Based on National Curriculum 2022

Model Textbook of

COMPUTER SCIENCE

GRADE 7

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SED Branch

National Curriculum Council
Ministry of Federal Education and Professional Training

National Book Foundation
Ministry of Federal Education and Professional Training
Government of Pakistan

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A Textbook of **Computer Science**
for Grade 7



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National Book Foundation

First Edition - First Impression: May, 2022 | **Pages:** 124 | **Quantity:** 72400

Code: STE-620, **ISBN:** 978-969-37-1283-4
Printer: Top Mountain Printers, Lahore

TEST EDITION

Note: All the pictures, paintings and sketches used in this book are only for educational and promotional purpose in public interest.

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Preface

The Textbook of Computer Science for Grade VII has been developed according to the National Curriculum, 2022. In today's modern age, digital technology is used everywhere in the society, that is, in business, government, industry, education, transportation, health and research. Digital technology helps people easily perform daily tasks and improve productivity. The usefulness of computer technology necessitates the need of people to learn about the fundamentals, concepts and skills of digital technology. The vision of National Curriculum of Computer Science, 2022 is helping students to achieve and understand digital literacy through student-centered & project-based activities, which have been translated for practice in this book of Computer Science for Grade VII.

This Computer Science Textbook for Grade VII is expected to go a long way in helping learners achieve Computer Science related knowledge, skills and attitudes as defined in the Student Learning Outcomes (SLOs) of the National Curriculum 2022. The format of the book is designed to ensure assimilation of the content knowledge and learning in other subjects like, Science, Mathematics, Social Studies, English & Urdu Languages, and Islamic/religious studies through cross-disciplinary activities.

The National Book Foundation strives to improve its textbooks in line with the demands of evolving conditions with a keen eye to maintain quality enhancement in each of its new editions. This continuous effort for improvement requires suggestions and feedback from the students, teachers and the community. As always, National Book Foundation is looking forward to receive feedback on this new textbook to make it more interesting and useful for the students.

Dr. Raja Mazhar Hameed
Managing Director

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1 ICT FUNDAMENTALS

Learning Outcomes

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

- identify the use of emerging technologies in various walks of life (e.g. artificial intelligence, biometrics, robotics, computer-assisted translation, 3D and holographic imaging, virtual reality, Cloud Computing, and open-source software)
- identify (advanced) hardware components of a computing system (e.g. different types of I/O ports, different types of peripherals, and networking components)

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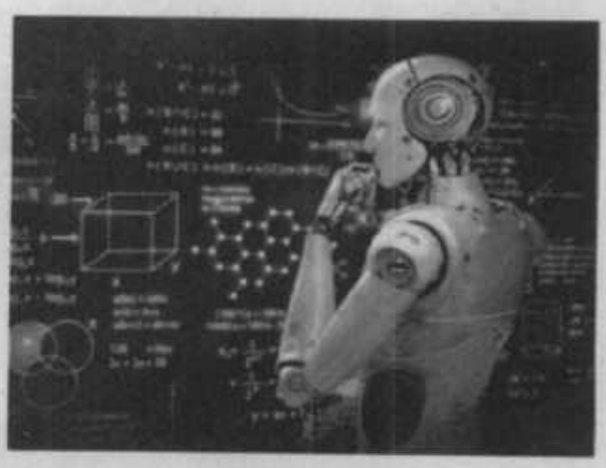
1.1 Emerging Technologