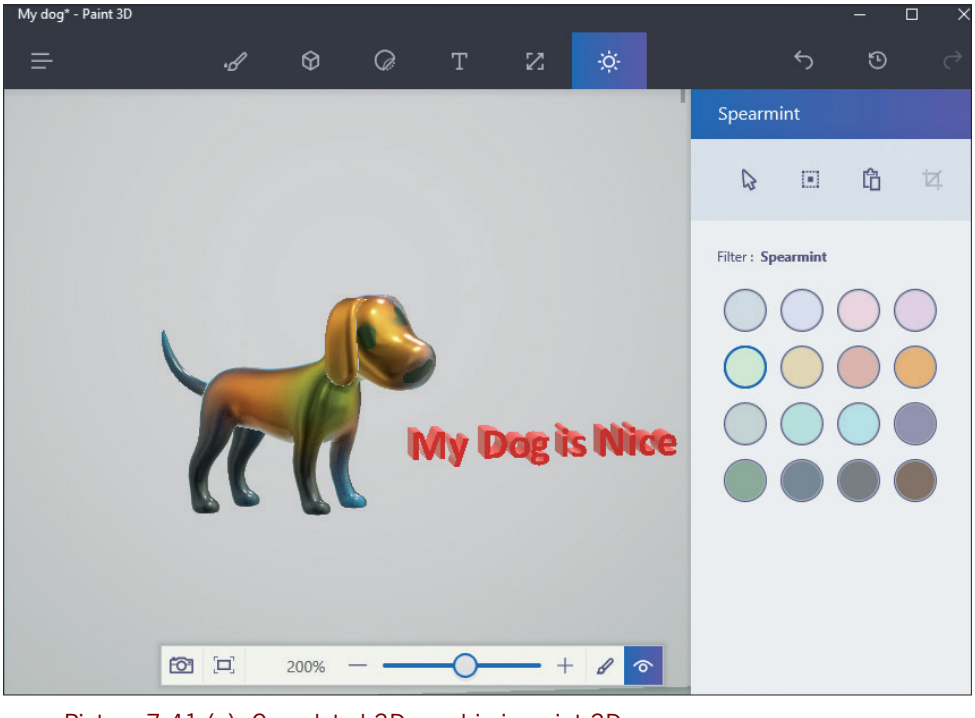
Step 5: Save your file as a project. Procedure for saving Paint 3D project:

Click on the **Expand menu** button and then select **Save As**. See picture 7.41 (f).



Picture 7.41 (f): Accessing the Save options in MS Paint 3D

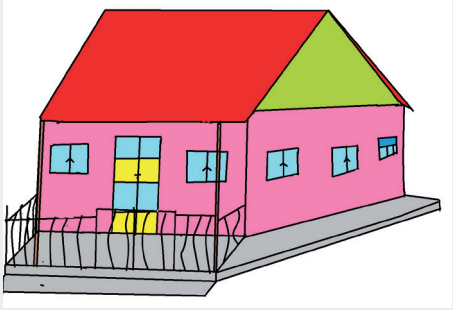
The complete project in 3D will appear as shown in picture 7.41 (g).

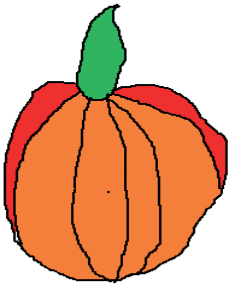


Picture 7.41 (g): Completed 3D graphic in paint 3D

Activity 7.8 (b)

1. Draw the following pictures in Microsoft Paint and save the files as their names shown.
   a) House
   b) A pumpkin





2. Imagine and draw a picture of a learner seated attentively in a classroom lesson using graphics software of your choice.

7.10 Using Photoshop

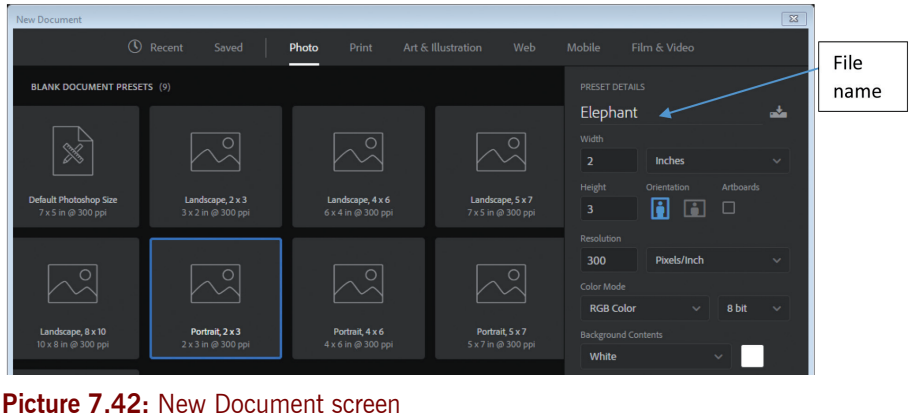
At the start when you open Photoshop it displays a dark interface as shown below in picture 7.42.

7.10.1 Create a new Photoshop file

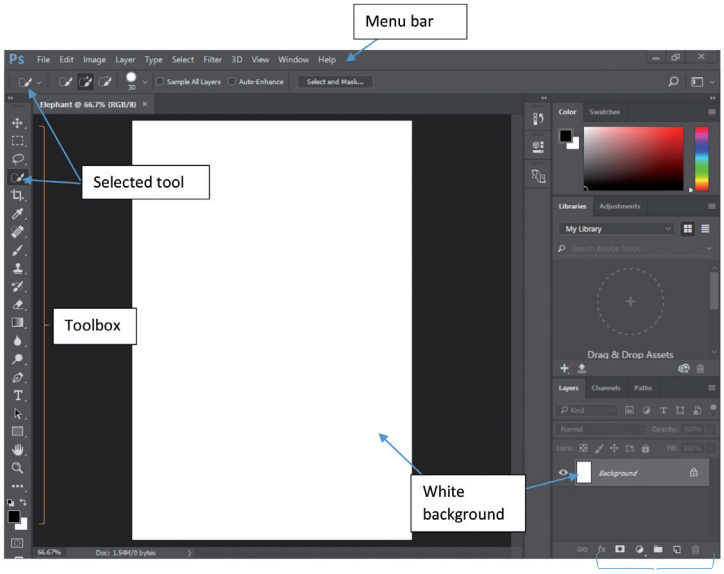
Step 1: When Photoshop opens, click on **File** menu and select **New.**

In the new document screen that appears, select a category of orientation for your document; then type in the file name in the PRESETS DETAILS pane.

Click **OK** at the bottom. The new named document will display with a white background as shown in picture 7.42.



Picture 7.42: New Document screen



Picture 7.43: A new Photoshop Document

Activity 7.9

Use the available digital camera and take desired photos as you master how to use it. Pick a suitable rough photo from your camera or open an existing rough photo in Photoshop . Edit the photo by :

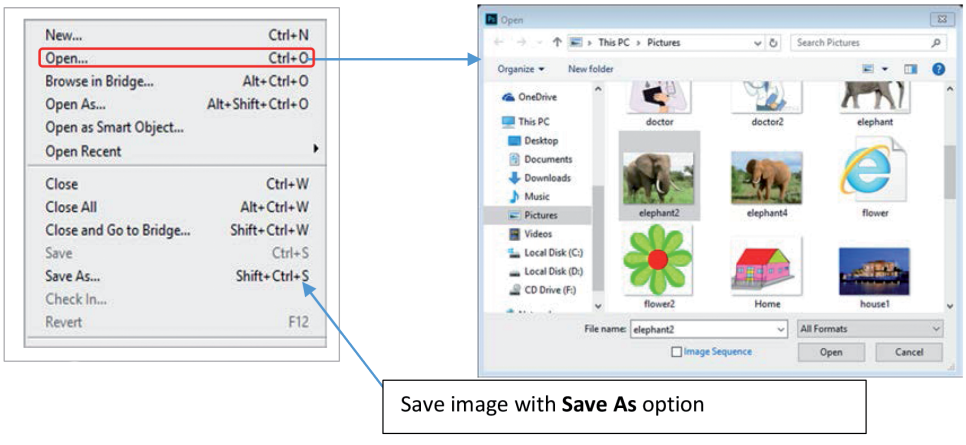
a) Adjust image size to a suitable size.
b) Reduce the roughness of the background or skin.
c) Apply desired text depending on the image applied in the upper right hand corner.
d) Crop part of the image and discard the rest. Save changes.
e) Rotate the cropped image by 180 degrees.

Follow procedure below

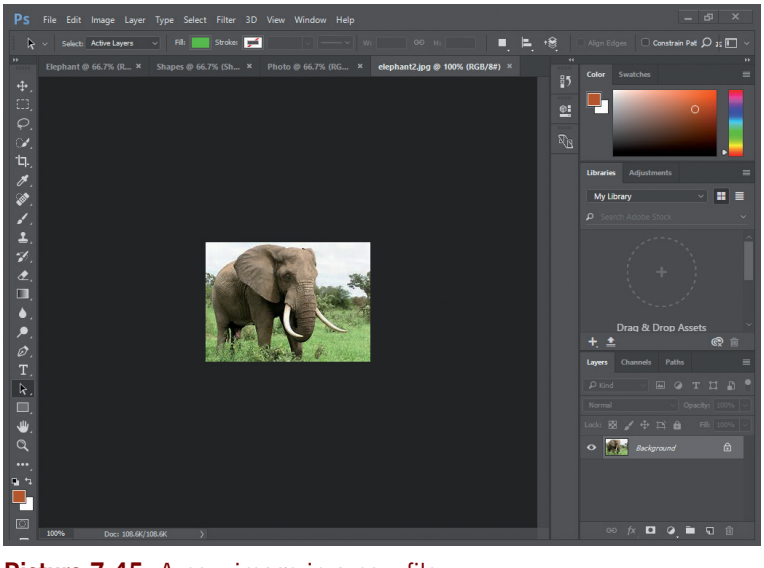
7.10.2 Open an image

Step 1: **Open or Add an image:** In a new file select **Open** on file menu.

Step 2: Select an image you want. The image I have chosen here below is an elephant:



Picture 7.44: Save As option



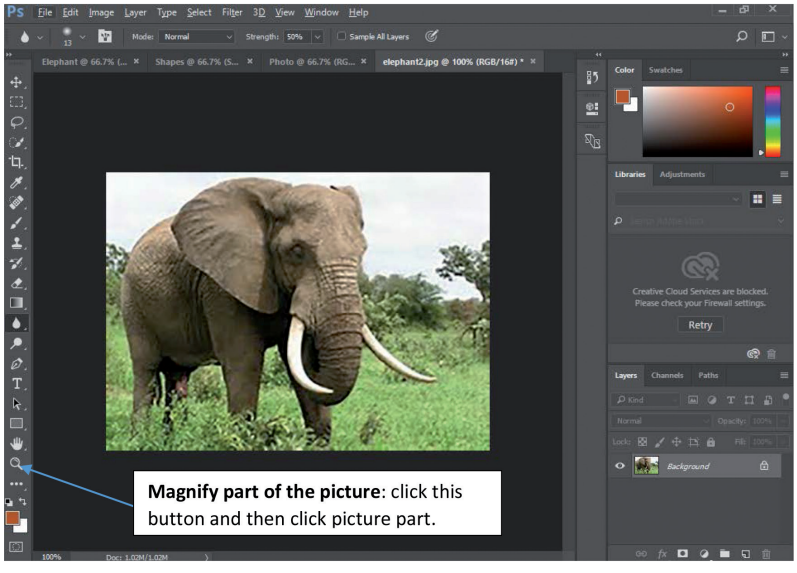
Picture 7.45: A new image in a new file

7.10.3 Resize image

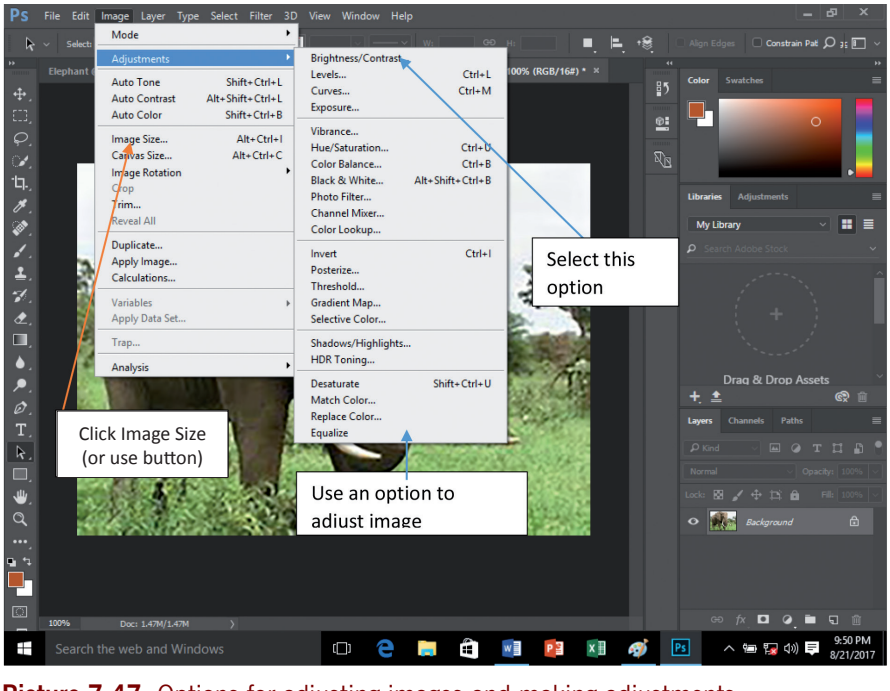
Step 3: **Adjust Image Size**: Use **Image** menu and adjust image to the size you want. Click **Image Size** on the **Image menu**

Make other **adjustments** using Image menu. See **picture 7.46**.

> **Note:** In case of a mistake you make in using Tools, press CTRL+Z (Un Do) but if there are several mistakes, then press ALT+CTR+Z to reverse those actions.



Picture 7.46: A Resized image



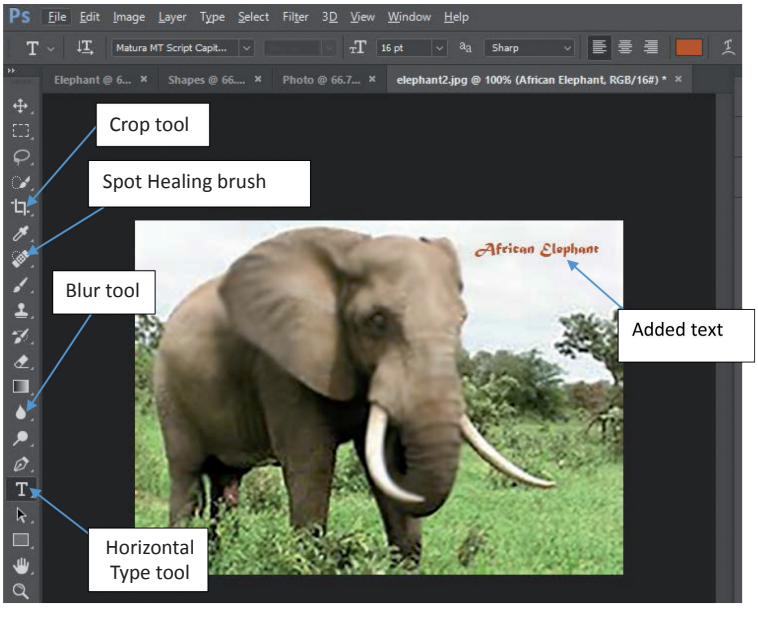
Picture 7.47: Options for adjusting images and making adjustments

7.10.4 Use brushing tools

Step 4: Remove some rough elements on the animal skin. Use the **Spot Healing Brush** and **Blur** Tool. Afterwards apply some light on parts using **Dodge** Tool.

7.10.5 Add text to photo

Step 5: Add text to the upper right hand corner as "African Elephant". Use the '**Horizontal Type Tool'** and draw a textbox in required position. Type the text. You can format the text using menu items below the menu bar. The text may appear as shown in picture 7.48.



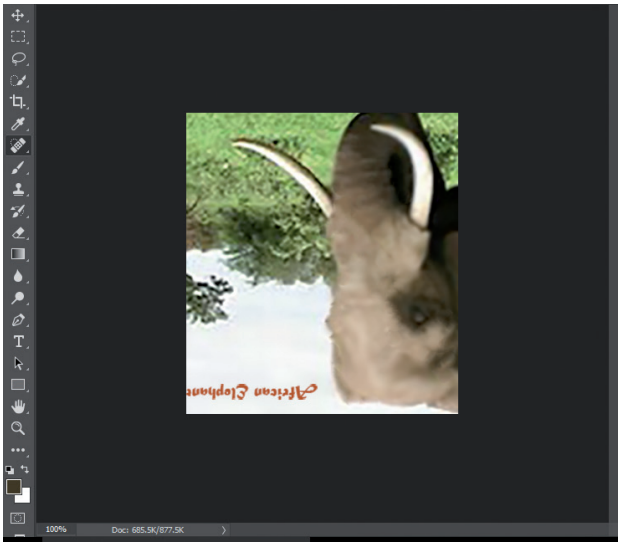
Picture 7.48: Text is added to image and rough spots removed

7.10.6 Crop an image

Step 5: **To Crop an image**. Select the **Crop Tool** from image menu or from Toolbox and then select part of the picture you want to crop. You can press the check button on toolbar.

7.10.7 Rotate an image

Step 6: Using the **Image menu**, on **Image Rotation** menu select 180^0. You can use a different option.



Picture 7.49: Cropped and rotated image

> **Note:** Photoshop generates better picture because many actions are done in a much professional way using advanced tools. Practice editing images using all the tools available in Photoshop to build your skill. If you need to draw lines and shapes within your image, you can use **Pen tool**.

Keyboard shortcuts

Keyboard shortcuts can greatly increase your productivity. Here are some of the more common ones:

- New Canvas: `Ctrl+N`
- Cut: `Ctrl+X`
- Paste: `Ctrl+V`
- Copy: `Ctrl+C`
- Save: `Ctrl+S`
- Delete: `Del`
- Print: `Ctrl+P`
- Undo: `Ctrl+Z`
- Highlight All: `Ctrl+A`
- Open: `Ctrl+O`
- Redo: `Ctrl+Y`

- Hide Toolbar: `Ctrl+T`
- Open Attributes: `Ctrl+E`
- Stretch And Skew: `Ctrl+W`

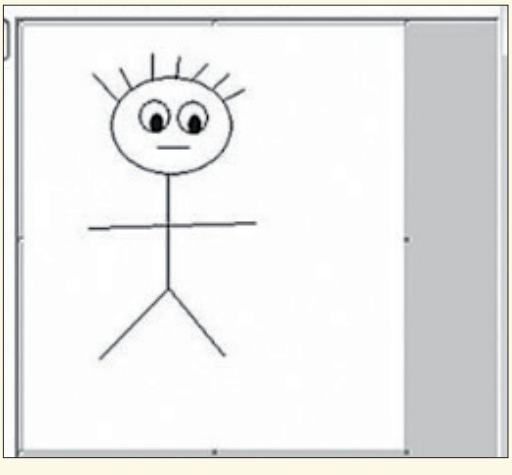
End of Unit 7 Assessment

Multiple choice questions

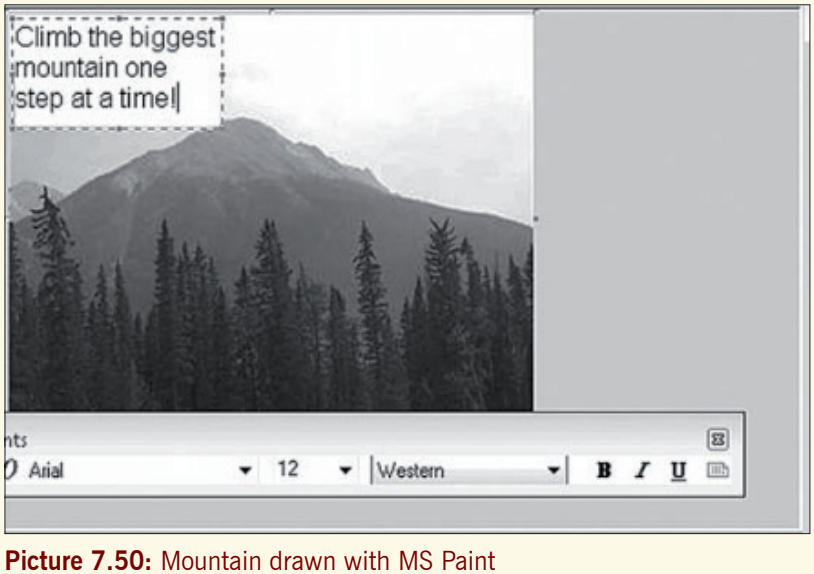
1. Which of the following will you use to select any irregularly shaped part of the picture?
   A. Free-Form Select B. Select
   C. Eraser D. Fill with Colour
2. Which of the following indicates the current foreground and background colours?
   A. Free-Form B. Eraser
   C. Colour box D. Select
3. Which of the toolbox is used to erase areas of your picture?
   A. Free-Form B. Eraser
   C. Magnifier D. Brush
4. Which of the following will you use to fill the entire picture or an enclosed shape with colour?
   A. Airbrush B. Fill With Colour
   C. Pencil D. Colour box
5. To zoom in on a section of your picture, you should use;
   A. Magnifier B. Free-Form
   C. Brush D. Eraser
6. To select any square or rectangular part of the picture, which toolbox will you use?
   A. Line B. Fill with colour
   C. Free-form select D. Select
7. Which of the following is used to set the current foreground or background colour of a canvas?
   A. Airbrush B. Brush
   C. Pick colour D. Text
8. A toolbox used to draw thin, free form lines or curves.
   A. Pencil B. Airbrush
   C. Brush D. Text

Practical work

1. Create a simple image using some of the drawing tools in Paint (Pencil, Brush, Airbrush and Filled shapes).
   a) Selecting and moving part of an image.
   b) Selecting and copying part of an image.
   c) Storing an image in a file Bmp as a large uncompressed file and Jpg as a smaller compressed file.
   d) Using the image in a Word document.
2. Use Paint to create the following effects:
   Draw a picture of some people stick figures. Be creative! The Figure below is an example.



3. Draw the following

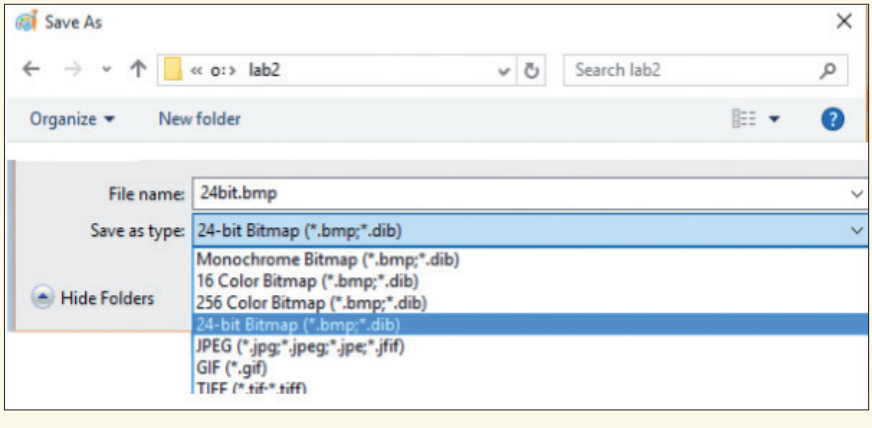


Picture 7.50: Mountain drawn with MS Paint

4. Using Ms paint, draw a flag of Rwanda as shown below.

Picture 7.51: National flag of Rwanda

a) Create a folder named 'lab2'. Create an image using Microsoft Paint, and save as a 24 bit .bmp file Start with a good size canvas, use lots of colours: **DO** something interesting! Include many different colours, lines, circles, etc. Save as a 24 bit .bmp file called **24bit.bmp**.



Picture 7.52: Save As dialog box in MS Paint displaying file types

b)
- Save as a 256 colour.bmp file called 8bit.bmp.
- Save as a 16 colour .bmp file called 4bit.bmp.
- Save as a monochrome .bmp file called 2bit.bmp.
- Close Paint.
- Start a new Paint session, and open 24bit.bmp.
- Save as a tiff file called 24bit.tif.
- Close Paint.

- Start a new Paint session, and open 24bit.bmp.
- Save as a gif file called 24bit.gif (will warn about colour loss).
- Close Paint.
- Browse to your lab2 folder, and compare file size.
- Right click each image, and choose Preview to compare how the images look.

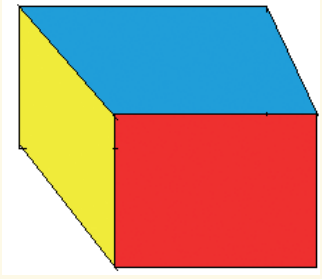
5. Take a picture of yourself using a digital camera and edit the photo in a way you wish using various tools on the Toolbox and menu. In case of absence of a camera, use any available photo on your computer and perform editing functioning to crop, resize, flip, rotate and magnify parts of the picture.
6. Scan or search from Internet for these pictures below and introduce them into Photoshop. Edit the pictures by adjusting their brightness or contrast, resize and change their colour or add a different background. Save the changes. Use other pictures provided by the teacher and edit them accordingly.

Picture 7.53: Small car (a) and Cubs walking (b)

7. Create a line, a curve, polygon, a circle and a square using Photoshop. Make the shape outlines coloured and filled with colour effects where possible. Apply accompanying text. Save the file as Super shapes.

8. Draw the pictures below using MS Paint and then MS Paint 3D.

a) Cube



b) Hut

APPLICATION SOFTWARE

Graphics and Multimedia

Introduction to Multimedia

Key unit competence

Explain the different uses of multimedia and interactive multimedia applications. Use multimedia software to create a video.

8.1 Introduction

Multimedia has become familiar in our life, it can be found in different areas of life such as in education, business, wedding ceremony and others. In these days, with the evolution of the use of computer, the demand of multimedia contents has also increased, multimedia content can be: movies, power-point presentation and audio sounds.

8.2 Definition

Multimedia is the collection of medias that use multiple forms of information content and information processing to inform or entertain the user.

Examples of multimedia contents are; text, audio, graphics, animation, and video.

Multimedia also refers to the use of electronic media to store and experience multimedia content.

Multimedia information can be represented in form of audio file, graphical file, image file, video file and animation file.

8.3 Categories of multimedia

Multimedia may be broadly divided into **linear** and **non-linear** categories.

- Linear multimedia; active content progresses without any navigation control for the viewer/user.
  Examples: Movies, video clips and songs.
- Non- linear multimedia content offers the ability to control the content interactivity with the user/viewer.
  Examples: Computer games, assimilation software used in self computer based trainings.

Multimedia presentations can be live or can be recorded.

- A recorded presentation is a presentation which has been recorded and edited, after all processing stages.
  Example: TV programme.
- A live multimedia presentation occurs when things are happening at that moment.
  Examples: News on television and Football game.

8.4 Features of multimedia

- Presentations may be viewed in person on stage, projected, transmitted, and played locally with a media player.
  Examples: Power point presentation and cinema presentation.
- Games and simulations may be used in a physical environment with special effects, played /used by multiple users on the computer network and locally with an offline computer, game system, simulator.
  Examples: Online games and game on mobile telephone.

8.5 Types of multimedia

- **Text:** It is used as the basic element for all multimedia applications. It is directly used to inform users about the information that it wishes to communicate.
- **Graphics:** It uses pictures as visuals in digital form used in multimedia presentations.
  There are two types of graphics:

(i) **Bitmap Graphics (Image Raster):** Formed by pixels arranged in specific ways in a matrix form.

(ii) **Vector Graphics:** Formed by lines that follow mathematical equations called vector.

- **Animation:** It is the process of adding movements to static images or picture through using various computing methods.
- **Audio:** It is the sound in digital form used in multimedia presentations.
- **Video:** Moving pictures in digital form in multimedia presentations.

Activity 8.1

Use internet or school library textbooks to make research and answer the following questions.

1. Explain the term multimedia.
2. Describe different types of multimedia.
3. Explain features of multimedia.
4. Using examples, describe categories of multimedia.
   You can share your opinions to the rest of the class.

8.6 Applications of multimedia

The application of multimedia is found in various areas including: advertisements, art, education, entertainment, engineering, medicine, mathematics, business, scientific research and spatial. A few of application areas of multimedia are discussed below:

1. Commercial

Most of the electronic media used in commercial advertisement fall in multimedia. In most Rwandan cities, there is exciting presentations that are used to take and keep attention of people with the interest of advertising.

2. Entertainment

Multimedia is heavily used in the entertainment industry. It is especially used to develop special effects in movies and video games.

3. Education

In Education, multimedia is used to produce computer-based training courses and reference books.

4. Industry

In the Industrial sector, multimedia is used as a way to help present information to shareholders, superiors and coworkers. Multimedia is also helpful for providing employee training, advertising and selling products all over the world via virtually unlimited web-based technologies.

5. Medicine

In Medicine, doctors can be trained to do human surgery and they can simulate how the human body is affected by disease viruses and how bacteria spread, using multimedia tools and then develop techniques to prevent it.

6. Multimedia in public places

In hotels, airports, shopping malls, museums, and grocery stores multimedia tools are available to help people/tourists to give information, they need.

Example: In airport, there is no need to ask plane information to the personnel of the airport; notice board is there to inform passengers.

Activity 8.2

Using your school internet facilities

1. Search for multimedia application and compare your results.
2. Discuss the applications of multimedia in your local community.
3. Compare what is happening in other communities and what you have found in your community.

8.7 Hardware and software in the multimedia requirement

8.7.1 Multimedia hardware

Below are some of the hardware that can be used in multimedia :

- Computer.
- Digital camera.
- Microphone.
- Scanner.
- Speaker /headphone.

		
Camera	Head phone	
		
Digital camera	Computer	
		
TV (screen)	Scanner	
		
Speaker	Microphone	CD/DVD

Picture 8.1: Different categories of multimedia hardware

8.7.2 Multimedia software

Software	Description
Adobe Acrobat Pro	Protect documents and accelerate information exchange with PDF.
Adobe Creative Suite Master Collection	Contribute, Dreamweaver, Fireworks, Flash Pro, Illustrator, InDesign, Photoshop, Premier Pro, and supporting applications.
Facetime	Make video calls.
Final Cut Studio Pro	Video Editing. Package includes Soundtrack Pro, Cinema Tools, and DVD Studio.
HandBrake	Video encoder.
iCal	Personal calendar application.
Image Capture	Upload pictures from digital cameras or scanners.
iTunes	Download media for Mac, PC, iPod and iPhone.
Microsoft Office Suite	PowerPoint.
PhotoBooth	Take photos and videos with an iSight camera.

Table 8.1: Multimedia software

These hardware and software are used together to make up the multimedia system which can capture, digitise, compress, decompress, retrieve multimedia data and show it on the output device like computer monitor and multimedia projectors.

Activity 8.3

1. Discuss other multimedia hardware and software which are not discussed in here. Use the facilities available within your school.
2. Identify multimedia hardware which are used in your school.
3. List multimedia software that are installed in school computer lab.

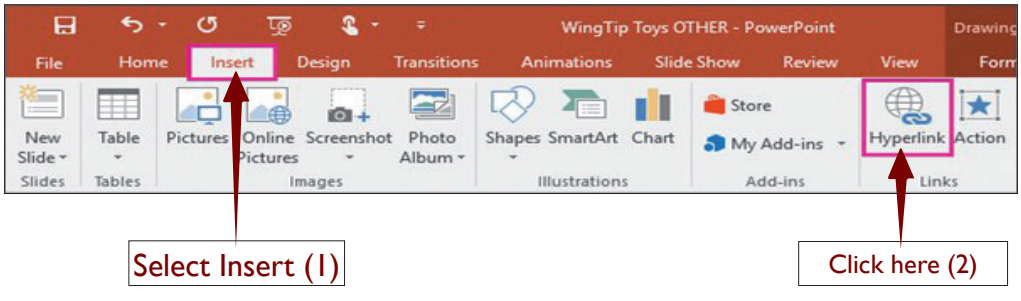
8.8 Interactive multimedia

8.8.1 Create hyperlinks to link to a slide in the current presentation.

A hyperlink is a logical link that creates a connection between files. You already know how to use MS PowerPoint presentation. Now open the program and perform the following actions. You should use an existing file.

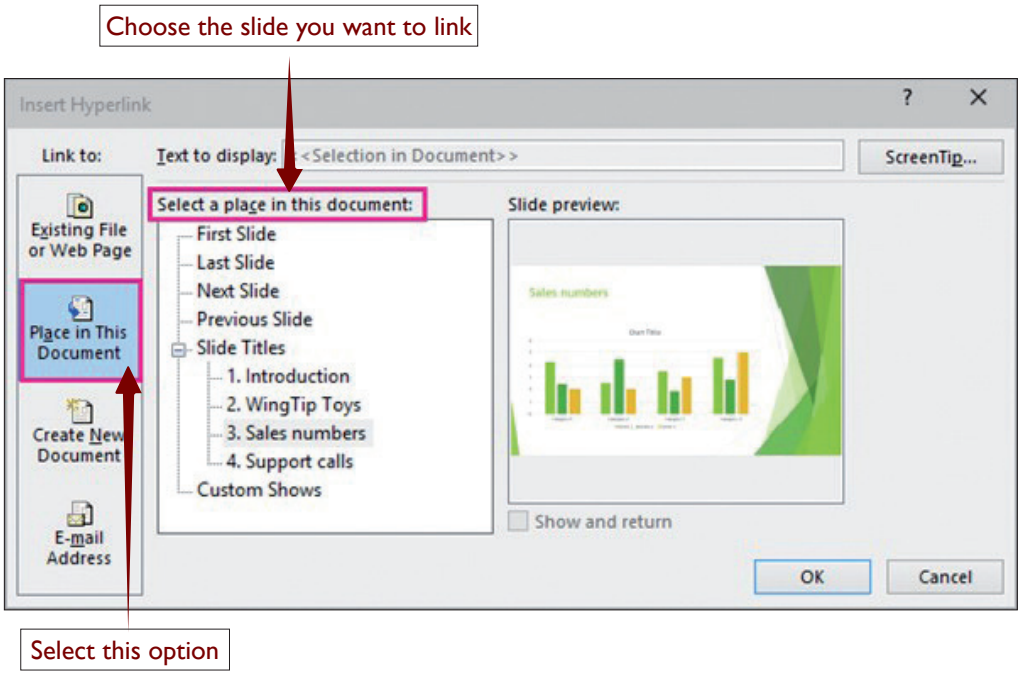
Step 1: In Normal view, select the text, shape, or picture that you want to use as a hyperlink.

Step 2: On the **Insert** tab, in the **Links** group, click **Hyperlink.**



Picture 8.2: Hyperlink button on Insert tab

Step 3: In the **Insert Hyperlink** dialog box, under **Link to**, click **Place in this Document**.



Picture 8.3: Insert Hyperlink dialog box. Current presentation is used

Activity 8.4

Create a PowerPoint presentation "Rwanda Nziza". This presentation has the following slides:

- Slide 1: Province.
- Slide 2: Northern Province.
- Slide 3: Eastern Province.
- Slide 4: Southern Province.
- Slide 5: Western Province.
- Slide 6: City of Kigali.

Link slide 1 to other remaining slides in any way that you can jump from slide1 to any other of these slides.

Step 4: Select "First slide, Next slide, Previous slide or Last slide". You can use slide titles.

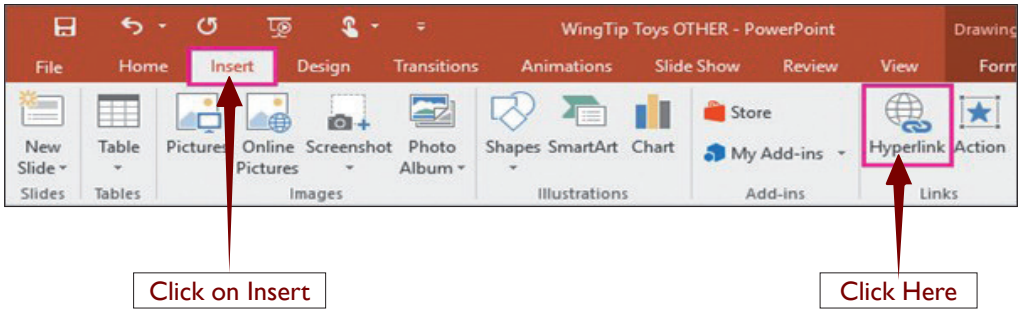
Step 5: Click **Ok.**

8.8.2 Create hyperlinks to link to a slide in a different presentation

Use the following steps to link a slide in a different file.

Step 1: In Normal view, select the text, shape, or picture that you want to use as a hyperlink.

Step 2: On the **Insert** tab, in the **Links** group, click **Hyperlink**.

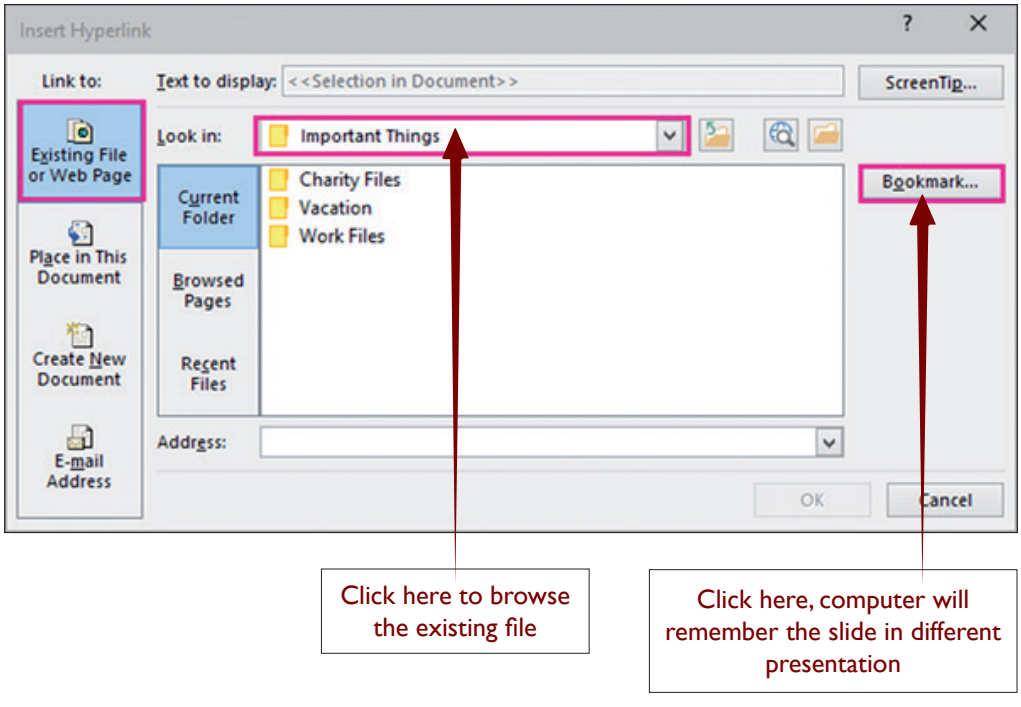


Picture 8.4: Hyperlink command on Insert tab

Step 3: Under **Link to**, click **Existing File or Web Page**.

Step 4: Locate and select the presentation file that contains the slide that you want to link to.

Step 5: Click **Bookmark** and then click the title of the slide that you want to link to. Click **Ok** and then **Ok**.



Picture 8.5: Insert Hyperlink dialog box. An existing file is used.

Activity 8.5

Create a PowerPoint presentation "My school" and connect it to the previous presentation "Rwanda Nziza". "My school" presentation should contain the slides about your school as follows:

Slide 1: Name of your school and school motto.

Slide 2: Location of your school, addresses or contacts. Headmaster's name.

Slide 3: 5 male and 5 female teachers in your school.

Slide 4: Sports activities in your school.

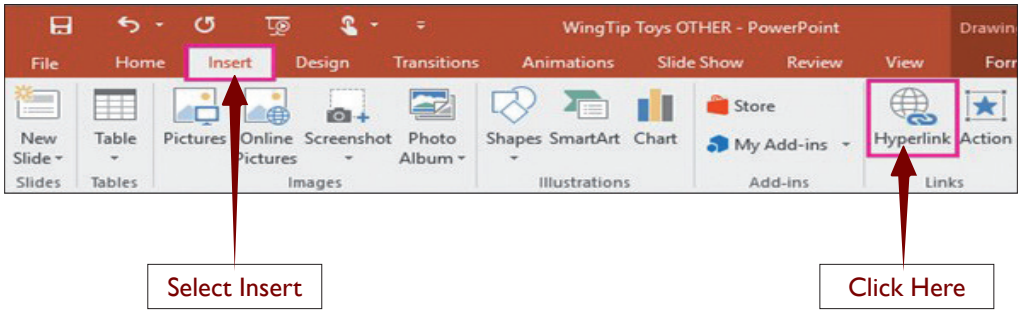
Slide 5: Co-curricular activities in your school.

Slide 6: Subjects taught in your school.

8.8.3 Create hyperlinks to link to an e-mail address

Step 1: In Normal view, select the text, shape, or picture that you want to use as a hyperlink.

Step 2: On the **Insert** tab, in the **Links** group, click **Hyperlink**.

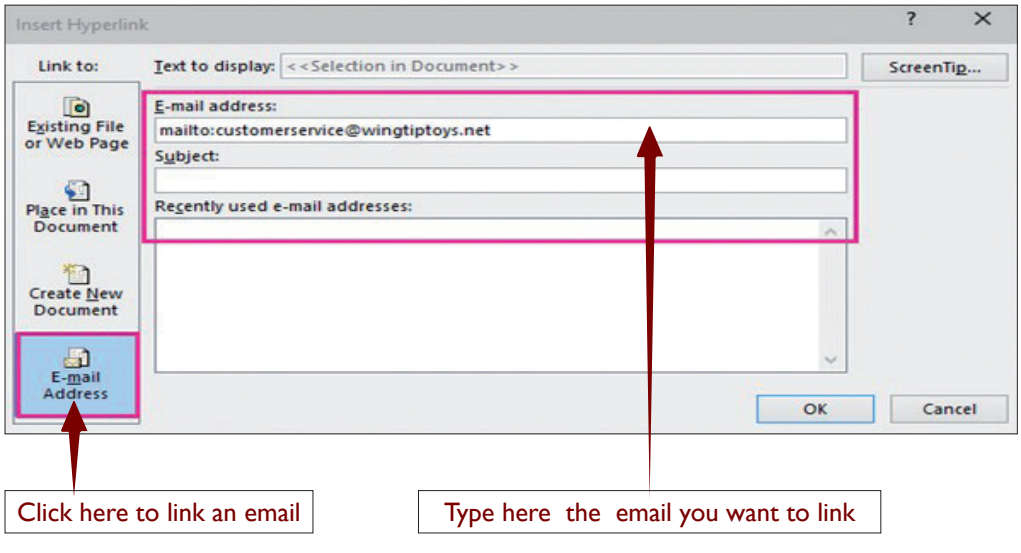


Picture 8.6: Ribbon with Hyperlink highlighted on Insert tab

Step 3: Under **Link to**, click **E-mail Address**.

Step 4: In the **E-mail address** box, type the e-mail address that you want to link to, or in the **Recently used e-mail addresses** box, click an e-mail address.

Step 5: In the **Subject** box, type the subject of the e-mail message.



Picture 8.7: Insert Hyperlink dialog box. Email address is used.

Activity 8.6

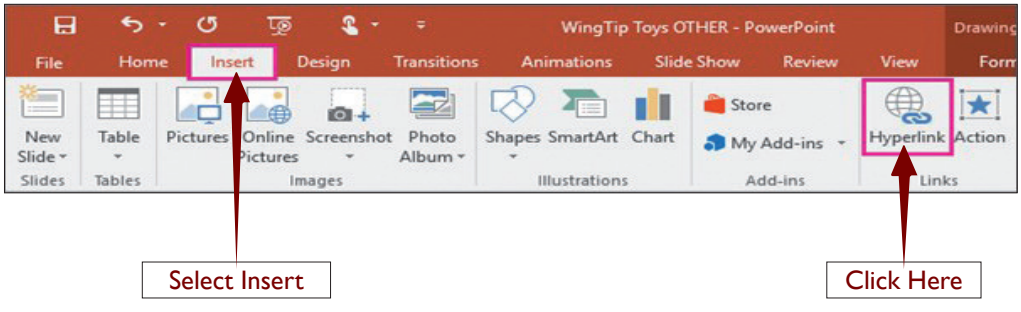
Open a PowerPoint presentation "My school" and connect it to the class email "classsenior3@gmail.com".

8.8.4 Create hyperlinks to link to a new file

Follow the steps below to create a link between my school and classroom3@gmail.com.

Step 1: In Normal view, select the text, shape, or picture that you want to use as a hyperlink.

Step 2: On the **Insert** tab, in the **Links** group, click **Hyperlink**.



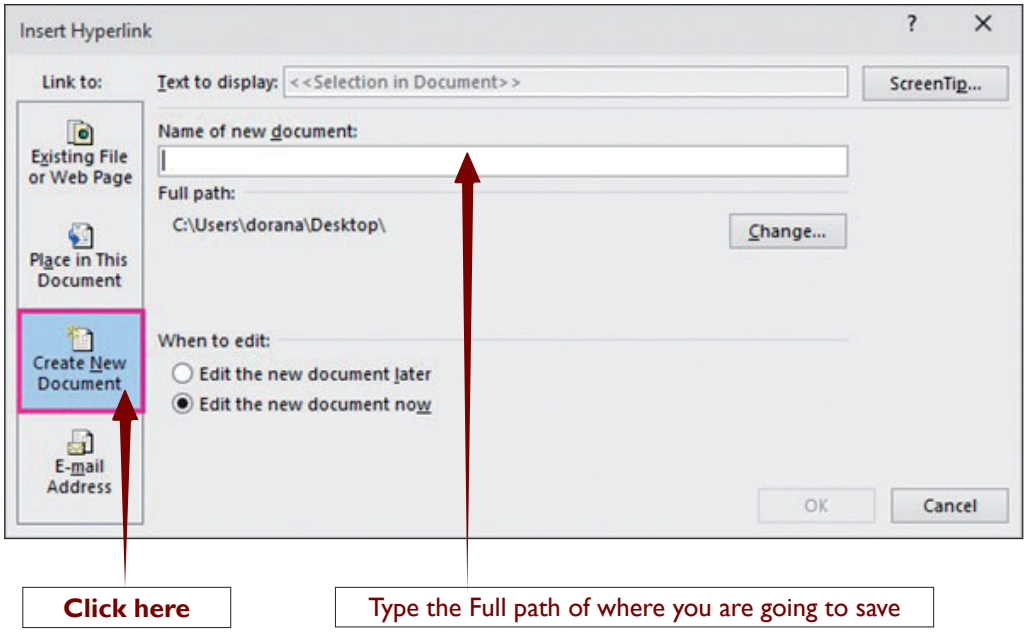
Picture 8.8: Hyperlink button highlighted on Insert tab

Step 3: Under **Link to**, click **Create New Document**.

Step 4: In the **Name of new document** box, type the name of the file that you want to create and link to.

> **Note:** If you want to create a document in a different location, under Full **path**, click **Change**, browse to the location where you want to create the file, and then click **OK**.

Step 5: Under **When to edit**, click whether you want to **Edit the new document later** or **Edit the new document now**.



Picture 8.9: Insert Hyperlink dialog box. New document is used

Activity 8.7

Open presentation "My school" and connect it to the new presentation you are going to create "My Class".

"My class" presentation should contain the following information:

Slide 1: Name of your class e.g. S.3.A.

Slide 2: List of 10 girls in your class.

Slide 3: List of 10 boys in your class.

Slide 4: Reasons why learners like ICT.

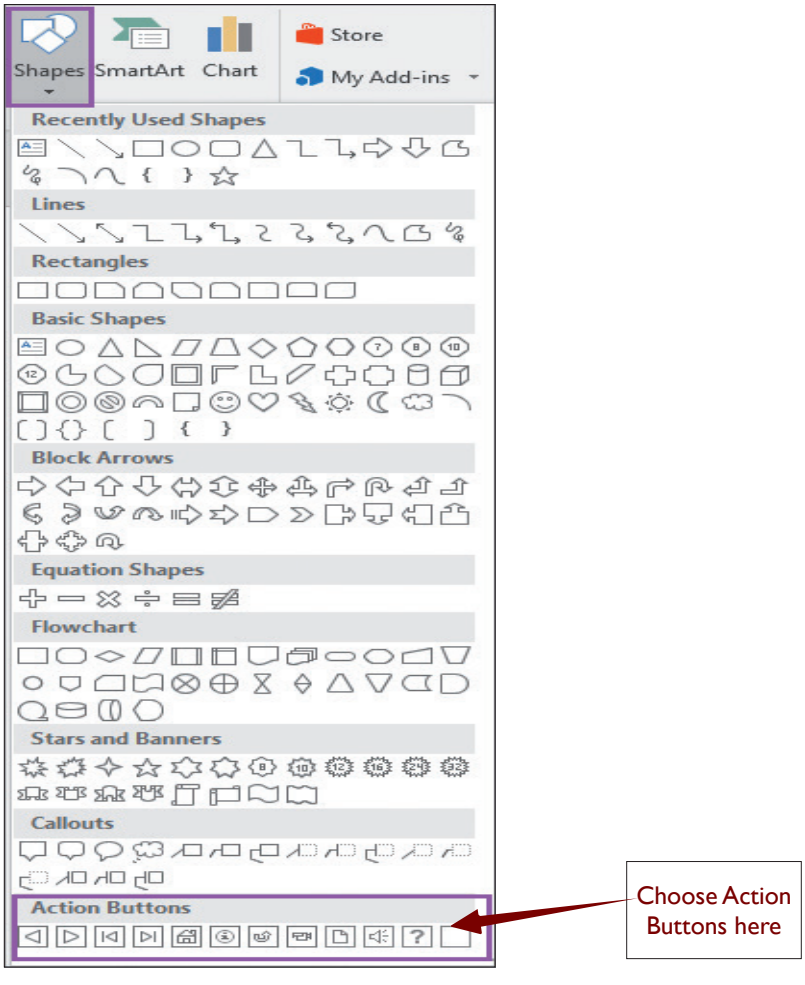
Slide 5: Disadvantages of ICT to learners.

8.9 Create action buttons

An action button is a shape used to perform a certain action like going to the next or previous slide, play or pause,...

8.9.1 Add commands to your presentation with action buttons

Follow the steps given below to use Action buttons. Step 1: On the **Insert** tab, in the **Illustrations** group, click **Shapes**, and then under **Action Buttons**, click the button shape that you want to add.



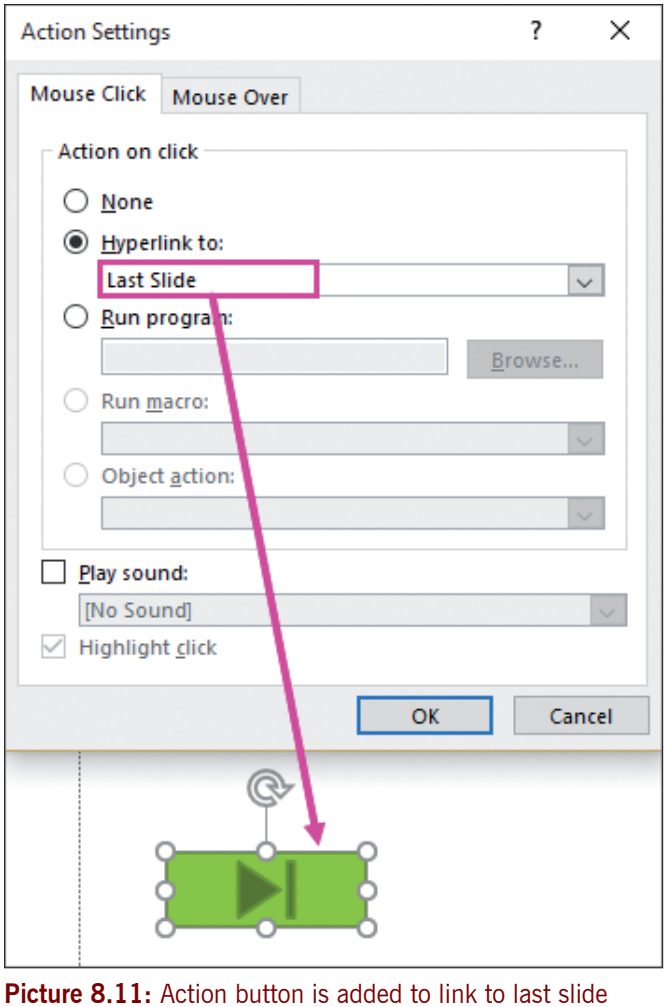
Picture 8.10: Collections of shape categories on Insert tab

TIP: *Action buttons provide great visual cues to the action it launches, but you can also assign actions to other objects, such as clip art, pictures, general shapes, or to the text in a SmartArt graphic. Use the procedure below to add an action to those objects as well.*

Step 2: Click a location on the slide, and then drag to draw the shape for the button.

Step 3: In the **Action Settings** dialog box, do one of the following:

- To choose the behaviour of the action button when you click it in Slide Show view, click the **Mouse Click** tab of **Action** setting dialog box.
- To choose the behaviour of the action button when you move the pointer over it in Slide Show view, click the **Mouse Over** tab.



Picture 8.11: Action button is added to link to last slide

Add a button shape, and then assign an action (in this case, a hyperlink).

Step 4: To choose the action that will take place when you click or move the pointer over the action button, do one of the following:

TIP: *To play a sound, select the* ***Play sound*** *check box, and then select the sound that you want to play.*

Step 5: When you've finished choosing your action, click **OK**.

Activity 8.8

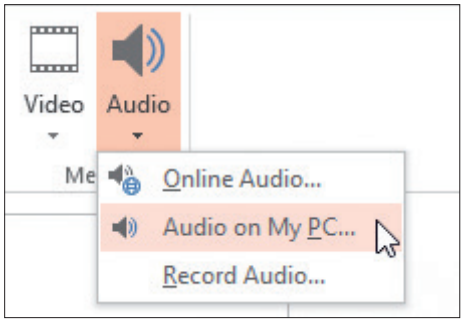
Insert in each slide play buttons and stop buttons on the last slide in "my class presentation".

8.9.2 Insert an MP3 audio file into a presentation

Activity 8.9

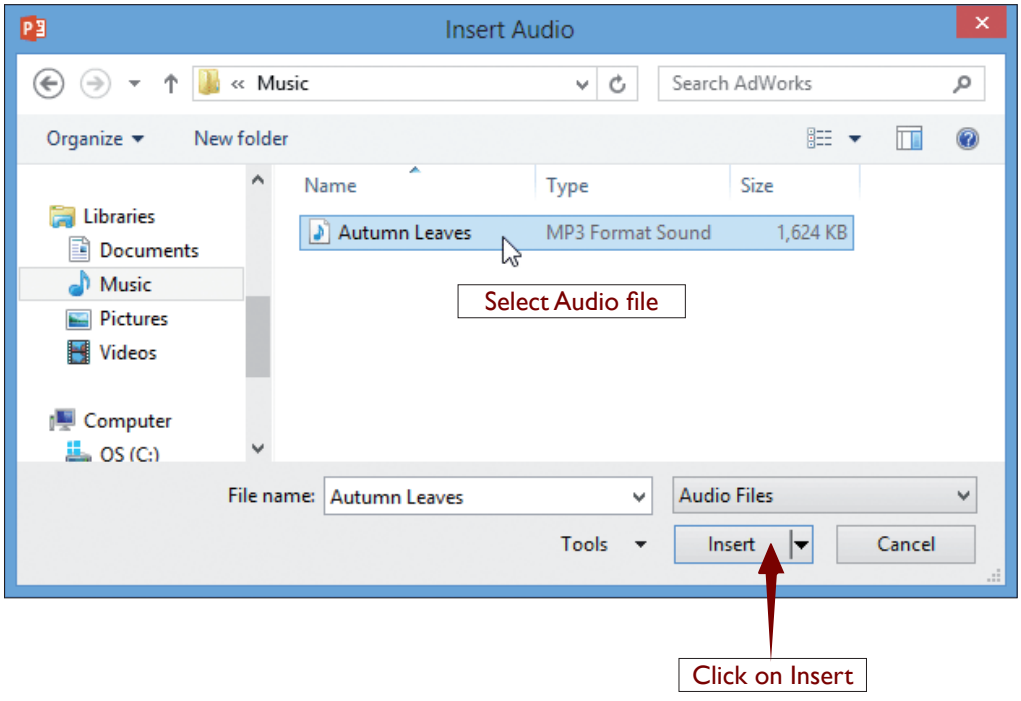
You are provided with an audio file which has mp3 file extension. Insert the audio file into "my class presentation" in the 3rd slide.

Step 1: Click on **Insert** tab of menu bar, then in **Media** group click on the Down arrow of the **Audio** icon. On the drop down list click on **Audio on My PC**.



Picture 8.12: Audio on My PC is selected under Audio button on Insert tab

Step 2: Locate and select the desired audio file, then click **Insert**.



Picture 8.13: Insert Audio dialog box

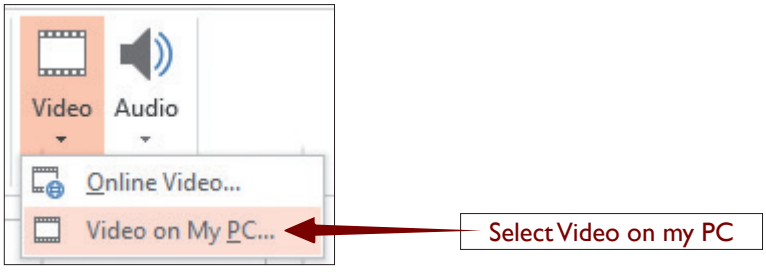
Step 3: The audio file will be added to the slide.

8.9.3 Insert a video file into a presentation

Activity 8.10

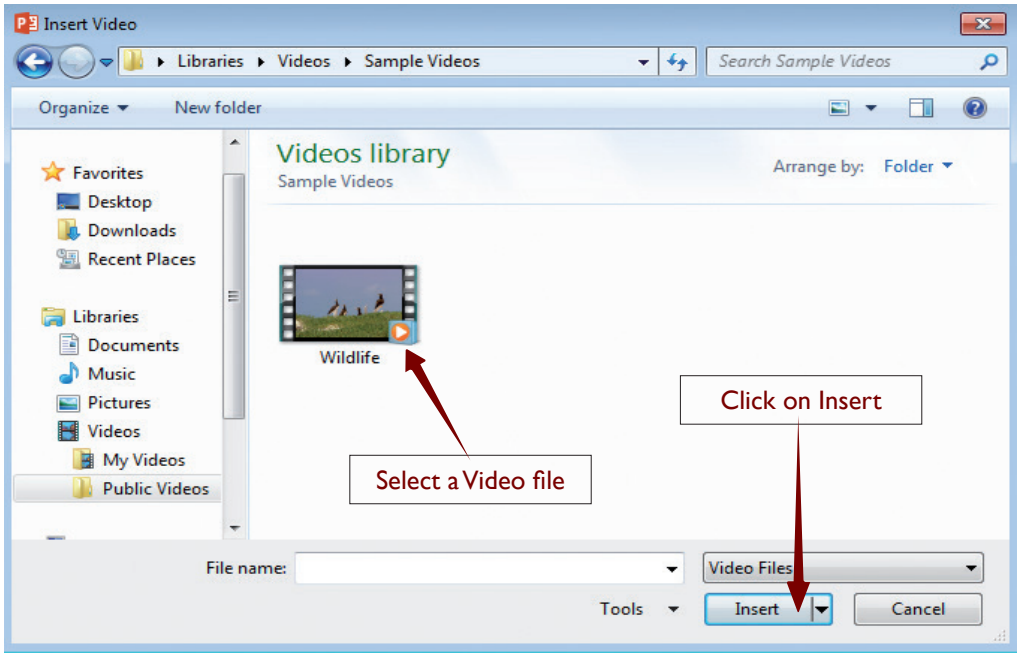
You are provided with a video file. Insert the video file into "my class presentation" in the 4th slide.

Step 1: From the **Insert** tab, click the **video** drop-down arrow, and then select a video by clicking on **Video on My PC**.



Picture 8.14: Video on My PC is selected from Audio button under Insert tab

Step 2: Locate and select the desired audio file, then click **Insert**.



Picture 8.15: Insert Video dialog box

8.9.4 Insert a CD audio track in the presentation

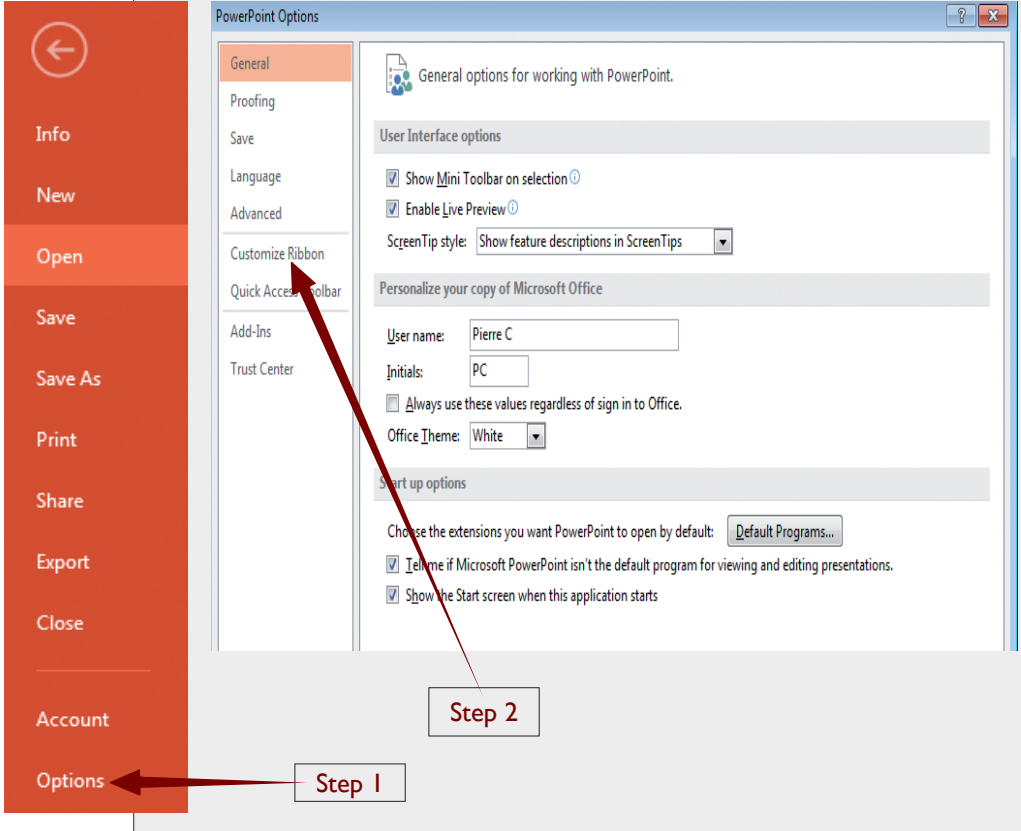
Activity 8.11

You are provided a CD audio track. Insert the CD audio track into "my class presentation" in the 5th slide.

If you want to add the **Play CD Audio Track** command back to the **Insert** tab, you must create a custom group and then add the command to the new group. To do this, follow these steps:

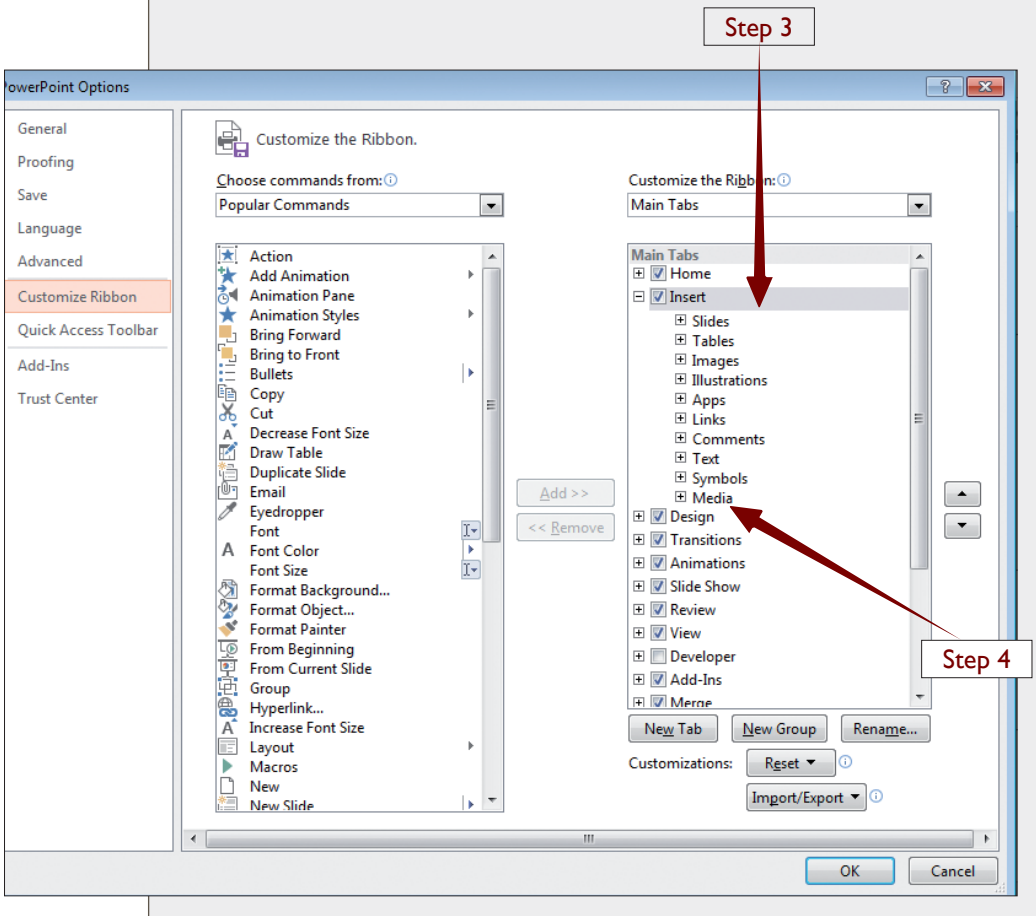
Step 1: Click the **File** tab, and then click **Options** in the navigation pane.

Step 2: In the navigation pane of the **PowerPoint Options** window, click **Customise Ribbon**.



Picture 8.16: Backstage view and General Powerpoint options. Click Customise Ribbon

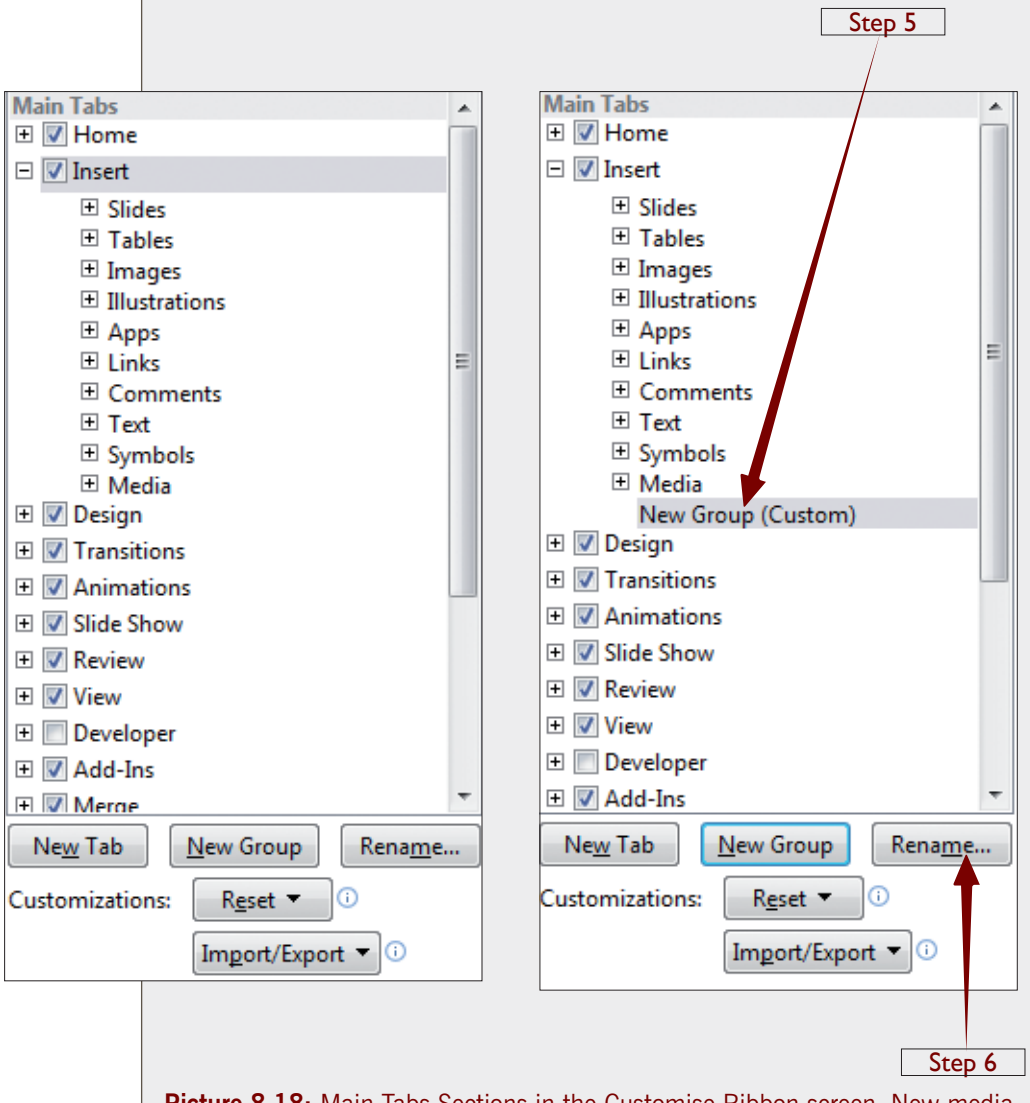
Step 3: In the **Customise ribbon** column, in the **Main Tabs** list, expand **Insert**, and then select **Media**.



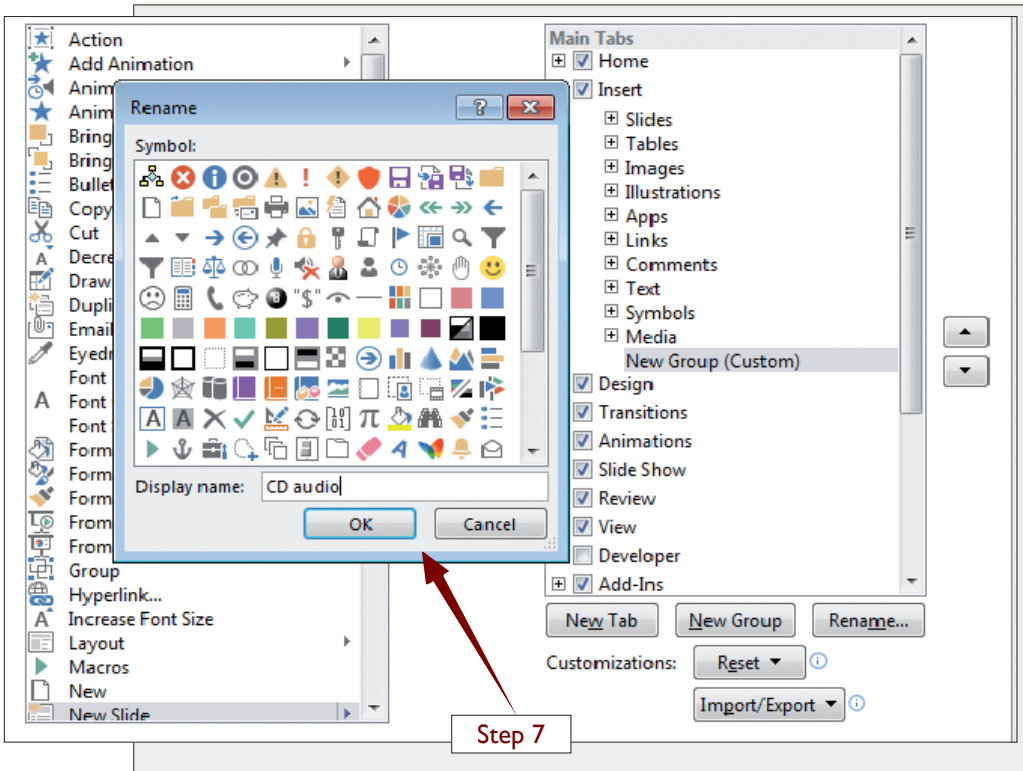
Picture 8.17: Customise Ribbon options

Step 4: Under the **Main Tabs** list, click **New Group**. The new group named **New Group (Custom)** is inserted under the **Media** group.

Step 5: Click **Rename**, type CD audio, and then click **OK**.



Picture 8.18: Main Tabs Sections in the Customise Ribbon screen. New media group is created

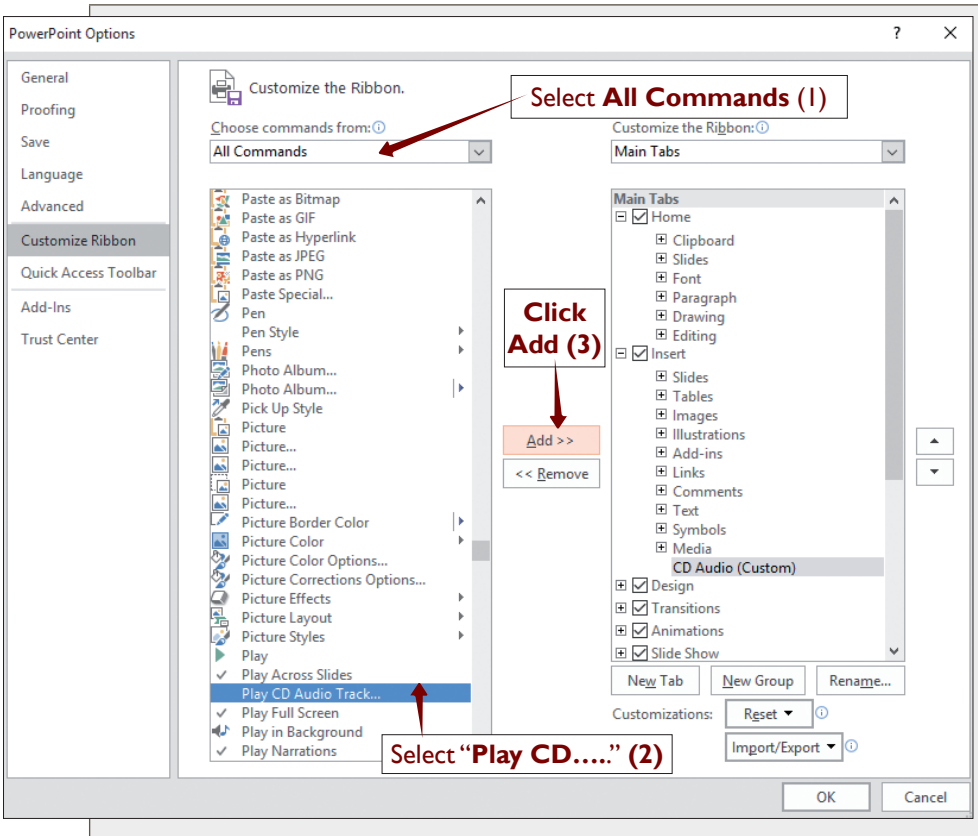


Picture 8.19(a): Rename dialog box on top of Powerpoint options window

Step 6: In the **Choose commands from** drop-down list, select **All commands**.

Step 7: Locate and then select the **Play CD Audio Track** command, and then click the **Add** button. The command appears under the new **CD Audio** group.

Step 8: Click **OK**.



Picture 8.19 (b): PowerPoint Options dialog box- for customising Ribbon

Step 9: Return to **Insert** tab and click **play CD Audio Track** from **CD Audio** group (new group created). This will work as long as you have the CD inserted in computer.

8.10 Create digital image, audio and video file

Activity 8.12

You are provided with a digital camera or smart phone elaborate on:

1. How to capture a video using a digital camera / Smartphone.
2. How to take a picture using a digital camera / Smartphone.
   After the teacher has demonstrated on how to do the activity, take a video of 4 minutes and 6 pictures to be presented in class.

Step 1: Open and switch on digital camera.

Step 2: Click the Video Capture button.

Picture 8.20: Part of digital camera with Video Capture button

8.10.1 Manipulate an image

Activity 8.13

In reference to Activity 8.12, open GIMP software and use the 6 pictures you have taken and do the followings:

1. Crop the pictures.
2. Rotate to 128 degrees.
3. Save the pictures on the desktop.

We are going to use GIMP (GNU Image Manipulation Program). It is free software and it is a powerful application that can alter, manipulate, enhance, and create digital image files. This software should be downloaded and installed on your computer.

Saving an image

To save an image file;

Step 1: Right-click on the image, follow the steps below;

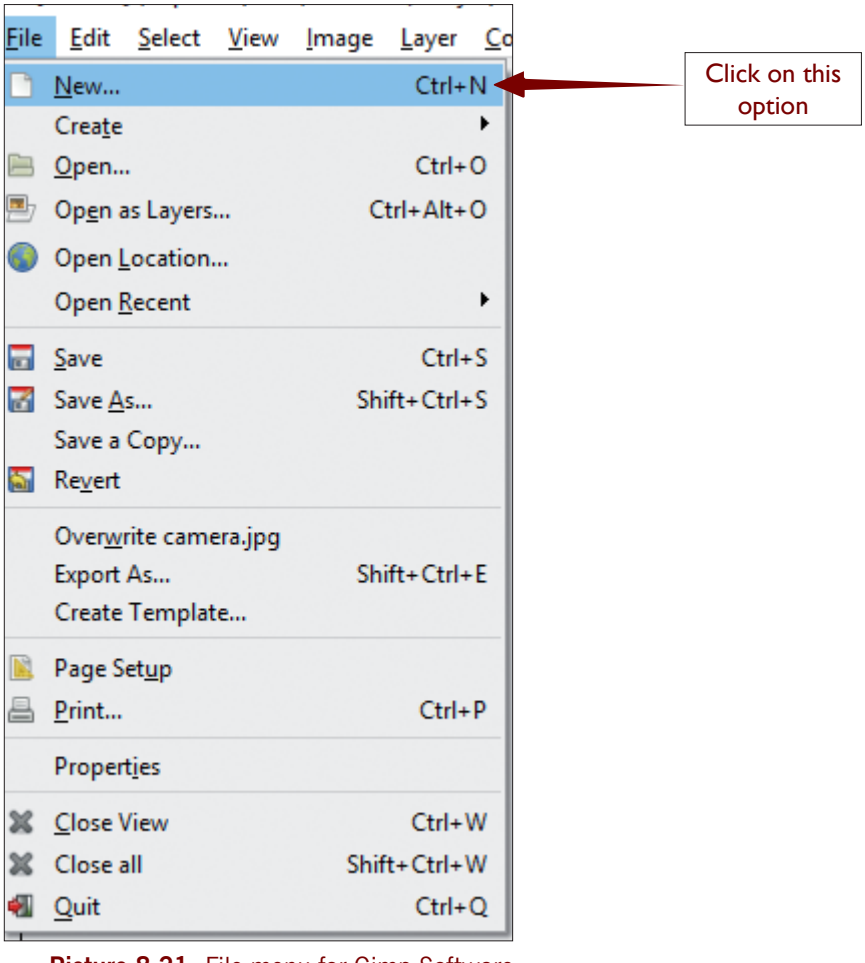
Step 2: Choose **File**.

Step 3: Select either **Save** or **Save As**.

Step 4: The **Save Image** window opens.

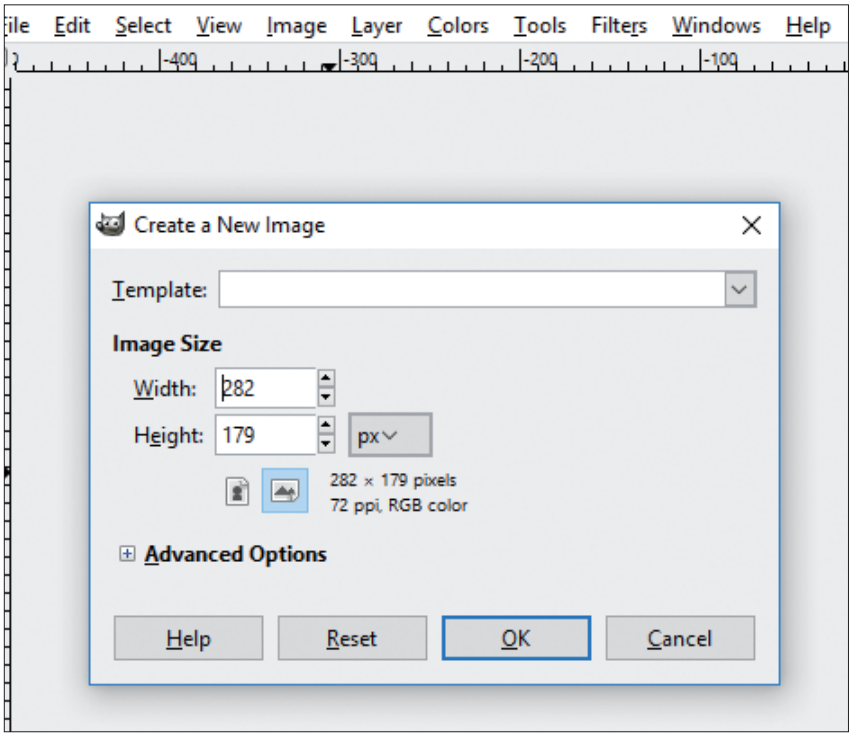
Create a new image

Step 1: Click **File** then **New**.



Picture 8.21: File menu for Gimp Software

Step 2: Enter the image size, image type, and fill type of the file.



Picture 8.22: Create a New Image dialog box for Gimp Software

Step 4: Click the **OK** button.

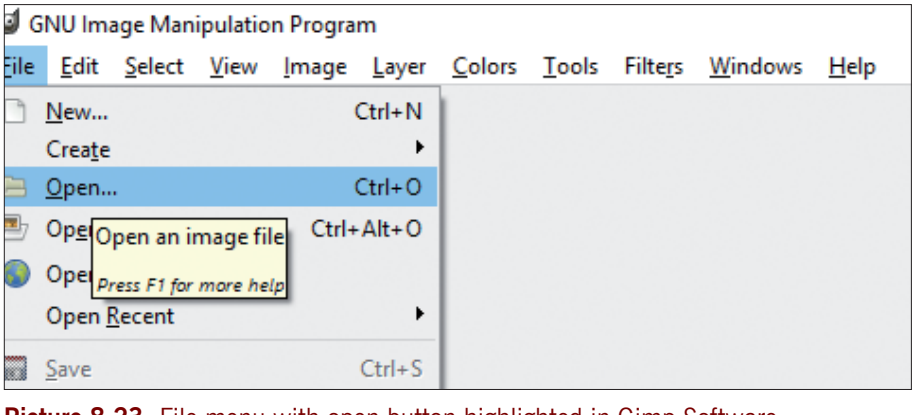
Step 5: Edit and manipulate the image with the **GIMP**'s various tools.

Step 6: Save your file.

Editing an image

Steps to crop an image

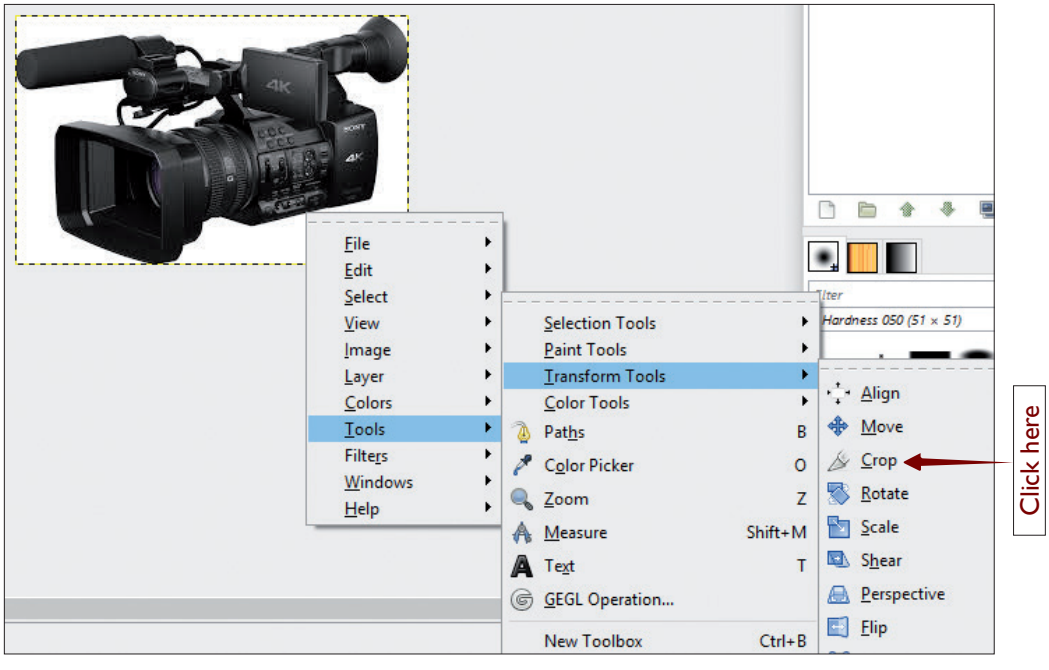
Step 1: Open the image.



Picture 8.23: File menu with open button highlighted in Gimp Software

Step 2: Browse your picture from the computer.

Step 3: Right click on the image and select **Tools** => **Transform Tools** => **Crop.**



Picture 8.24: Displayed image is right clicked to access needed commands and Tools

Step 4: Left-click and drag the mouse pointer to create a frame that fits the part of the image to keep.

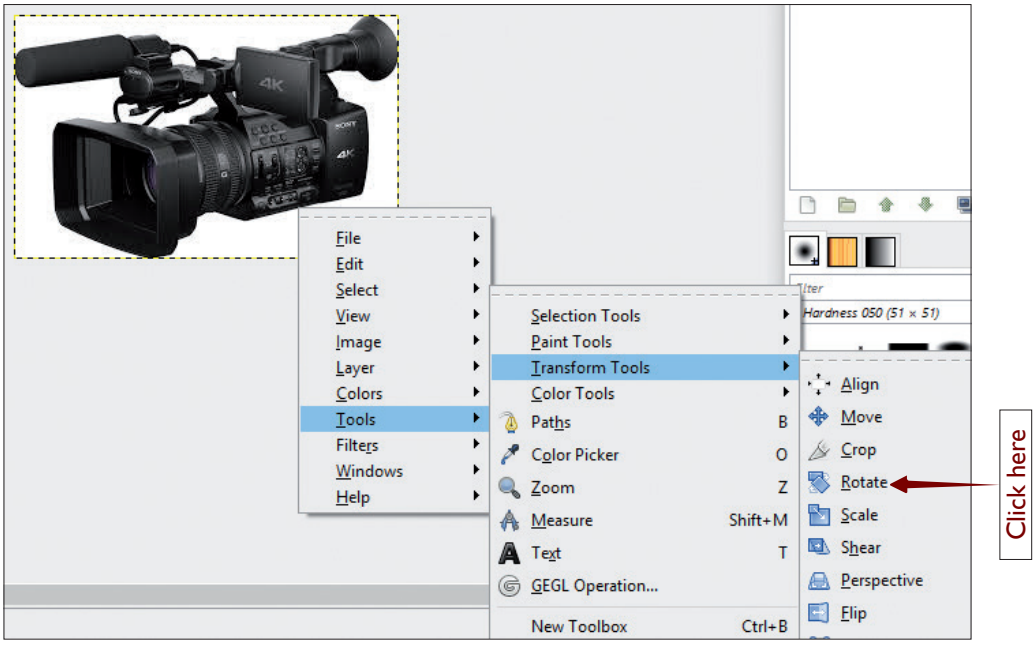
Step 5: Click the **Crop** button in the window that opens as you drag the frame across the image.

Step 6: If you are unhappy with the cropped image, press [Ctrl]-[Z].

To Rotate an image

Step 1: Open the image.

Step 2: Right-click on the image and in drop down list select **Image.** In the drop down list that appears click on **Tool** then from the list click on transform. From the new list click on **Flip** or **Rotate**.



Picture 8.25: Image in window is right clicked to access Rotate Command

Step 3: If you are unhappy with the changes, press [Ctrl]-[Z].

Activity 8.14

Record audio file (on your computer)

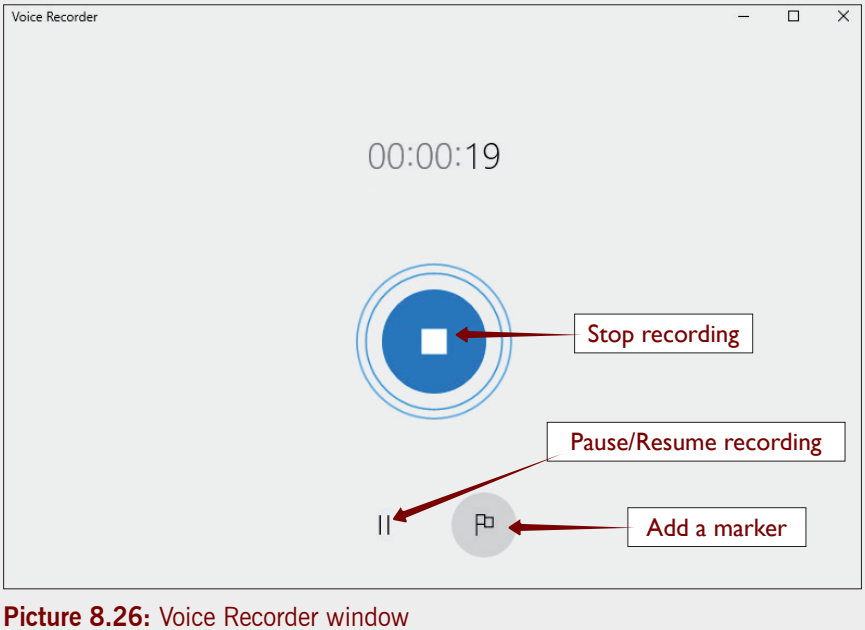
Follow these steps to create or record an audio file on your computer

1. **Connect a microphone on your computer**. A microphone can connect through USB port (USB microphone) or input jack- (audio port) for microphone. Some computers come with built-in microphone. If you don't have microphone, use headphones.
2. Open Windows **Voice Recorder**. Follow procedure given below:
   - Click **Start**
   - Click **All Apps**
   - Select **Voice Recorder**

   Alternatively, you click in the **Search** box near the Start button and type **Voice** and then click **Voice Recorder**.

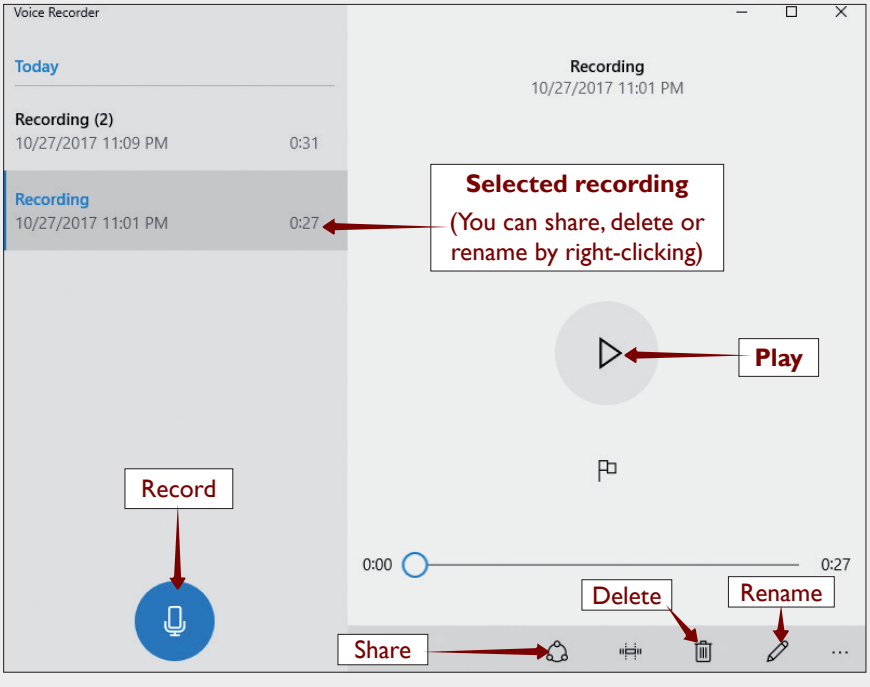
> **Note:** Voice Recorder is a small application in Windows OS having the capability to make sounds louder, quieter, faster or slower.

3. In the *Voice Recorder window*, click **Record** button to record your message. When you click **Record** button, wait for 3 seconds and then start to speak or sing. When you have finished speaking or singing, wait for 3 seconds and then click on **Stop recording** button. This will prevent the recording to start or stop abruptly. See the picture below.



Picture 8.26: Voice Recorder window

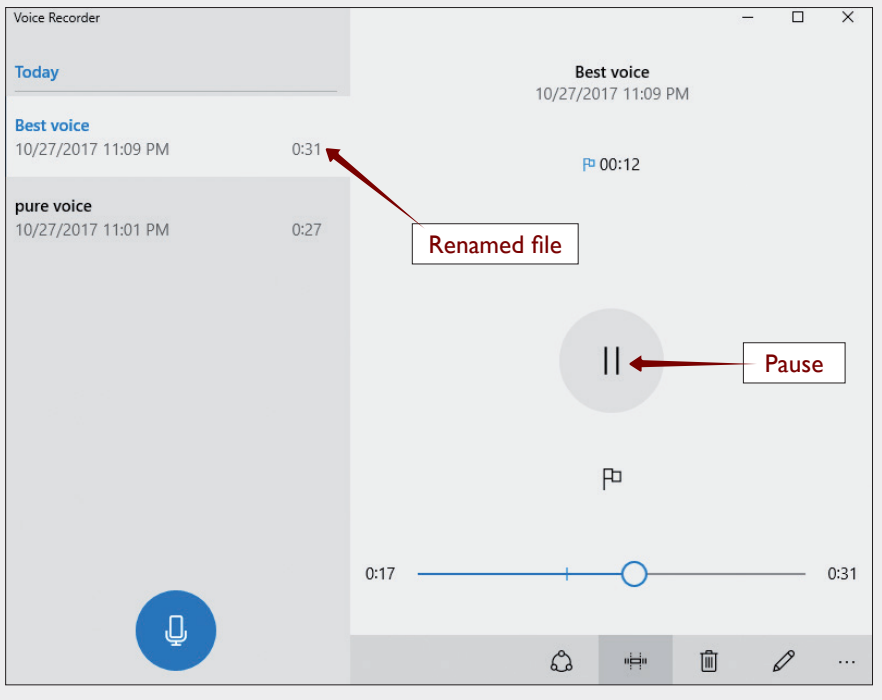
4. Click **Play** to hear your message or song. (See picture below)



Picture 8.27: Voice Recorder showing recorded files you can play

> **Note:** When you are not pleased with your recording, you can delete it and then record again or record new files for comparison.

When audio file (s) is named and played, may appear as shown.



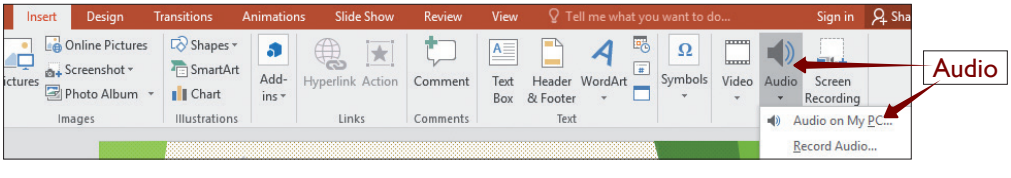
Picture 8.28: Voice Recorder showing renamed audio files

Create/record video

There are two main ways you can use to create video on your computer i.e. using Microsoft PowerPoint and using Windows Movie Maker.

Method 1: To create/record a video file (with PowerPoint) follow steps below:

1. Create a PowerPoint presentation and save it. You can also open an existing presentation. In this activity, let us open ***Nature-protect*** presentation we created in unit 6.
2. Add transitions and animations to your PowerPoint presentation in case they are missing (follow steps for adding animation and transitions in Unit 6)
3. **Add audio** to your presentation: on **Insert** tab, in the Media group, click **Audio**. On the Audio menu, select **Audio on My PC**… See picture below.



Picture 8.29: The PowerPoint Insert tab showing the Audio button (highlighted)

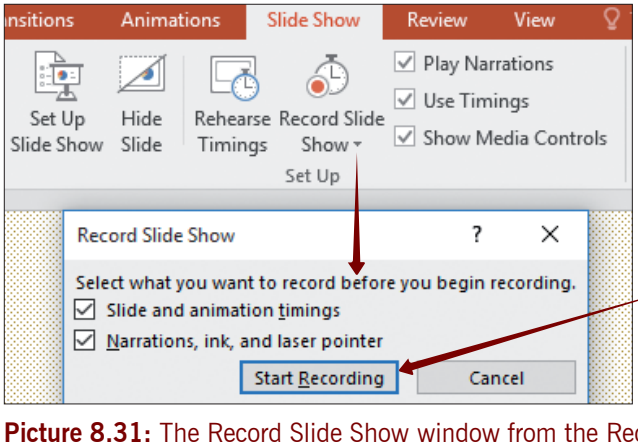
After the audio has been inserted you will need to edit it by selecting it then click on playback tab on the menu bar. You will get a ribbon for audio tool editor as shown below:

Picture 8.30: The PowerPoint Ribbon showing Audio Tools on **Playback** tab

4. Record narration and add timings to the slide show

   Record a narration during a presentation

   - In **Normal view**, select the slide that you want to start the recording on.
   - On the **Slide Show** tab, in the **Set Up** group, click **Record Slide Show**.

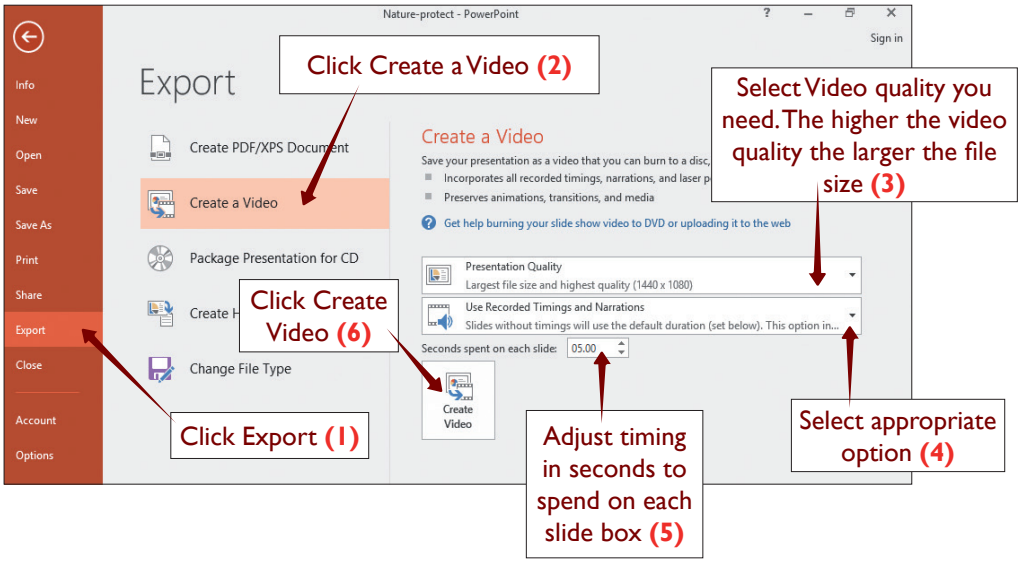


Picture 8.31: The Record Slide Show window from the Record Slide show button

   - In the **Record Slide Show** box that displays, click **Start Recording**

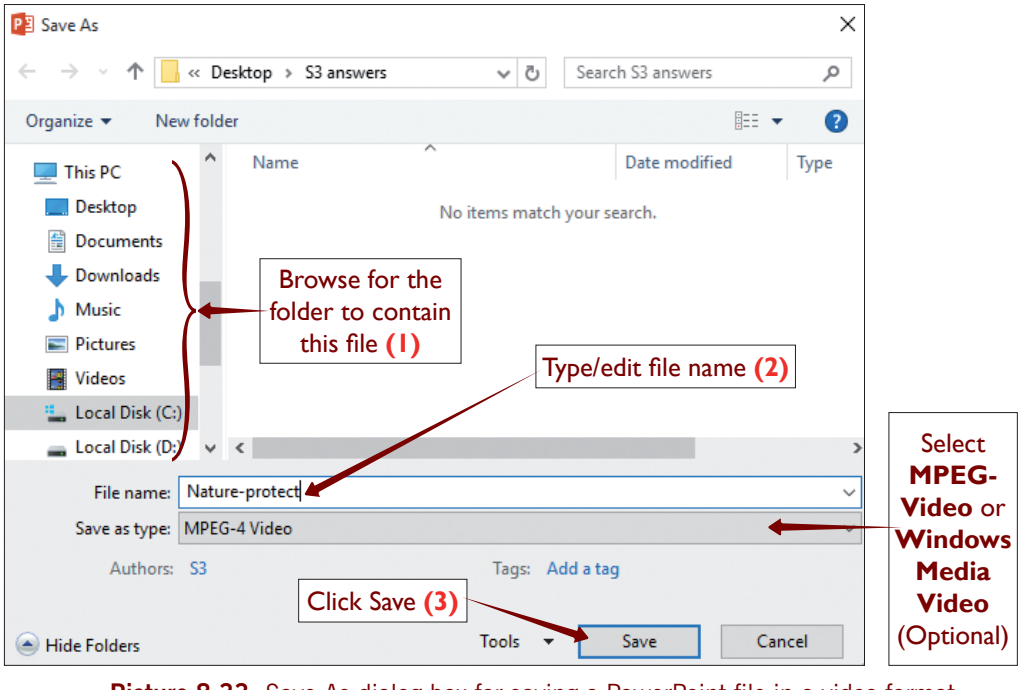
5. Export (save) your PowerPoint presentation as a video by;

   Click **File** tab, select **Export** and then click **Create Video**. On the **recording** tab of the ribbon, click on **Export to Video**.



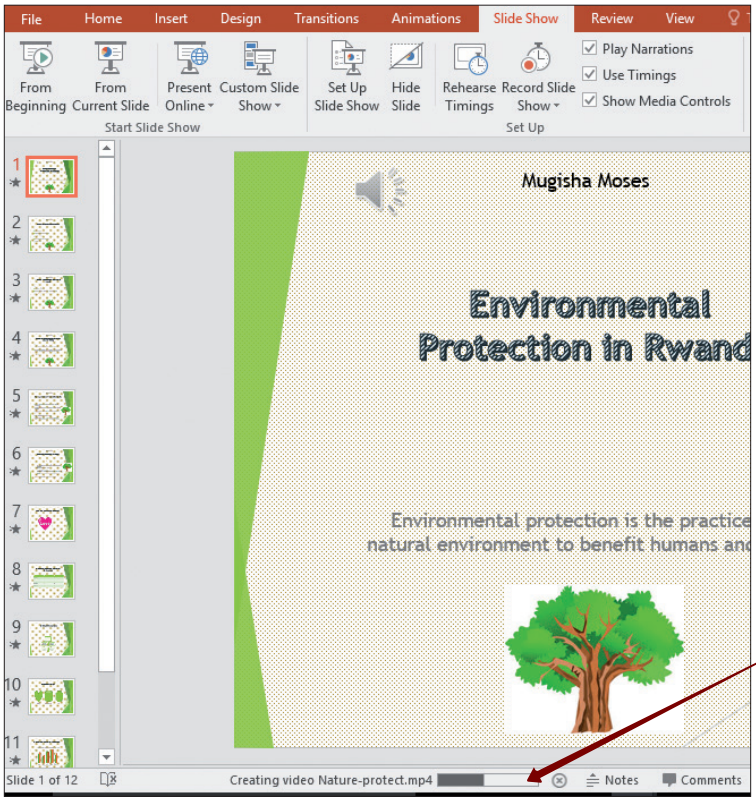
Picture 8.32: The Backstage screen for Exporting PowerPoint file (Create a Video)

6. Click **Create a Video**



Picture 8.33: Save As dialog box for saving a PowerPoint file in a video format

Track the progress of the video creation by looking at the status bar at the bottom of your screen. See picture 8.34 for status bar.



Picture 8.34: A PowerPoint file being converted into a video as depicted by status bar.

> **Note:** The video creation process can take many hours depending on the length of the video and the complexity of the presentation. If the video is long, you can set it up to be created overnight. By morning time, it will be ready.
>
> To play your newly-created video, go to the folder location, and then double-click the file.

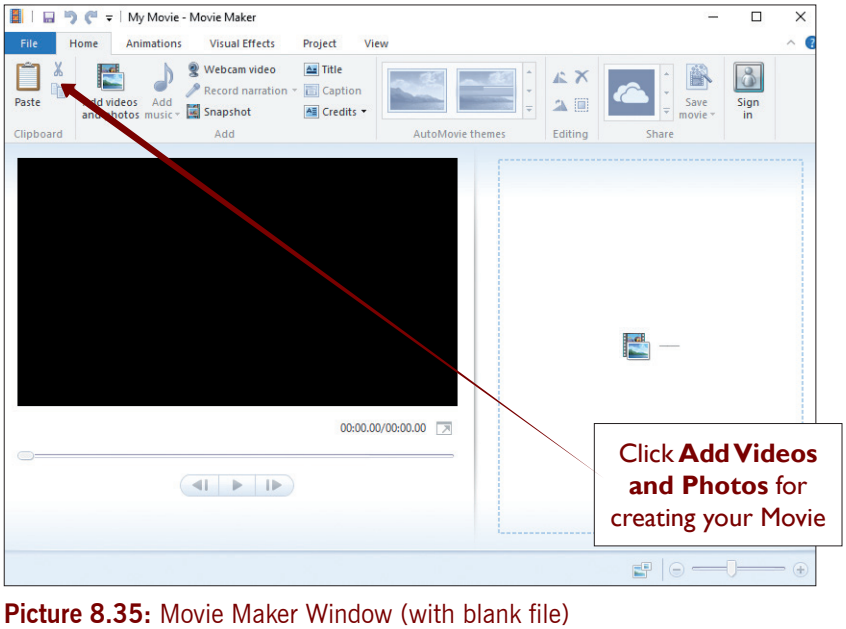
Activity 8.15

Create or open any presentation file you have on a computer and use it to make a video file.

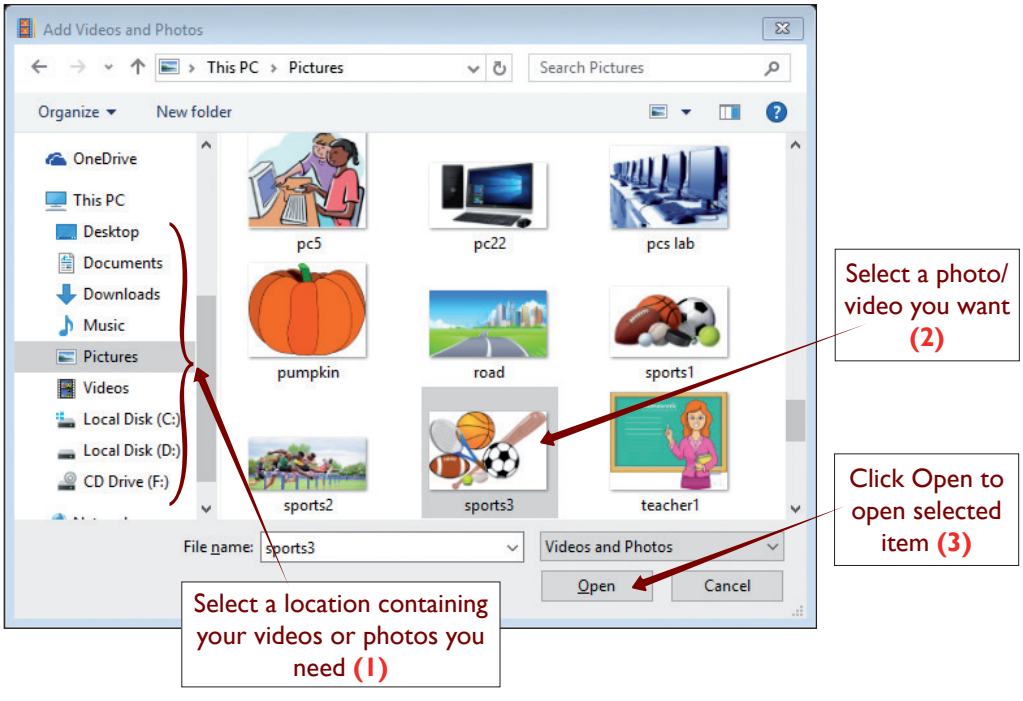
Method 2: To create video (movie) file - using Windows Movie Maker

Start Windows Movie maker

> **Note:** Users of Windows 10 must have to download Movie Maker and install it on their computers. When Windows Movie Maker is ready, then:
>
> *First add videos and photos to Movie Maker following the procedure below:*
>
> (i) In Movie Maker, on the **Home** tab, in the **Add** group, select **Add Videos and Photos**.
>
> (ii) In the Add Videos and Photos dialog box, open the folder that contains the photos or videos that you want to add, select the video files and photos, and then select Open.



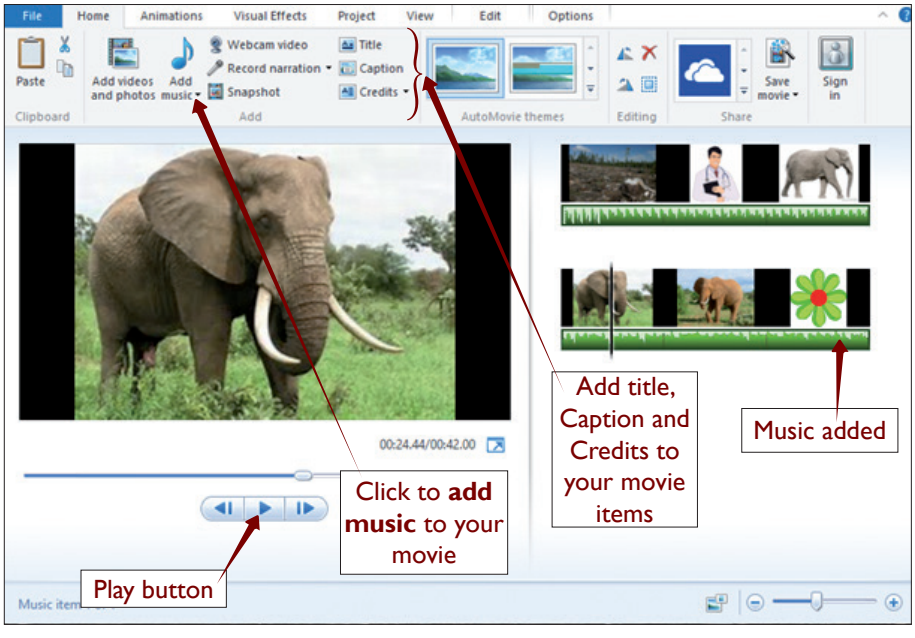
Picture 8.35: Movie Maker Window (with blank file)



Picture 8.36: Add Videos and Photos dialog box

To select multiple photos or videos, press and hold the **Ctrl** key, and then select each photo and video you want.

> **Note:** You can import photos and videos from many different kinds of cameras and devices to your PC using Movie Maker. For example, a webcam built into your PC, a data CD/DVD, digital camera, flash disk, or Secure Digital card (SD card) in a card reader. With your webcam you can record a live video and add to Movie Maker.



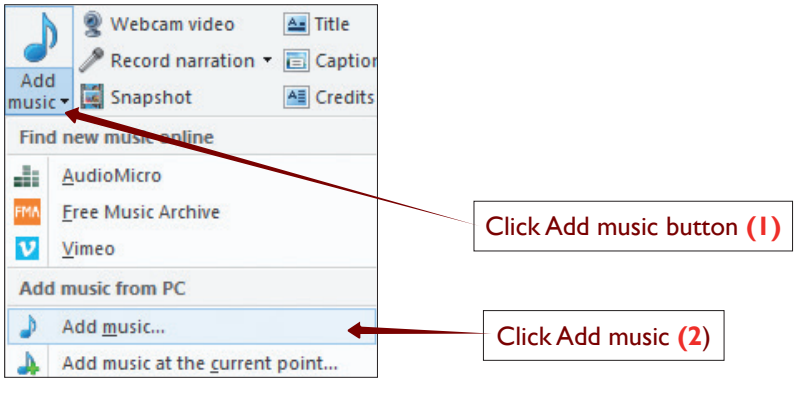
Picture 8.37: Movie Maker window with pictures added for making a movie

Add and edit audio - in Movie Maker

Your movie requires you to add a soundtrack to feel professional. Later you can use editing tools to adjust the volume, fade music in or out.

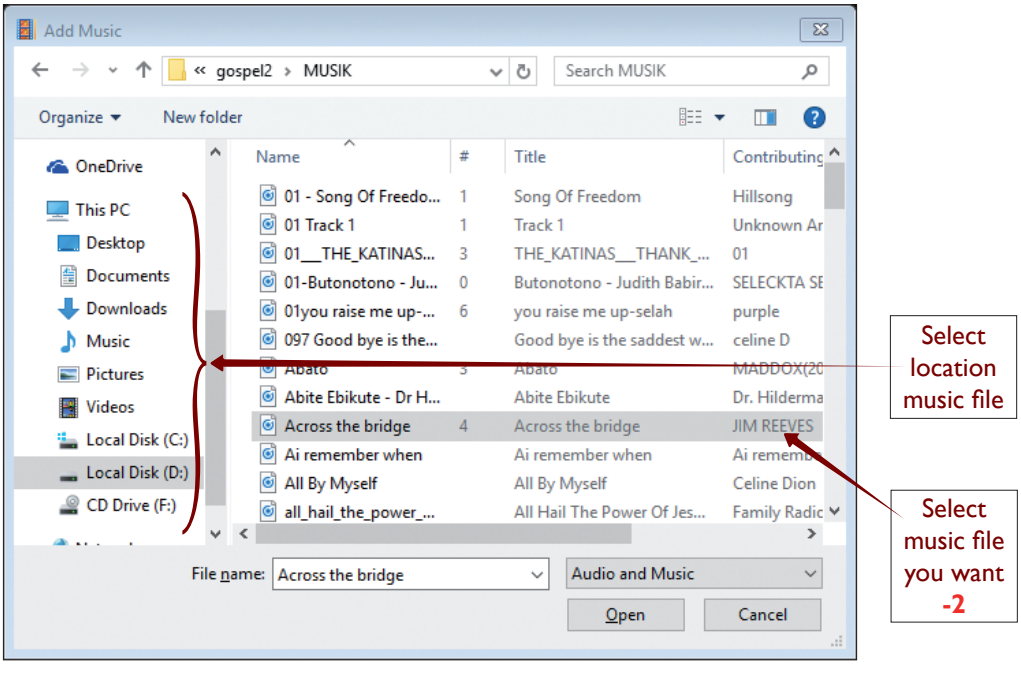
To add music

1. On the **Home** tab, in the **Add** group, select **Add music**.



Picture 8.38: The Add music menu on the Home tab of Movie maker

2. Select the music file you want to use, and then select **Open**.

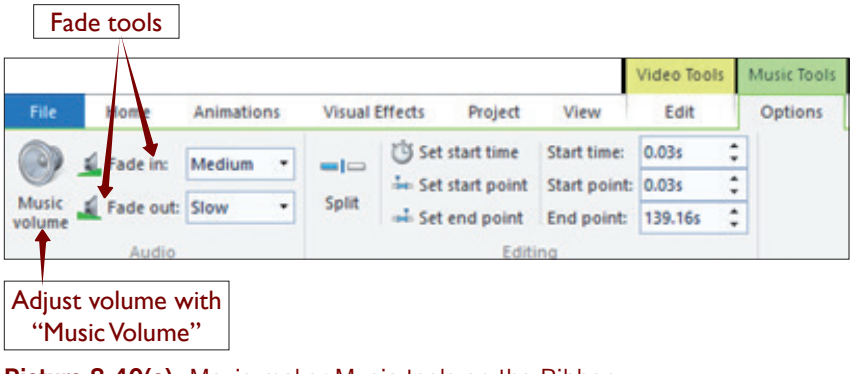


Picture 8.39: Add Music dialog box

To fade music in or out

Fade in is the progressive increase of volume as the audio is being played while fade out is the decrease of the volume.

1. Select the music you want to fade in and or out.
2. Under **Music Tools**, in the **Options** tab, in the **Audio** group, do either and or:
   - Select the **Fade in** list, and then select the speed for the *music to fade in*.
   - Select the **Fade out** list, and then select the speed for the *music to fade out*. See picture below.



Picture 8.40(a): Movie maker Music tools on the Ribbon

To change the start or end point of the music

Use picture above and follow steps given below:

1. Select the music.
2. Drag the playback indicator on the storyboard to the point in the music where you want it to start or stop playing in your movie. Then do one of the following:
   - To set a new start point for the music to start playing at the current point, under **Music Tools**, on the **Options** tab, in the **Editing** group, select **Set start point**.
   - To set a new end point so the music stops playing at the current point, under **Music Tools**, on the **Options** tab, in the **Editing** group, select **Set end point**.

To change the audio volume of a music item

1. Select the music.
2. Under **Music Tools**, on the **Options** tab, in the **Audio** group, select **Music volume**, and then move the slider left to lower the volume or right to increase it.

Edit video (Movie Maker)

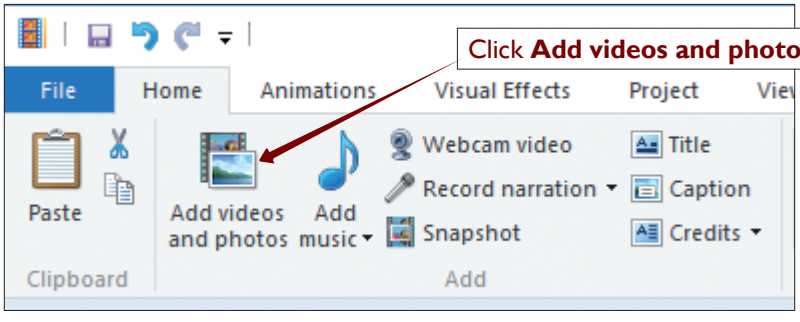
There are several applications used today to edit videos/movies and movie maker is one them. You can use it to make your video/movie look the way you want it to be. One way of editing video is to trim it as described below. See edit video tools in picture 8.41.

Trim your video (see picture 8.41 and 8.42)

You can trim the beginning and the end of a video such that the video shows only the part you want. For example, if you have a video with black frames at the beginning, you could trim the beginning of the video so the black frames don't appear in your final saved movie, however this does not affect the original video file.

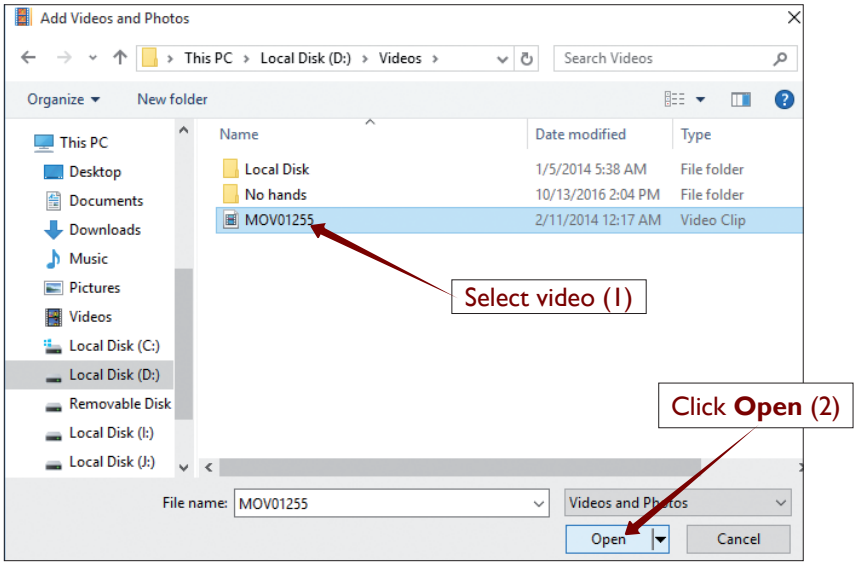
To trim a video in Movie Maker

1. On the **Home** tab, in the **Add** group, select **Add videos and photos**.



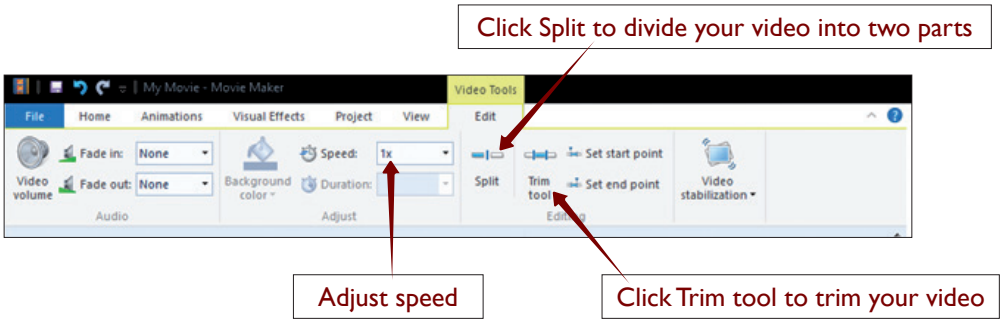
Picture 8.40 (b): Some of the commands on the Home ta of Moviemaker

2. In the **Add Videos and Photos** dialog box, open the folder that contains the photos or videos you want to add, select the video file or photo, and then select **Open**. See picture 8.40 (c).
3. Select the video that you want to trim.

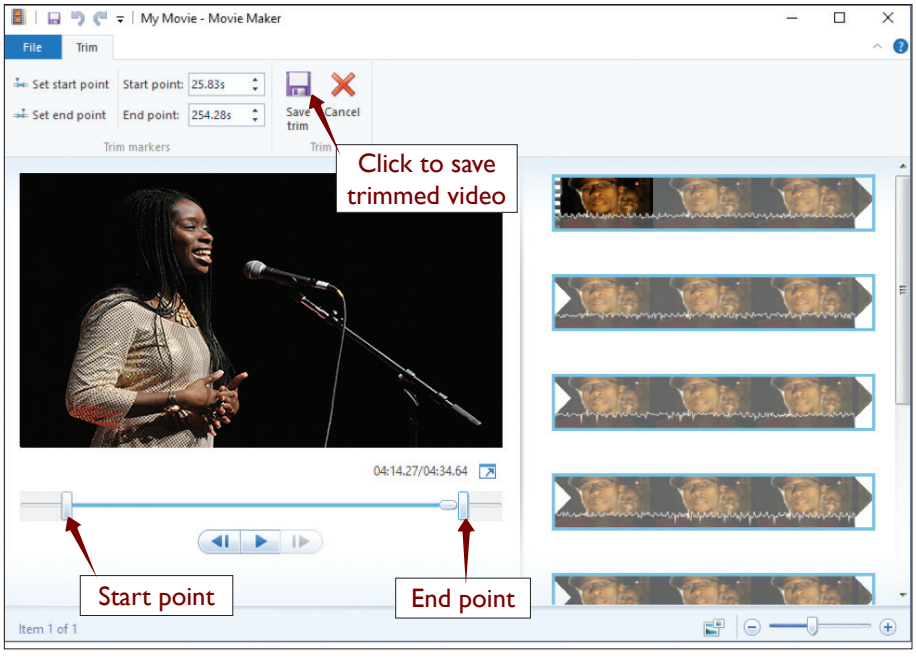


Picture 8.40 (c): Add Videos and Photos dialog box

4. Under **Video Tools**, on the **Edit** tab, in the **Editing** group, click on **Trim tool,** either set start point or set the end point.
   - Move the slider underneath the preview monitor to the point that you want the video to start, and then select **Set start point**. See picture 8.41 and 8.42.
   - Move the slider underneath the preview monitor to the point that you want the video to stop playing, and then select **Set end point**. See pictures 8.41 and 8.42.



Picture 8.41: Video tools



Picture 8.42: Movie Maker showing a trimmed video

> **Note:** To remove the start and end points and allow the whole video to play, repeat 1 – 3 above. Move the start trim handle to the beginning of the video and end trim handle to the end of the video (in their original locations). Afterwards click Save trim to save the changes.

Split a video

You can split a video into two smaller items and then continue editing.

To split a video into two items

1. Select your video, and drag the playback indicator to the point where you want to split the video.
2. Under **Video Tools**, on the **Edit** tab, in the **Editing** group, select **Split** (see picture 8.41).

Speed up or slow down a video

Change the speed of your video in Movie Maker to make it play faster or slower by:

- Selecting the video, and under **Video Tools**, on the **Edit** tab, in the **Adjust** group, select the **Speed** list, and then select a speed (depending on how much you want to speed the video up or slow it down). See picture 8.41.

Activity 8.16

Use a digital camera to capture video (s) about different activities different learners do during either break or lunch time. Use this video in windows Movie Maker and trim as you may like. Split the video into two parts and burn each part on a separate compact disk.

End of Unit 8 Assessment

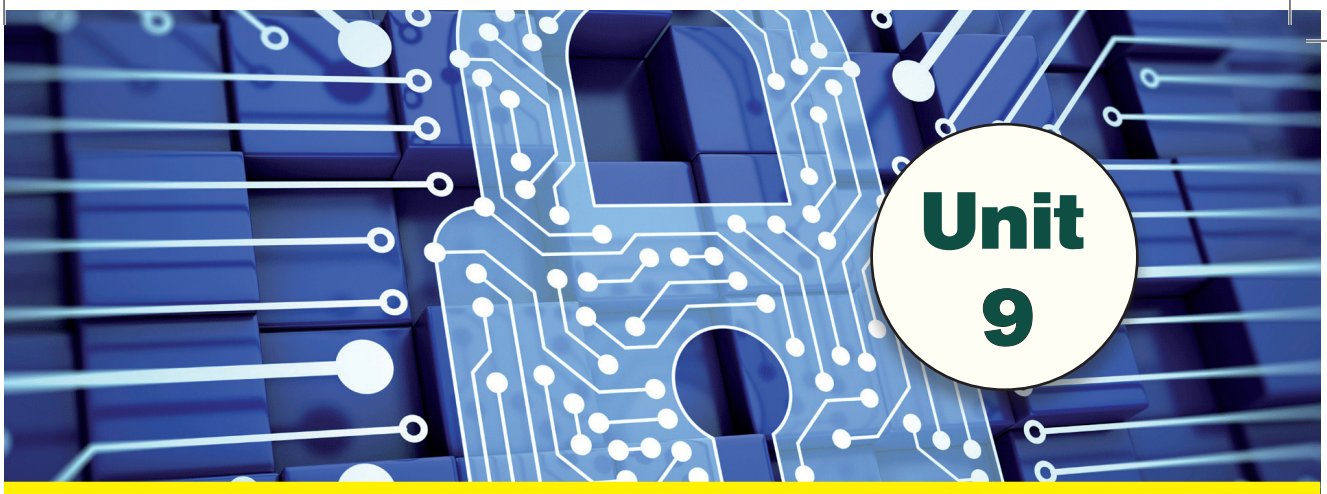
1. List at least 5 multimedia tools used in your community (Village, Town, Home, and School).
2. In which area are these multimedia tools being used?
3. Open MS PowerPoint and create the following presentation:
   a) Geography of Rwanda , it must have 8 slides
   b) Cities of Rwanda , it must have 6 slides
   c) Gender in Rwanda, it must have 5 slides
   Therefore create the following hyperlinks:
   (i) In geography of Rwanda presentation , link the second slide and the last slide.

(ii) Link together cities of Rwanda and geography of Rwanda presentation in the third slide of cities of Rwanda presentation.

(iii) Link gender in Rwanda to your class email. Save the presentation as "Beauty of Rwanda".

4. Use a digital camera and do the following:
   a) Take 20 pictures which show learners doing different activities.
   b) Record a video in your school where learners are in extra-curriculum activity (learners in sport, different club and other activities).
5. Explain 5 ways in which you can use pictures captured by digital camera on different school activities.
6. Open voice recorder on your computer and record yourself singing the:
   a) National anthem
   b) School anthem
   c) East African anthem
7. Introduce one audio track in Powerpoint and edit it by trimming parts you do not want at the beginning or at the end of the track.
8. Take a video about learners playing football or netball using digital cameras. Introduce the video into Windows Movie maker and edit the video by splitting it into two parts.

COMPUTER NETWORK AND DATA COMMUNICATION



Unit 9

Network Security

Key Unit Competence

Explain network security and apply basic security measures.

9.1 Introduction to Network security

Network security consists of policies implemented to prevent and monitor unauthorised access, misuse, modification, or denial of a computer network and network-accessible resources.

It includes all technologies designed to protect the usability and integrity of computer network and information.

Implementing network security can save a business from malicious hacking and virus attacks that could cause a great data loss.

Network security and privacy are major issues in data communications. To deal with internal and external security threats, networks need to be safeguarded with antivirus and firewall solutions. Good computer networks must meet performance levels expected. Good networks should also be reliable, consistent, and meet recovery procedures and security criteria to maintain smooth flow of data in an organisation.

Activity 9.1

Research on the internet or library books and answer the following questions.

1. Explain the meaning of the term *network security*.
2. Distinguish between the terms *security* and *threat*.
3. Identify security threats that are common with computer networks today.
4. Suggest solutions that can be used to safeguard a computer network.
5. What are computer viruses? What risks are involved when a computer virus attacks your system?
6. How do you get to know that your computer is having a virus?
7. Explain what you can do to protect computer system from viruses.

Practical

8. Scan your computer with installed antivirus. If viruses are found, delete them. Turn on your internet connection and allow the antivirus to auto update itself (or if it requests for permission to do so allow it). Scan any available external disk e.g. flash drive before use.

9.2 Definitions of terms

- **Security:** This is a state of feeling safe and protected. Something that provides a sense of protection against attack, harm or loss is security.
  - *Computer security* means techniques developed to safeguard information stored on computer network.
- **Threat**: This is a possible danger that might exploit a vulnerability to breach/break security and therefore can cause damage, pain and loss. **Vulnerability** is a weakness in a system which allows an attacker to reduce system's information assurance.
- **Authentication**: This is a process used to identify individuals based on username and password. This process establishes whether;
  - Someone or something is in fact who or what is declared to be.
  - Authentication ensures that the individual is who he or she claims to be but nothing about access rights of an individual.

- Authentication proves that somebody or something is genuine or valid. Authentication is a security measure and uses data encryption to identify the user and verify that the message was not tampered with.

- **Authorisation**: This is permission to perform action.
- **Encryption**: This is the process of encoding messages between two or more parties information such that hackers cannot read the message/information except the authorised parties.

Restricted/sensitive information include:

- Identity information such as social security numbers, identification card numbers, driving license numbers, etc.
- Financial account information i.e. saving and credit card numbers, etc.
- Student record information e.g. learner's grades, financial aid information, etc.
- Medical record information e.g. diagnoses, treatment information, etc.

Note: If your computer is lost or stolen and you have encryption activated, people who try to access information on the computer won't be able to read it.

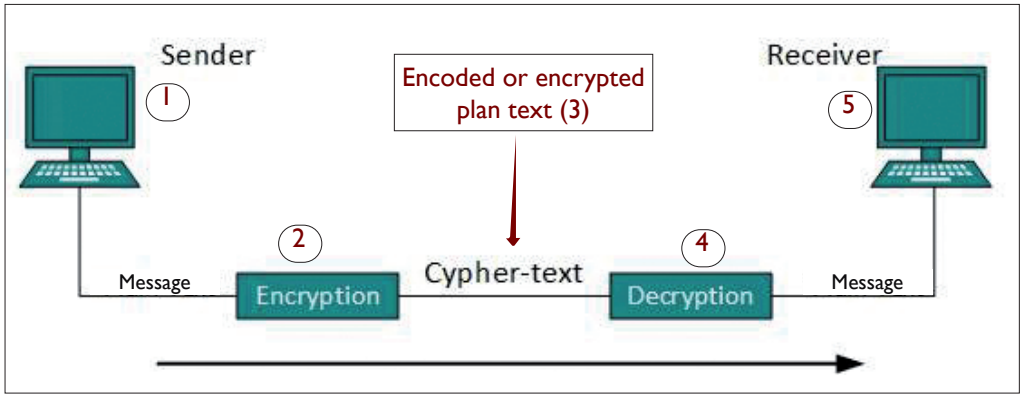
Note: Encoding is a method designed to protect the integrity of data as it crosses networks and systems i.e. to keep original message upon arriving at destination.

Importance of encryption

1. Encryption protects data in transit i.e. via computer networks like internet, e-commerce, mobile phones, wireless microphones, blue tooth devices and Automated Teller machines.
2. It is used today to protect information on computers and storage devices such as flash drives belonging to civilians.
3. It is used by governments and in the military to facilitate secret communication.

Decryption: This is the process of decoding messages information such that authorised parties can read them.

Sensitive information stored on computer must be encrypted (using encryption key) so that it cannot be understood if it is accessed without using a (decryption key) to decrypt the information.



Picture 9.1: How Encryption and Decryption work

Additional information for Picture 9.1. above

Elements of communicating data on a network include:

(i) **Sender:** This is a computer where message has been created by the user.

(ii) **Encryption:** This is the process of converting/encoding the message. The message is encrypted into cypher text form that cannot easily be understood.

(iii) The information is transmitted into **cypher text** to the receiver

(iv) **Decryption:** This is the process of decoding or reconverting cypher text to original message so that it is easily understood by the receiver.

(v) **Receiver:** This is a computer where the reader accesses the message.

Firewall: A firewall is a security software designed for preventing/ blocking unauthorised access to data and system software on a computer network.

> **Note:** A firewall is a piece of software or hardware. Firewall acts as a protection line between your network and the external threats from internet or other networks.

The firewall keeps track of every file that enters or leaves the local network so as to detect the sources of viruses and other problems that might enter the network.

9.3 Importance of computer security

Computer security is the protection of computer systems from threat that can damage software, hardware, and information and from disruption and misdirection of the services they provide.

The major importance of computer security is:

- protect the computer
- protect data
- protect user's identification

This is mainly because data present in the computer can be misused by unauthorised intrusions.

Purpose of computer security is to:

- keep your information on computer protected
- maintain your computer's overall health
- help prevent viruses and malware
- help programs run more smoothly.

9.4 Security threats

A security threat is anything that has the potential to cause serious harm to a computer system. Threats can lead to attacks on computer systems and networks.

9.4.1 Origins of threats

Deliberate: I.e. aiming at information asset, for instance spying and illegal processing of data. Deliberate threat is planned intentionally.

Accidental: E.g. equipment failure or software failure. This occurs unexpectedly.

Negligence: I.e. known but neglected factors that can compromise network safety. Negligence comes from paying less attention on a serious issue at hand.

Environmental: I.e. natural event and loss of power supply. This is generated by nature or condition of service.

9.4.2 Threats can be classified into two main categories

Intended threats: Include people within the organisation. This is the most dangerous threat.

External threat: Include people outside the organisation such as thieves, hackers.

The following are the threats in general that commonly affect systems:

- Physical damage such as fire, water, and pollution.
- Natural disasters such as volcanic eruptions, climatic changes.
- Loss of essential services such as electrical power, air conditioning and telecommunication.
- Compromise of information e.g. hacking, theft of media.
- Technical failures; equipment, software or capacity saturation.
- Compromise of functions i.e. error in use, abuse of rights and denial of actions.

9.4.3 Computer networks attacks

- **Computer Viruses**: Viruses are malicious programs that can corrupt your data on hard disk, delete most important operating system files, slow your computer operations and can make the system to crash. Viruses can also allow hackers to run programs on your computer or allow access to your files.
- **Spyware**: A big threat to online computers. *Spyware* is a software code installed on a computer without user's knowledge to monitor or supervise user activities.

  Spyware can do the following:

  - Gather personal information and can transmit it without your knowledge.
  - Change computer settings.
  - Corrupt windows Registry files.
  - Slow down internet connection speeds and the machine itself.
  - Steal your privacy.
  - Take up memory and space on your computer.
  - Can make a computer to malfunction or totally crash.
- **Trojan horse (or Trojan):** This is malware (malicious software) that is disguised as legitimate software. In computing, a Trojan is any malicious computer program which misrepresents itself as useful, routine, or interesting in order to persuade a victim to install it on

computer. Trojans do not replicate themselves and appear harmless but in fact malicious.

- **Social Engineering:** This is a method used by hackers to gain access to computer systems by exploiting human behaviour.
  In computer networking and security; **social engineering** is a collection of methods used to trick internal computer users to carry out specific actions or revealing confidential information thus breaking normal security procedures.

- **Identity Theft:** This occurs when personal information is obtained by unauthorised individuals who then use the information to commit a crime such as fraud or theft.
  Everyone is at risk of identity theft. Therefore, be careful managers of personal information, identification, and passphrases to help minimise your risk.

  Risk involved with identity theft include: victims have to spend time and money cleaning up their personal and financial records. They may be refused loans, housing or cars, or even get arrested for crimes they didn't commit.

- **Sabotage by employees:** Sabotage is malicious damage done usually by annoyed employees. An employee can intentionally enter data incorrectly, destroy hardware or delete sensitive data, changing known passwords and disappearing with customer information. The major solution is to regularly monitor employees' activities and limit their access to certain sensitive systems or resources.
- **Denial of Services Attack (DoSA)**: This is a method used by hackers to send too many requests to a specific server thereby using all available resources. This leads the server to become unavailable for internet users or crash down.
  Unauthorised access by intruders or hackers.

Activity 9.2

1. Explain the difference between a spyware and a spam. Identify risks involved when your computer is infected with spyware.
2. Explain the term '*social engineering*' in regard to computer security threats.
3. Explain the term 'identify theft'. Identify the risks involved with identity theft.

4. Describe the concept of firewall as a security solution to network threats.
5. Explain the difference between *encryption* and *decryption*.
6. Identify the kind of information that should be encrypted in your school.

Practical

7. Start your computer and open a folder where you frequently save your files. Do the following tasks:
   (i) Make two of your files as **Read-only** files (this will prevent other users from modifying contents).
   (ii) Hide two of your files such that other users do not see them even when they open that folder.
   (iii) Encrypt any two of your important files.
   (iv) Unhide the hidden file(s).

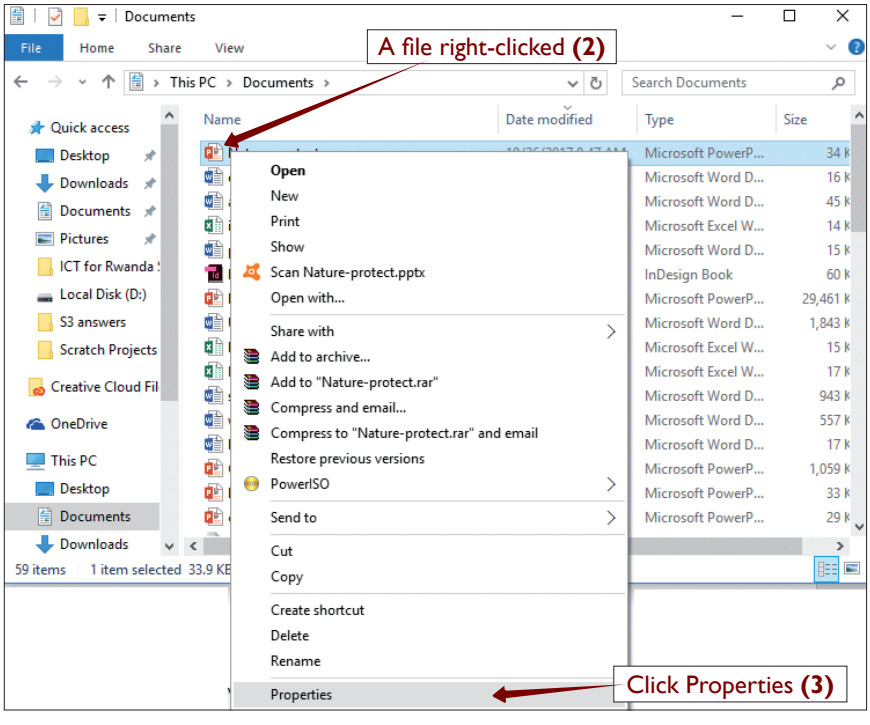
To make a file a Read-Only

Step 1: Open the folder where you often save your files such as My Documents folder.

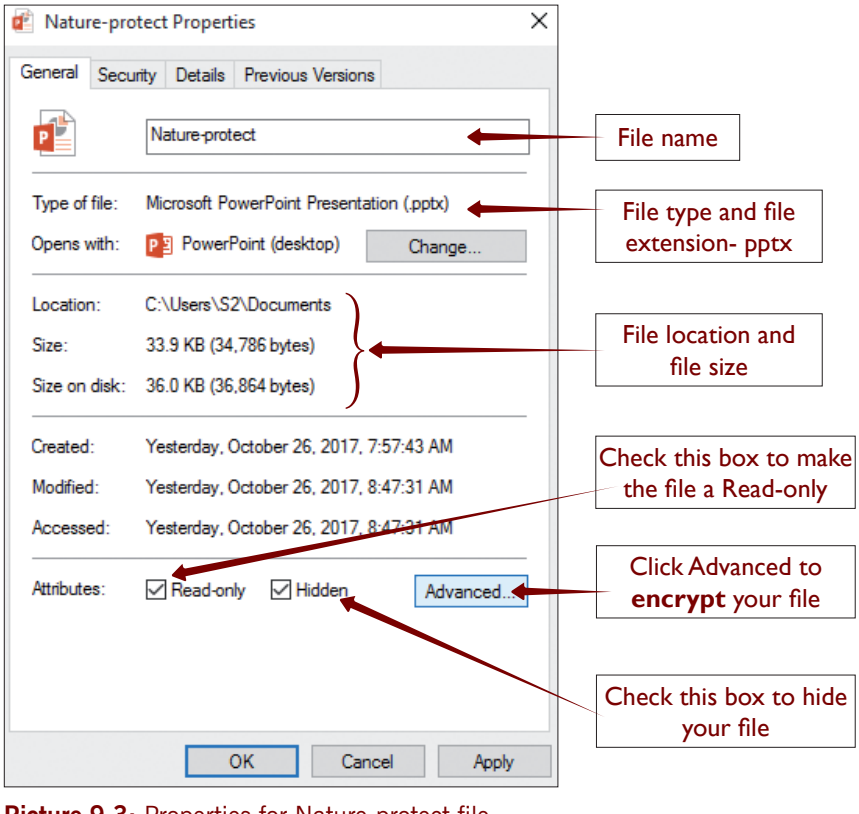
Step 2: Right-click on a file (s) and in the shortcut menu select **Properties** (See picture 9.2)

Step 3: In the File Properties dialog box that displays, check **Read-Only** Attribute. (See picture 9.3)

Step 4: Click on **Apply** and close the dialog box.



Picture 9.2: A file in Documents folder is right-clicked



Picture 9.3: Properties for Nature-protect file

To hide a file

Step 1: Open a folder where your files are stored such as My Documents folder.

Step 2: Right-click on a file (s) and in the shortcut menu select **Properties** (See picture 9.2)

Step 3: In the **File Properties** dialog box that displays, check **Hidden** Attribute. (See picture 9.3)

Step 4: Click on **Apply** and close the dialog box.

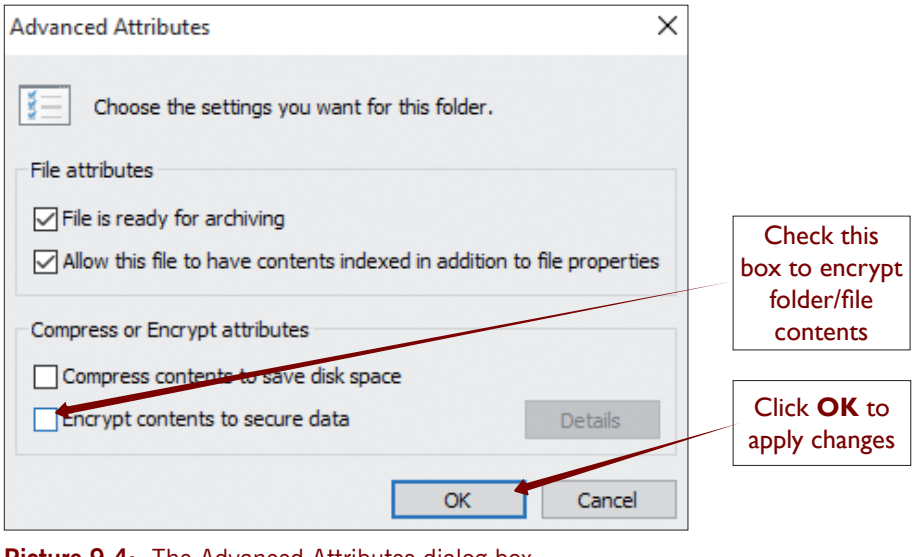
To encrypt a file or folder

Step 1: Open a folder where your files are stored such as My Documents folder.

Step 2: Right-click on the file (s) and in the shortcut menu select **Properties** (See picture 9.2)

Step 3: In the **File Properties** dialog box that displays, click **Advanced** Attribute. (See picture 9.3)

Step 4: In the Advanced Attributes dialog box that displays, check box for *"Encrypt contents to secure data"* and then click **OK**.

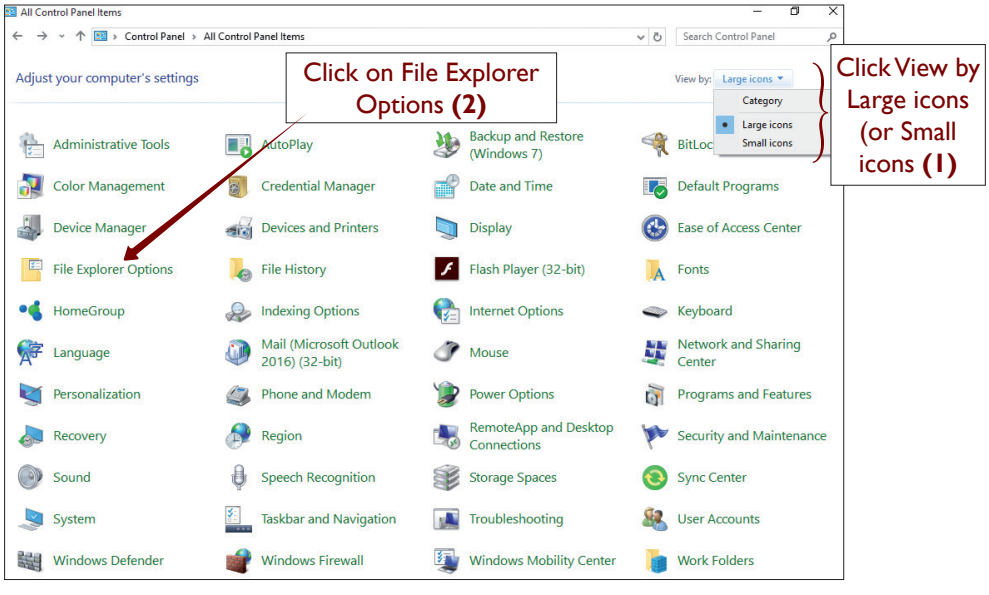


Picture 9.4: The Advanced Attributes dialog box

Step 4: Click on **Apply** and close the dialog box.

To unhide hidden file(s)

Step 1: Open **Control Panel** window and display the contents as small or large icons

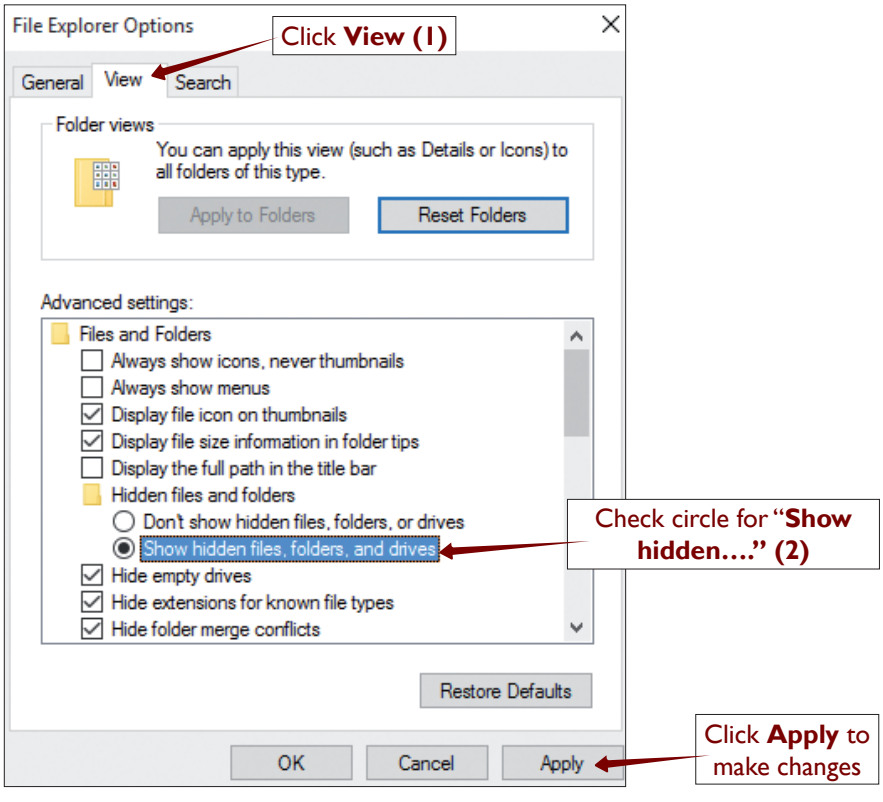


Picture 9.5: Control Panel Window

Step 2: Click on **File Explorer Options** (See picture 9.5 above).

Step 3: In the **File Explorer Options** dialog box that displays, click on **View** tab. See picture 9.6.

Step 4: Select "*Show hidden file, folders and drives*"



Picture 9.6: File Explorer Options dialog box

9.5 Security procedures

9.5.1 Protect physical equipment

- To protect physical equipment against fire and burglary, put in place fire extinguishers against fire, use metallic doors and windows with strong padlocks against theft. Security cameras and burglar alarms and security guards are used to detect theft.
- Use UPS (Uninterruptible Power Supply) to protect system failure and data loss due to the power failure. A UPS is a power backup device. UPS keeps power for about 15 minutes after power loss.
- Use power surge protector to protect your computer against voltage spikes that can harm your system.

9.5.2 Protect data

Protection of data is aimed at safe gaurding data against loss, damage and theft. The procedures include;

a) Data backups
   You risk losing your data that could have taken you a lot of time to gather if you do not back it up. Your files could disappear due to virus, crash, accidental keystroke, theft or disaster. To backup is to create a second copy of your important data/files somewhere other than your computer's hard drive.

   To be sure and secure, that your data is protected, do the following:

   - Create a duplicate copy of your critical data.
   - Backup critical and essential files on a daily basis.
   - Backup and non-critical files on a weekly or monthly basis. You can back up your data to a CD or DVD, to an online backup service (for a small monthly fee), flash drive or to a server.
   - Store your backup media (CD/DVD, external hard disk and backup server) in a safe, secure place away from your computer, in case of fire or theft.
   - Periodically, test the capability to restore from the backup media. An unreadable backup is not worth keeping. To ensure that your backup files are reliable, simply upload the files to your computer.

b) Regularly update antivirus software.
c) Scan your computer data and programs regularly.
d) Update your operating system regularly with the latest security patches and service packs.
e) Have a strong password and change it frequently.
f) Install and configure a firewall.
g) Don't download information from the insecure websites.
h) Don't open email attachments from unknown sources.
i) Scan every external disk memory attached to your computer to protect from malware.
j) Scan all shareware and freeware before installing them on your computer.

Activity 9.3

1. Describe security risks to computers in your school computer laboratory. Suggest solutions that can be used to protect school computers and information stored therein.
2. Discuss the concept of 'backup' in regard to security procedures on computer.
3. Explain security procedures that can be used to protect physical equipment of computers.

Practical Numbers

4. Create a backup of all your important files existing on the computer to a Flash disk or a DVD. (Simply save the files on the disk and keep this disk in a safe place for future use).

> **Note:** In case school computers are serviced, all the files and programs may be deleted, so backing your files can help store your files safely for longer periods without getting lost.

5. a) Start your computer and then use Administrator Account to create a User Account with a strong password (8 characters and above).
   b) Exchange computers with a friend. Give your password to that friend to allow him use your account for 10 minutes. Return back to your computer and log on by typing your password. Change your password to become even stronger (12 characters and above).

> **Note:** Each time you are prompted to give someone your password, make sure when you return to the computer you change it immediately.

6. Collect all rubbish and papers (as heap) from your class and place them in a particular location outside the computer lab. Light fire on the rubbish and papers. Quickly pick the Fire Extinguishers to extinguish that fire and avoid its spread.

> **Note:** Ensure you learn properly how to use a fire extinguisher so that in case of fire outbreak on Network devices, you can contain it.

7. Disconnect your UPS from the computer. Connect your computer directly to power source such as Power socket. Start your computer and begin working by typing a brief background about your school. One learner shall switch the main power source without your consent. When you switch back your computer, determine how much data you have lost without using a UPS.
8. Download Nero burning software and attempt to install it using your limited account.

> **Note:** If you don't have administration password, you cannot install programs.

9.6 Basic security precautions

Security precautions are guidelines you need to follow in order to use a system when you are protected on a network. You need these guidelines on both wireless and wired network.

9.6.1 Wireless networks

A wireless computer network can be protected from the internal and external security threats by implementing the following techniques:

- Control access rights. Unauthorised access must be stopped immediately.
- Don't expose your SSID server password for your wireless network or login password to wired network.
- Encrypt your Wi-Fi network.
- Use encryption method i.e. converting data into unreadable format during transmission using an encryption algorithm and encryption key.
- Disconnect your PC from the network when you are not using it.
- Enable firewall and the antivirus software on each computer.

9.6.2 Wired networks

The following techniques are necessary to protect wired networks:

- Control direct physical access to network devices and avoid unauthorised access.
- Use strong passwords that must be regularly changed.
- Disconnect your PC from the network when it is not in use.
- Use hardware firewall for access to external network and internet.
- Secure loose cables.

End of Unit 9 Assessment

1. Describe the kind of data security that can be implemented on a wireless computer network.
2. Explain how you can protect computer information in relation to data backups.
3. Explain the meaning of the following terms:
   a) Denial of Service Attack
   b) Trojan horse
   c) Hacking
4. Describe solutions designed for the following Network attacks:
   a) Spam
   b) Sabotage by annoyed employees
   c) Spyware
   d) Denial of service
5. Your teacher has instructed you to clean your computer laboratory, describe the precaution you should undertake to;
   a) protect computers and network devices
   b) protect other users (fellow learners)

Practical Numbers

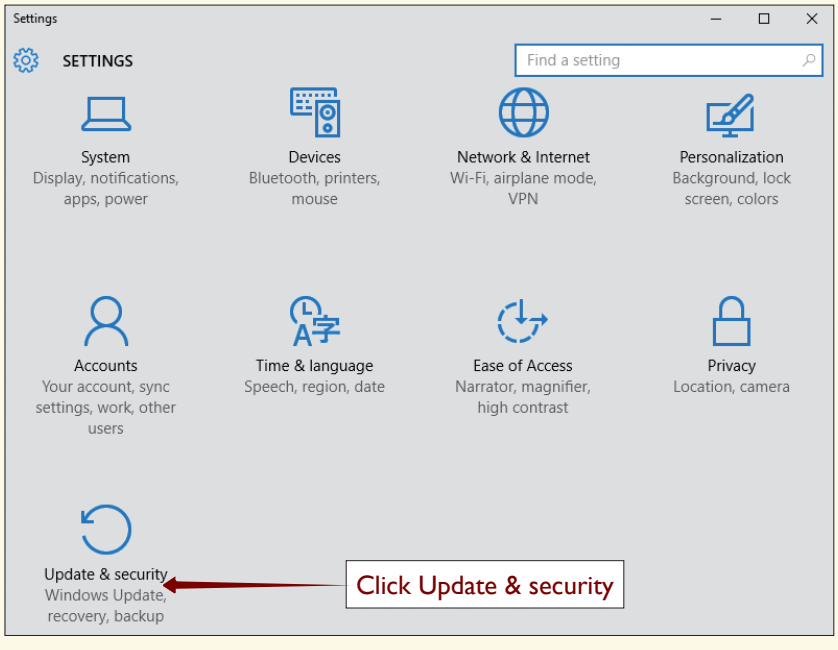
6. a) Backup all your important files on your computer to a flash drive.
   b) Delete all files on the computer that you have backed. Perform the process to restore these important files on the computer.

Follow the procedure below

a) Steps to set up your backup on the computer

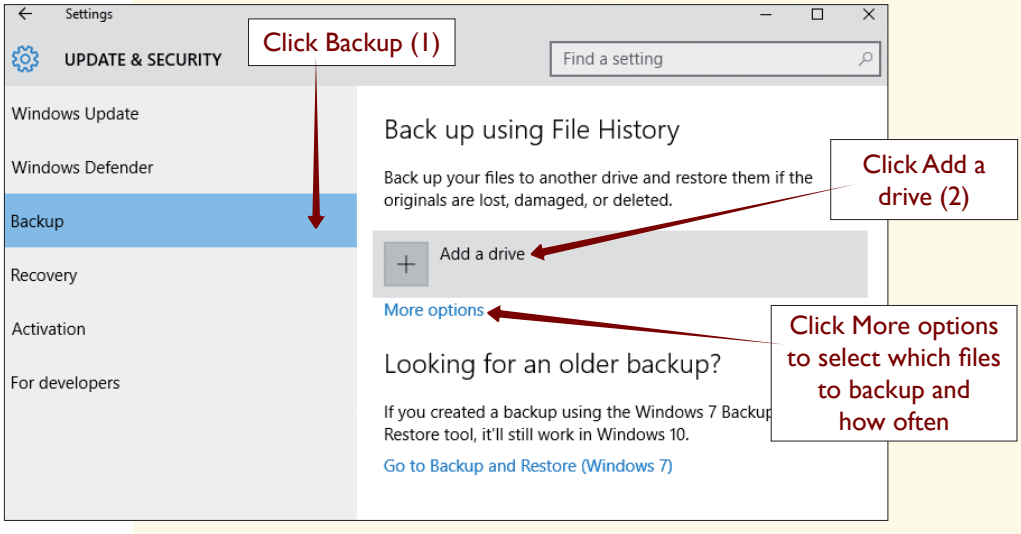
Step 1: Click **Start** button, Select **Settings**.

Step 2: Click **Update & Security** (See picture 9.7 below)



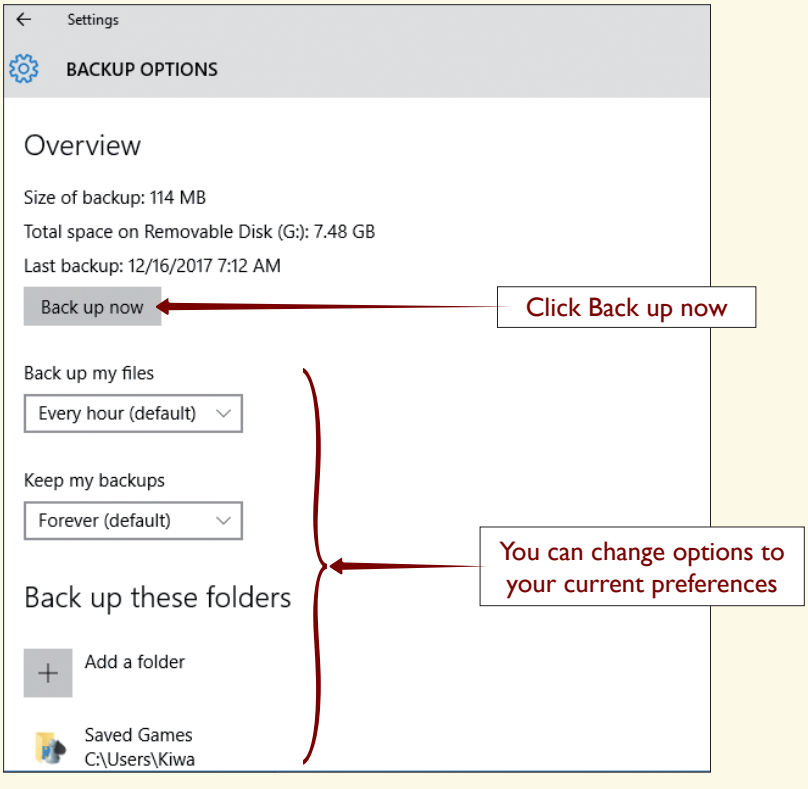
Picture 9.7: Settings options

Step 3: In the **Update & Security** screen that appears, select **Backup** tab on the left and then click **Add a drive** on the right. (see picture 9.8 below). In the screen that displays, select an external drive or network location for your backups.



Picture 9.8: Update & Security settings

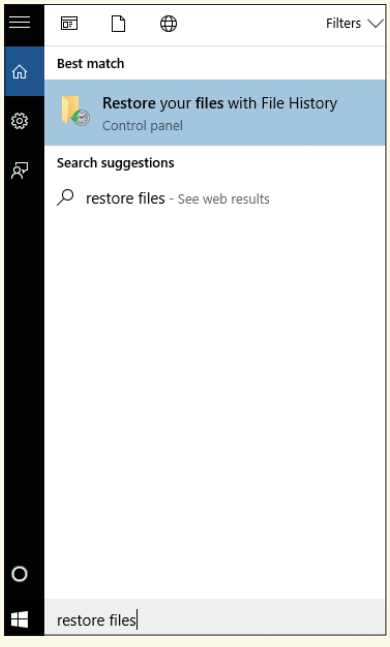
Note: Determine which files to backup and how often to backups happen click **More Options**



Picture 9.9: Back options

b) Steps for Restoring your files

Step 1: Type **Restore files** in the search box on the taskbar, and then select **Restore your files with File History**.

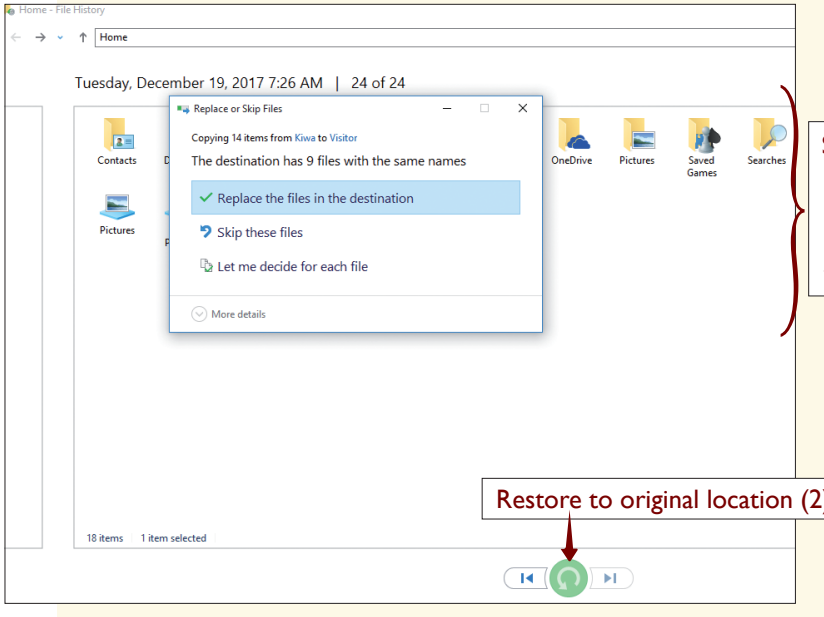


Picture 9.10: The search word on the Search box on Start

Step 2: Look for the file (or folder) you need, then use the arrows to see all its versions.

Note: You must connect the Restore source or backup device.

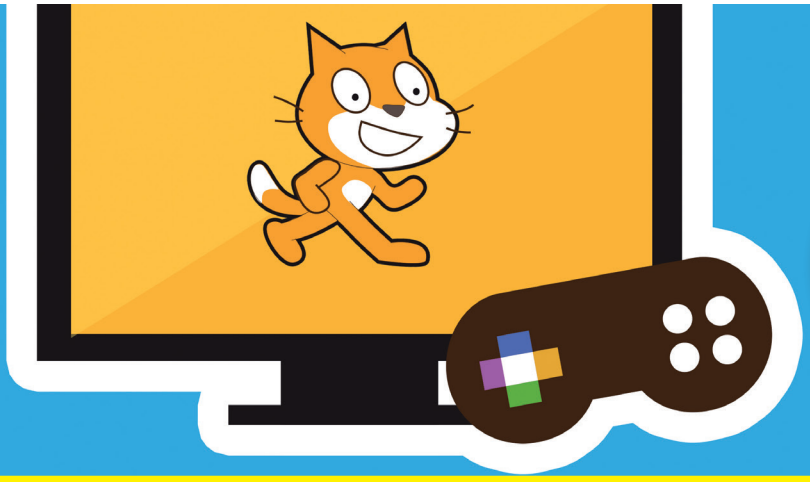
Step 3: When you find the version you want, select **Restore** to save it in its original location. To save it in a different place, press and hold (or right-click) **Restore**, select **Restore to**, and then choose a new location.



Picture 9.11: Home-File History

7. a) Start your computer and update your antivirus.
   b) Carryout a complete scan (to scan all drives and devices attached to your computer).
8. Download Windows Updates and install them on your computer.

PROGRAMMING



Unit 10

SCRATCH camp

Platform Game Programming

Key unit competence

To be able to use complex expressions, operators and controls to design platforms.

10.1 Concepts of platform and its usage

A **platform** sprite is an immobile sprite usually a stage background and can interact with other sprites on stage. Most platforms are located at the bottom of the stage and appear as either ground, wall, grass field, brick pavement, etc. A game where there is no platform, the player cannot *jump*, *swing*, or *bounce*; the actions that are characteristics of a game.

The platform sprite is the avatar controlled by the player. Its appearance can affect gameplay slightly, depending on the angles and size of its costume(s).

An avatar is usually a picture representing a particular person or something in a game or forum.

10.1.1 Create platform sprites

Before you create a platform sprite, you must know what type of the game you want the platform to work for, the level of the game, etc. Learn more about creating platform sprites in section 10.2.

10.1.2 Interact with platform sprites

Two or more sprites may interact with each other when they touch each other, or touches certain specified colours, moves in certain direction, etc. The scratch player can interact with platform depending on the type of game and sprites therein designed. Most platforms are designed immobile, the main sprite-player must be given commands that limits or allows movements and in any form of interaction.

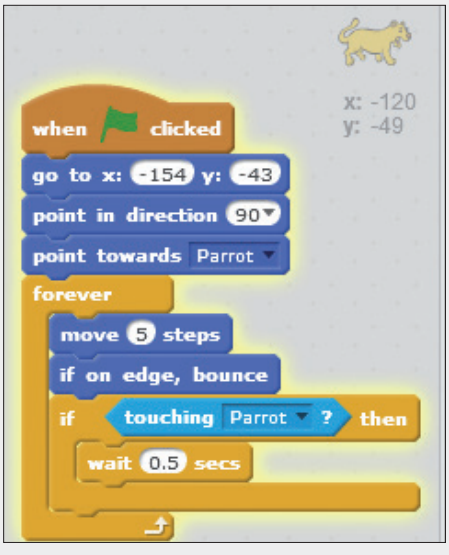
The scratch window below is showing two sprites. One is Lion and another is a parrot. Whenever the lion touches the parrot, the parrot runs away. The accompanying sprites are given below. Try using these scripts and see how sprites interact. Assume all the white space (background) is your area of interaction.

Activity 10.1 (a)

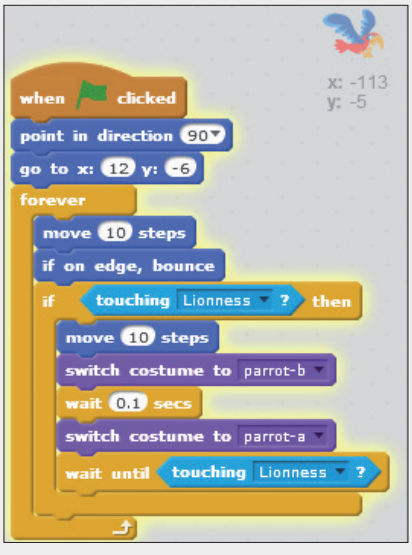
(i) Introduce the two sprites as shown in the screen below. You can use paint to draw them or at this stage just import them into scratch. For more information on how to use scratch paint tools, see Activity 10.1 (b).

Picture 10.1: Scratch window showing two sprites introduced from Scratch library

(ii) Place these scripts in the scripts area for the lion and for the parrot and watch how these sprites interact.



Block 1: Scripts that move the lion



Block 2: Scripts that move the parrot

The way sprites interact with others and the platform is covered within the games we have developed in this unit.

10.1.3 Role of platforms in scratch

In a platform, objects i.e. sprites can fall, move, slide, jump, and bounce. The platform acts as an area of sprite interactions. The platform associates those properties identified into the game in which one controls a character to typically move towards a given goal.

10.2 Creating a platform sprite

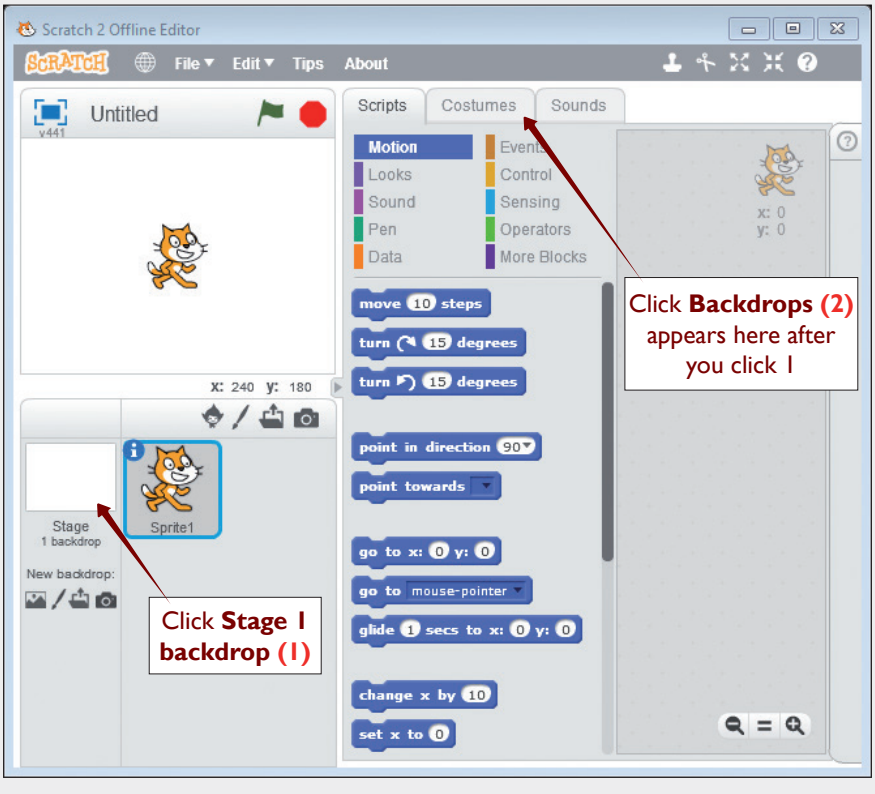
We need to create a platform and so we think of a game for which to create and a suitable platform to use.

Activity 10.1 (b)

Create a platform sprite for a game named *Hard Journey* in which a sprite named John is to walk to the end in order to win. In this platform, John should find items that give him a challenge to pass on.

Use the steps given below to create the platform sprite

Step 1: Create a platform sprite as a walk way for John using scratch tools. First open Scratch (I am using Scratch 2.0 the newer software) and then click on Stage1 Backdrop. See picture below.



Picture 10.2: Scratch 2.0 screen at the start

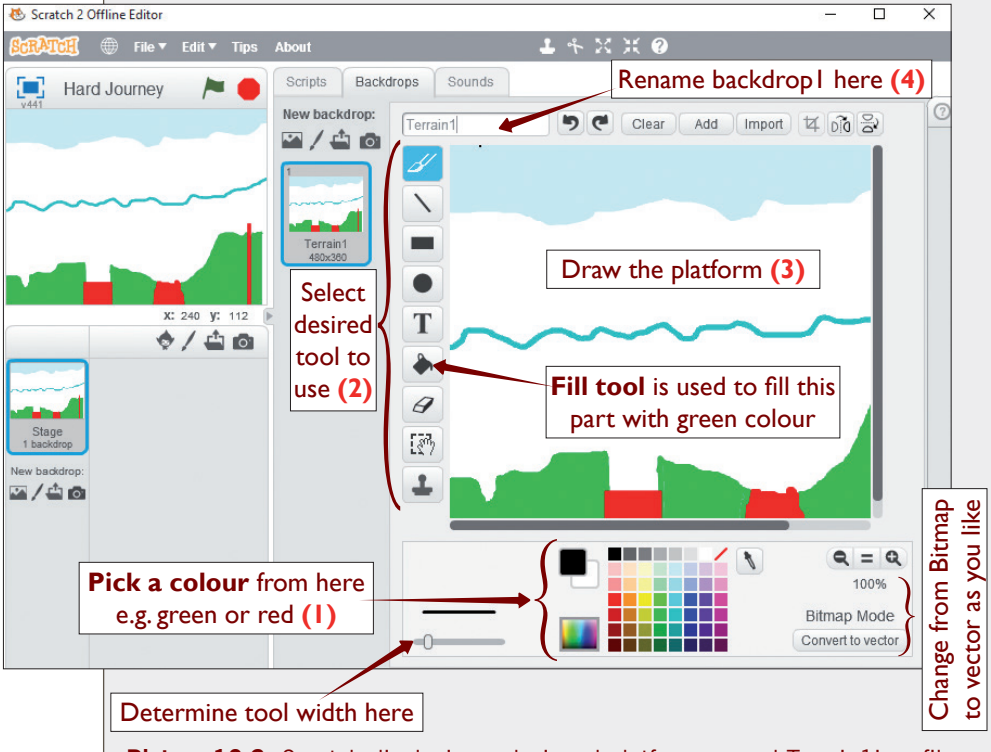
10.2.1 Pick a colour

Scratch Editor has very many colours to choose from. After you have clicked on 1 and 2 as shown in picture 10.2 above, you can then make a choice of the colour (s) you want using the mouse and design a needed item. See picture 10.3.

10.2.2 Design a needed item

Step 2: Use scratch **Paint** tools to design a needed item (platform-journey where John is to walk).

It's better we use two colours. One colour (green) for free movement in the journey and another colour (red) indicating enemy.



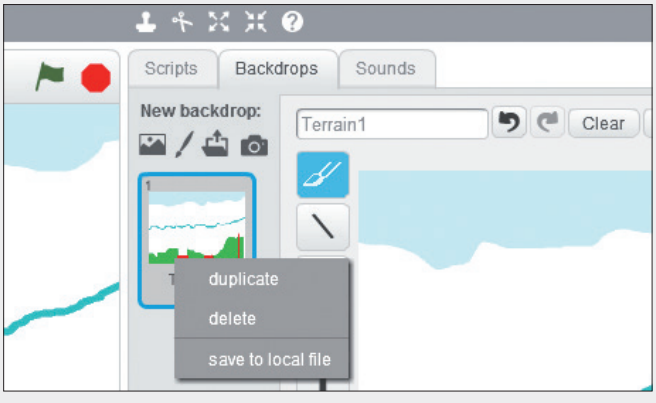
Picture 10.3: Scratch displaying a designed platform named Terrain1in a file named Hard Journey

10.2.3 To edit or copy a sprite or an item

To *edit a backdrop name*, click on it and type a new name. See picture above.

To **copy a backdrop**, right-click on it and select **duplicate**.

To delete **a backdrop**, right-click on it and select **delete**.



Picture 10.4: When Backdrop is right-clicked you get options for deleting, or duplicating it

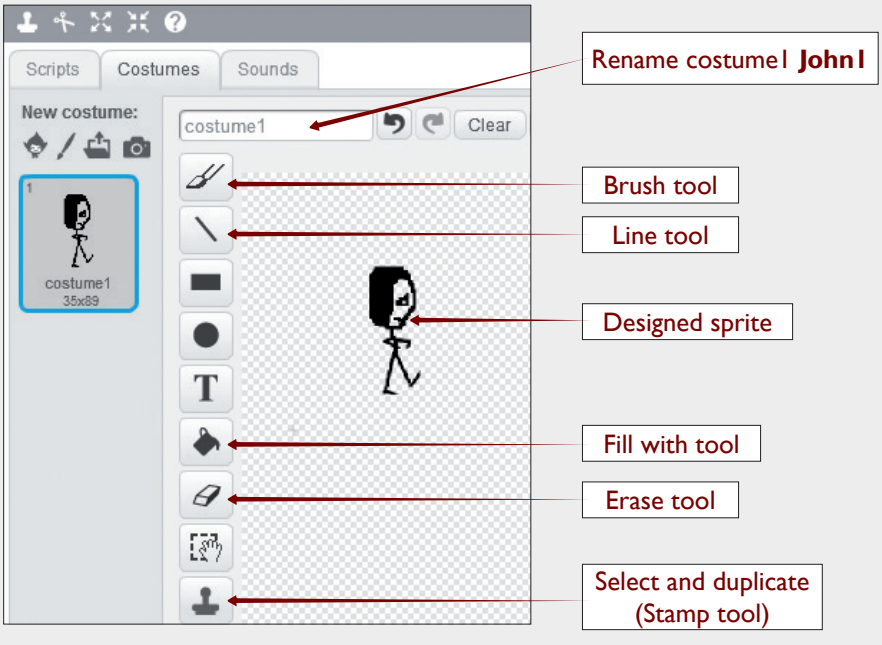
To **edit a sprite's name**, click on default name and type the new name in the name box.

To copy a sprite; right-click on the sprite; select duplicate.

To delete a sprite; right-click on the sprite; select delete.

Designing a needed item (Player)

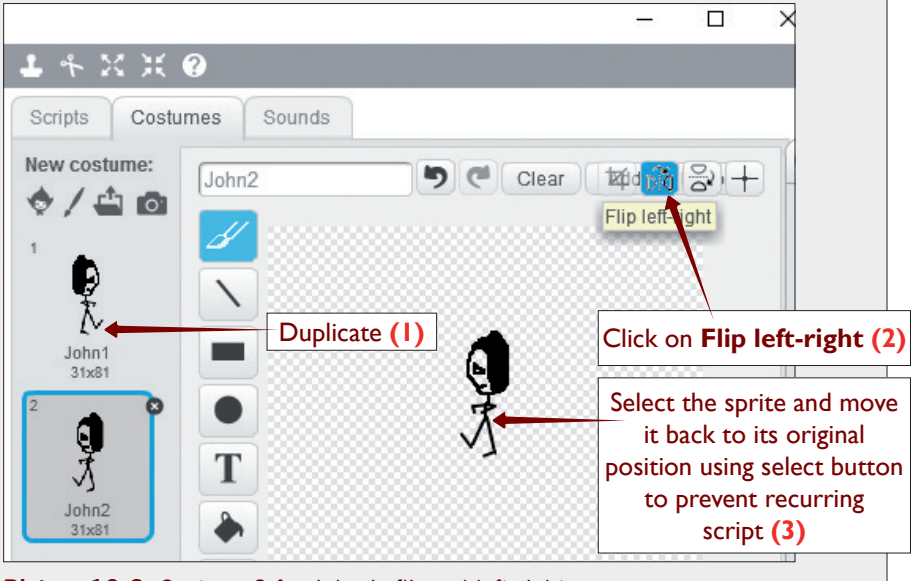
If you had deleted the cat sprite you can now draw a new item (John) using scratch paint tools.



Picture 10.5: Part of scratch window showing a newly drawn sprite to interact with platform

Duplicate John1 costume and then click Flip left-right.

Do this by right clicking on the John1 costume then select duplicate. Afterwards click "Flip left-right" button as shown in the picture below.



Picture 10.6: Costume2 for John is flipped left-right

10.2.4 Build a Combo block

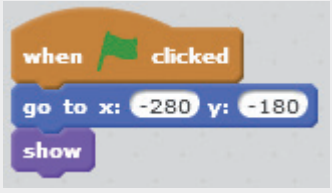
A combo block is a combination of scripts that can make a sprite to move, jump, walk, make sound, etc. and can also affect the behaviour of the background platform.

Activity 10.2

Create combo blocks that will make John to appear in a specific position when the game starts, ready to move and jump.

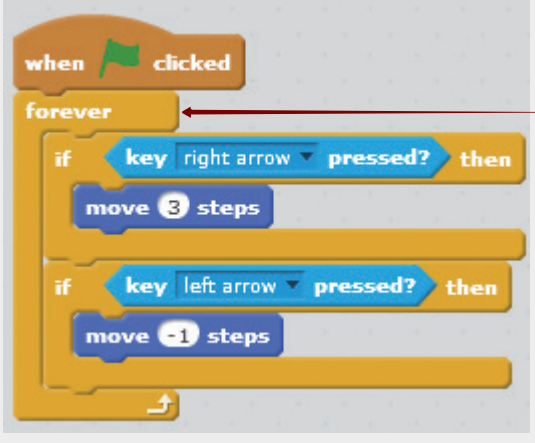
Solution

To create combo blocks, you must know what each block does and we already have this knowledge. Now you give John-sprite the following scripts (combo block) to take his initial position, show up and get set each time the green flag is clicked.



Block 3: Gives the sprite ability to appear in a specific location you set

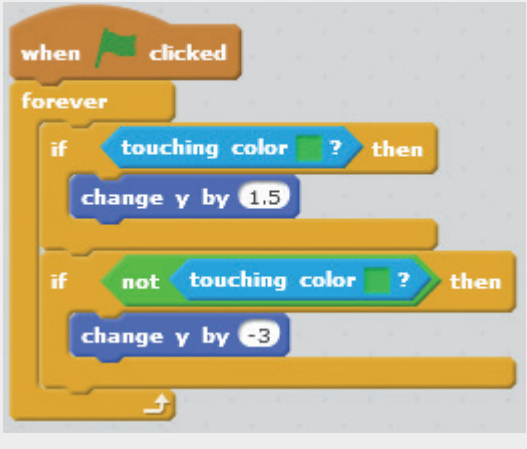
To give John the ability to move forward or backward. Use the following scripts below.



The forever loop setup gravity and monitors for right and left arrows to be pressed to change the sprite's horizontal movements.

Block 4: The sprite will be able to move left or right with move steps you set

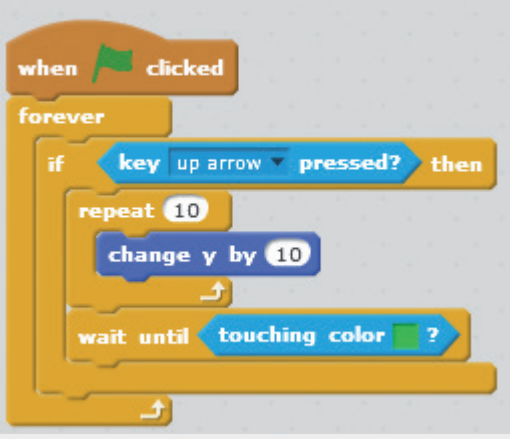
Give John-sprite some movement limits by using the scripts below.



Note: A condition is a statement which is checked for a true or false response. In our game when the sprite checks if it's touching a green colour, it's checking a condition, using **if** blocks

Block 5: The sprite will detect colour changes as it moves and changes y position accordingly

With the scripts below, John will be able to jump



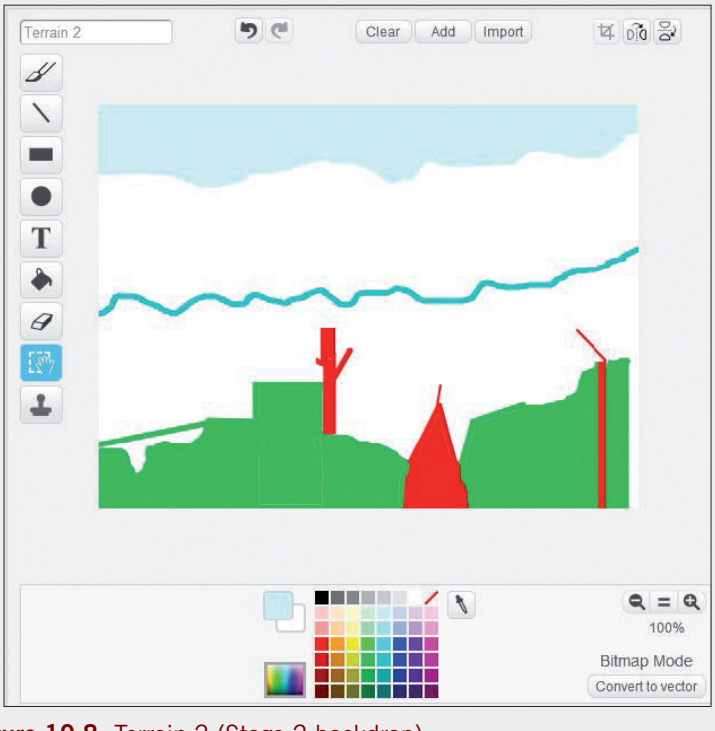
Block 6: The sprite shall be able to jump

Activity 10.3

1. In groups, discuss how you can associate scratch tools and produce a planned platform. Just think of a game and look at the tools you may need.
2. Discuss the role of platforms in scratch programming language.
3. Modify the platform (*Stage1 backdrop)* we made in Activity 10.1(b) to appear as shown in the following pictures using scratch paint tools.

Picture 10.7: A modified Stage1 backdrop

4. Create the **Stage2 backdrop** and make it Terrain2 to appear as shown below.



Picture 10.8: Terrain 2 (Stage 2 backdrop)

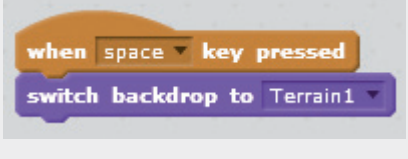
Use the following steps to create backdrop2

- Select Stage1 Backdrop and then click on the **Backdrops** tab.
- Right click on **Terrain1** backdrop and select **duplicate**. This will create *Terrain2 backdrop.*
- Make changes to the backdrop using scratch paint tools to appear as shown in picture 10.8.

5. Create stage3 backdrop to appear similar to the following as shown in picture 10.9 and call it Terrain3.

Picture 10.9: Stage3 backdrop

To all level backgrounds add the following scripts to enable a player move back to level 1 faster if it is required.



Block 7: When you press space bar at any level the background will change to terrain1

10.3 Add Level of a game

You can use colours in a platform to detect the end of a level or determine the end using edge of a platform. You can also use an object which sends one back to the beginning of the level.

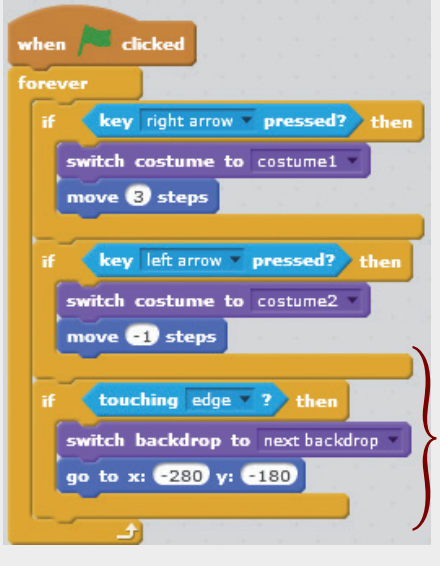
The character sprite is named John. Green is the colour of the walking ground. Edge has been used such that if one reaches to it; qualifies for next level platform.

Activity 10.4

Using the designed backdrops (platform) in Activity 10.3, add levels of the game enabling a player to move from one level to another. Create a winning costume that will produce a sound and a winning message at level 3.

Follow the following steps

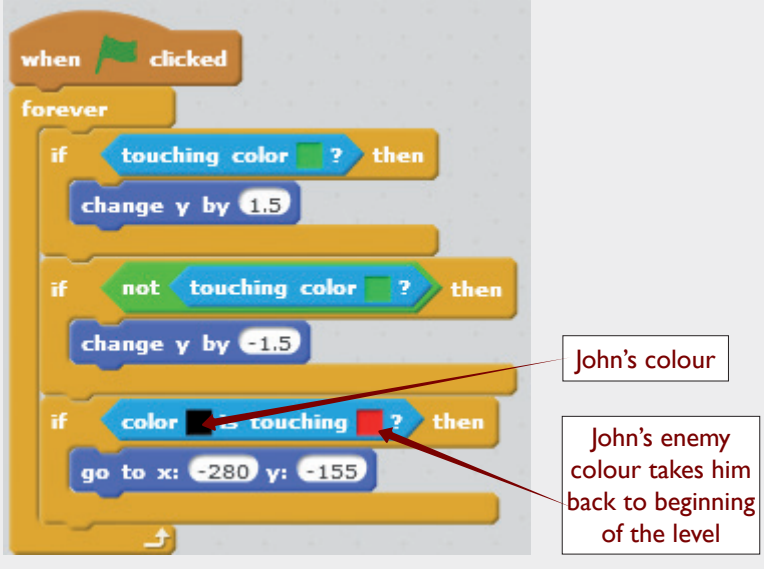
Step 1: Let us add more scripts to block 4 enabling the sprite to move from one platform or backdrop to another. See block 8 below (as a result).



With this part of combo, once the sprite reaches the edge then it switches to the next backdrop and it goes to x -280 and y -180 of the next level

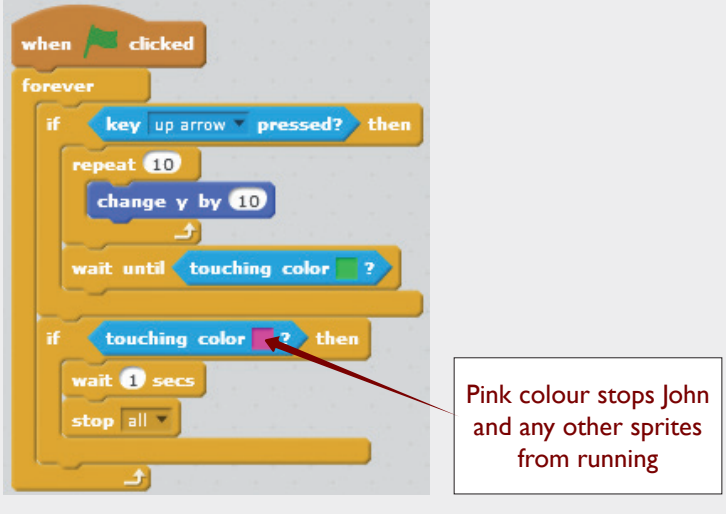
Block 8: Scripts can make the sprite to switch costume and move to another stage

Step 2: In this game, RED objects are used to send the player back to the beginning of the level. We can now modify block 5 by adding in more scripts as shown below in block 9 below (as a result).



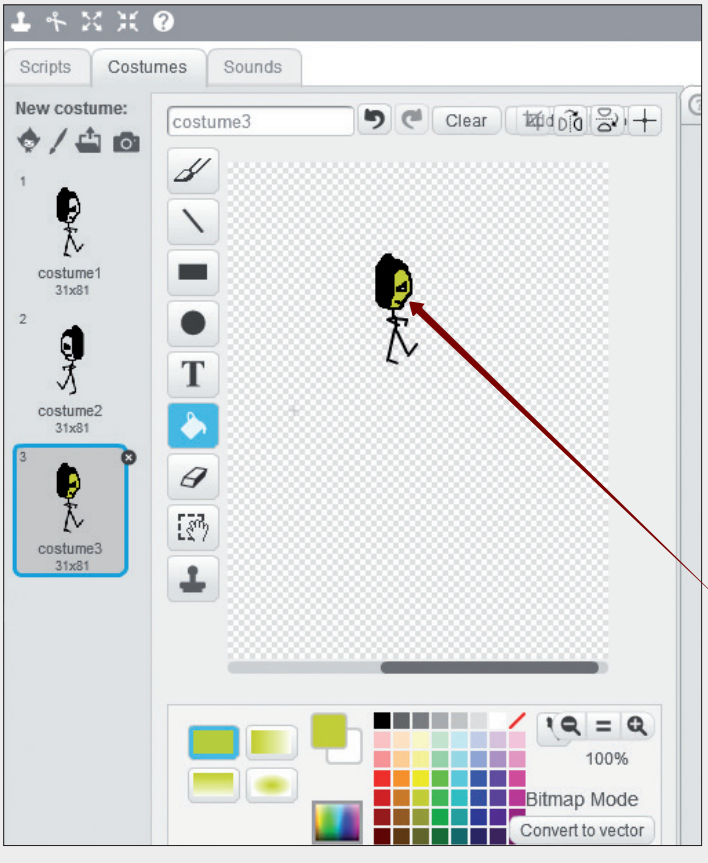
Block 9: If the sprite's colour (black) is touching red colour, it goes back to the beginning of the level

Step 3: Let us add more scripts to block 6 and determine where the game ends. See block 10 below as a result.



Block 10: This block not only will help John to jump but also to stop once it touches pink colour after 1 second

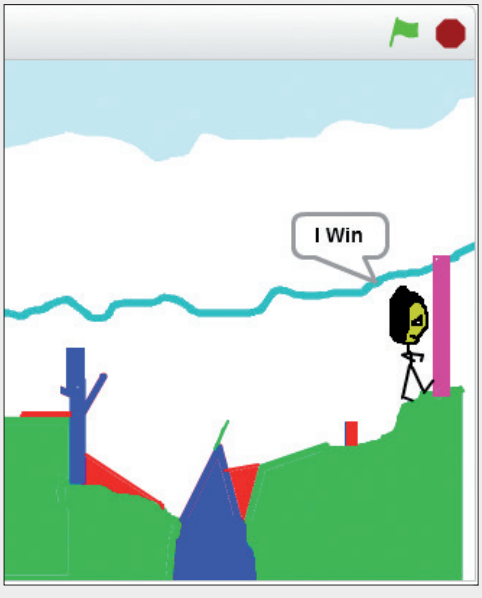
Step 4: Create a winning costume for John sprite by giving him a different facial colour.



Picture 10.10: Scratch drawing area with a winning costume sprite

Step 5: Let's us add more scripts to make John produce sound and a winning message. See block 11 below.

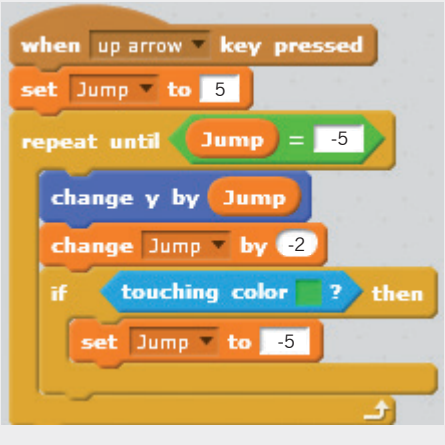
Block 11: These scripts will make John-sprite (after touching pink colour) to change costume, produce a message and sound



Picture 10.11: John has reached the end of Journey and has won the game

Activity 10.5

1. Using the **Hard Journey** game in the previous activity, design two more challenging backdrops (add 2 levels) to work for level 4 and level 5 of the game. Let the backdrops be placed in-between backdrop 2 and 3.
2. Make a variable called **Jump** and use it to test how John-sprite works with gravity while jumping. Use the following scripts.

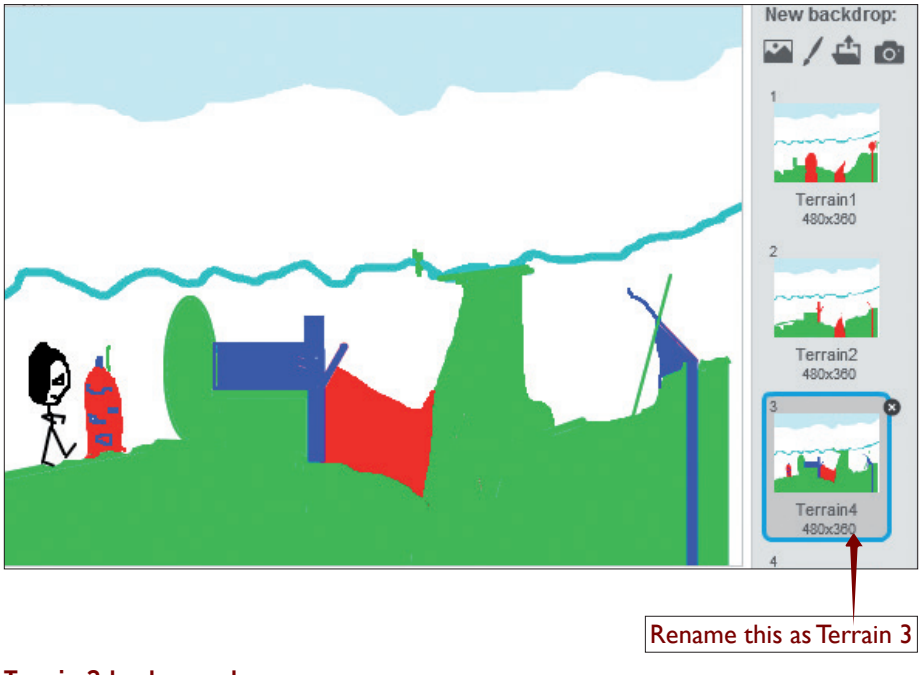


Block 12: Scripts you can use to make John jump with gravity (you free to modify them)

3. Use appropriate scripts that could make the blue colour to hide John (disappear automatically) such that a player must show him in order to play again.

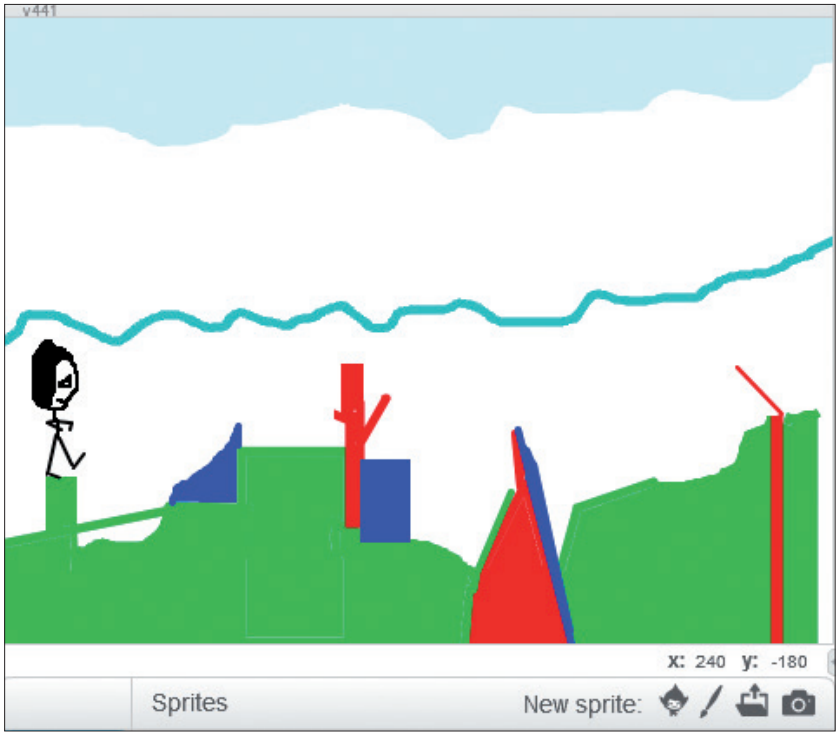
Suggested answers for Activity 5

1. New backdrop3 may appear as this one shown in the following pictures (a) and (b) but you are free to design a different one. This level can later be renamed *Terrain3*.



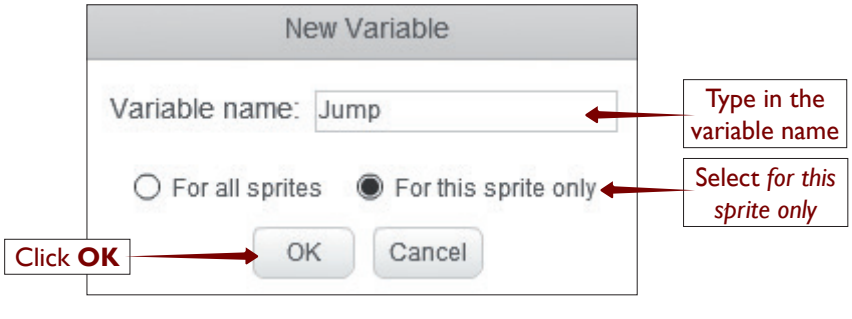
Terrain 3 background

The new backdrop4 which can later be renamed *Terrain4* may appear as this one below.



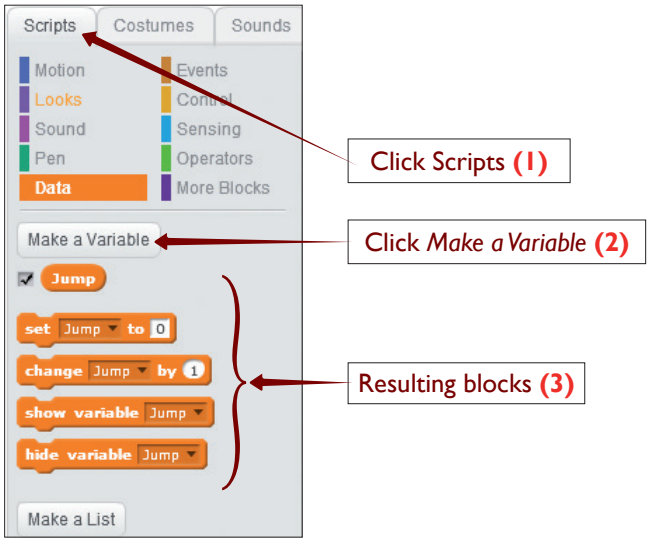
Terrain 4 background

2. Steps for making a variable are:
   - On the **Scripts** tab click **Data** block.
   - Click **Make a Variable**. In the **New Variable** dialog box type in **Jump**. Select "*For this sprite only*" and click **OK**.



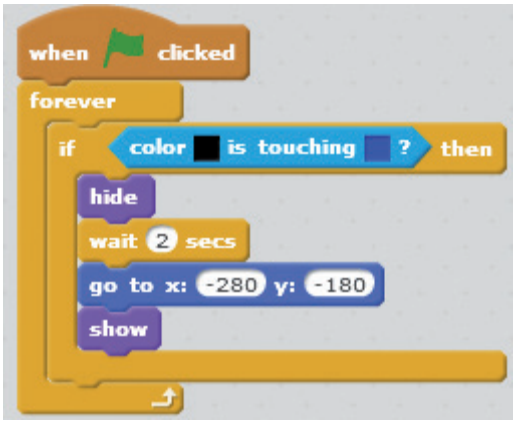
Picture 10.12: New Variable dialog box

   - The resulting blocks appear as shown in picture 10.13 from which you can pick what you want.



Picture 10.13: Scripts are containing jump variable blocks

3. The scripts that can make John-sprite hide when touching blue colour are in block 13.



Block 13: This block can make John-sprite in black colour to hide when touching blue colour.

10.4 Commands for sprite manipulations

There are a number of commands in Scratch, which you can use to make your game interesting. Most of the commands below have been used in our activities. You should learn more of what they exactly do. Also practice on locating them quickly when needed.

1. **Colour () is Touching ()?**: This is a condition for checking if a colour (represented by first brackets) on the sprite is touching a specific colour (represented by the second brackets).
2. **Repeat Unitl:** This is a loop that will stop once the condition is true.
3. **Change () by ():** This script changes the specified **variable** by the amount.
4. **Key () Pressed?**: This is a condition for checking if the specified key (represented by brackets) is being pressed.
5. **Touching ()?**: This is a condition for checking if the sprite is touching the mouse-pointer or another sprite (represented by the brackets).
6. **Touching Colour ()?**: This is a condition for checking if the sprite is touching a specific colour represented by brackets.
7. **Switch Costume to ():**This block changes the sprite's costume to the specified one (represented by brackets).
8. **Switch Backdrop to ()**: This changes the Stage's costume/backdrop to the specified one (represented by brackets).
9. **Switch Backdrop to () and wait**: This block is for stage only, it waits until all of the hat blocks triggered by this have completed.
10. **Next Costume:** This block changes the sprite's costume to the next one in the costume list.
11. **Next Backdrop:** This changes the Stage's costume/backdrop to the next one in the costume list.

10.5 Sample controls

There are a number of controls in Scratch and some of them include the following:

1. **Repeat ()**: This is a loop that repeats the specified amount of times.
2. **Forever:** This is a loop that will never end.
3. **If () Then:** This block checks the condition so that if the condition is true, the blocks inside it (represented by brackets) will activate.
4. **If () Then, Else:** This block checks the condition so that if the condition is true, the blocks inside the first C will activate and if the condition is false, the blocks inside the second C will activate.
5. **Move () Steps:** This block moves the sprite forward the amount of steps (represented by brackets) in the direction the sprite is facing.

6. **Turn () Degrees (Clockwise):** This block turns the sprite (clockwise) the specified amount (represented by brackets).
7. **Turn () Degrees (Counter-clockwise)**: This block turns the sprite (counter-clockwise) the specified amount (typed in brackets).
8. **Point in Direction ():** This block points the sprite in the direction you specify.
9. **Point Towards ():** This block points the sprite towards the mouse-pointer or another sprite.
10. **Go to X: () Y: ():** This sprite moves the sprite to the specified X and Y position.
11. **Go to ():** This block moves the sprite to the mouse-pointer or another sprite.
12. **Touching ()?**: This is a condition for checking if the sprite is touching the mouse-pointer or another sprite.
13. **Show:** Shows the sprite.
14. **Hide:** Hides the sprite.
15. **Set () to ()**: Sets the specified variable to the amount.
16. **Change () by ()**: Changes the specified variable by the amount.
17. **Show Variable ()**: Shows the variable's Stage Monitor.
18. **Hide Variable ()**: Hides the variable's Stage Monitor.

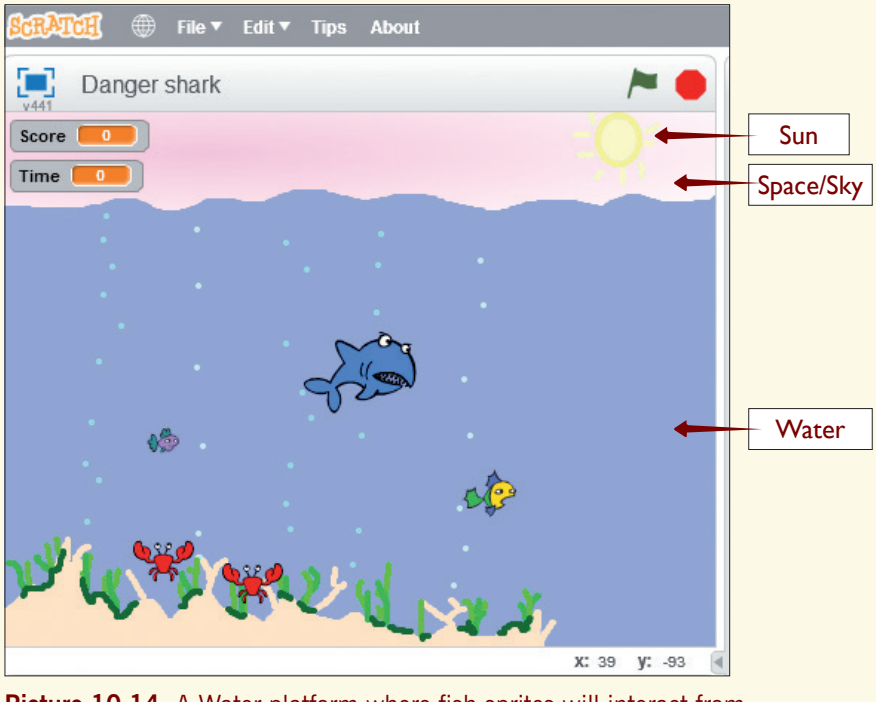
Note: Try to use most of these block sprites in your games.

End of Unit 10 Assessment

1. Use Internet facility and explore millions of scratch projects that other scratch users have shared. Look inside and see how they work and then learn from them.

> **Note:** Since playing scratch games is fun, make sure you know how the codes used in those projects work and try them. Remix projects or borrow scripts and graphics from them but ensure to include credits on the projects page if you are to use other people's material.

2. a) Design a platform stage (background) similar to the one shown below as lake waters and sky. In the waters there is a shark that eats small fish that you will introduce in the water. Name the game file as **Danger shark**.



Picture 10.14: A Water platform where fish sprites will interact from

b) Introduce in a big fish (Shark) with two costumes. Costume1 is biting and costume2 is opening mouth.

c) Apply necessary scripts to make the shark, move up, down, left and right in the waters so as to catch pray but must not move beyond waters upwards.

d) Introduce in 2 small (can be similar or different) fish as prey for the shark. Use similar scripts on each of them. Set score variable and time variable. Set time at 20 such that if it elapses, the game is over and the player just counts the scores achieved in that time.

e) Design a platform where the game ends (Game over) and show its sprite commands.

f) Apply sound in your scripts such that each time the shark eats a fish it makes sounds.

Glossary

Ad blocking: This is a software technology, which allows for blocking ads before they are loaded by the web browser. That means that you are saving bandwidth and the page is rendered faster within your browser.

Add ons: These are apps that Internet Explorer uses to interact with web content like videos and games. Toolbars and extensions are also types of add-ons.

App: A program written mainly for mobile operating system like iOS or Android. Apps are usually games, utilities, or suites.

Application: A program that turns your computer into a specific tool, such as a word processor, photo editor, or browser.

Axis Title: This is text that identifies plotted data on x or y- axis.

Browser extension: Software that modifies the interface and/or behaviour of web browser e.g. add-on.

Chart Title: This is text that identifies the purpose of the chart.

Content-control software (content filtering):

This is computer software designed to restrict or control the content a reader is authorised to access, especially when utilised to restrict material delivered over the Internet via the Web, e-mail, or other means e.g. ad blocker.

Data point: This is a value in data series.

Data range: This is a block of cells that provides data to be used to create a chart/graph.

Data series: This is a range of data that comprises of a bar, column, line or pie slice.

Data source: This is a named source of data usually a DBMS file.

Document Protection: This is to safeguard or preserve a document from damage or **misuse.**

Download: This means copying files from a remote computer to your computer using a modem or network connection. For example, you can download files from the web to your hard disk.

Downloading: This is a process of **transferring** information (copying) from a remote computer to your computer.

File system: This is the overall arrangement in which files are named, stored and organised by the operating system, for example, Windows 8 uses NTFS file system.

Gridlines: These are horizontal and vertical lines that help the reader to determine data values in a chart.

Install: This is to copy a program on to your computer for use. E.g. you can install operating system on your computer and Microsoft office applications after and then use them do perform tasks.

Legend: This is a feature that connects colours and patterns in a chart with the data they represent. The legend acts as the key that explains what each colour or pattern in the chart means.

Open source operating system: This is an operating system that anybody is freely licensed to use, copy, study and change e.g. Linux is a Free and Open Source Software (FOSS); this means, anybody can use Linux operating system in any way he/she wants. The source code is openly shared such that people are encouraged to

voluntarily improve its design. Chrome OS is also **open source.**

Photography: This is the method of producing procedures with camera. It is a profession or hobby of taking photographs, developing and printing/ processing the images.

Plug-in (or Add-on) and Add-in: These are simple extensions that **extend the usability of the** program **s**uch as Internet Explorer or Mozilla Firefox.

Printing: This is the action of producing text or graphics on paper or another medium by a Printing machine.

Source code: This is a computer code used by programmers to write a program and it is human readable.

Suite: A collection of applications or utilities sold for a single price, and having a single or similar user interface. These include both application suites (Microsoft Office), and utility suites (Norton Internet Security).

Typography: This is the art and craft of designing typefaces and organising for display.

Uploading: This is the process of sending or transferring data or programs, usually from a peripheral computer to a central often remote computer.

Utility: A program that either protects the computer or makes it faster, more reliable, or easier to use.

Video game accessory: This is a piece of hardware used in conjunction with a video game console for playing video games.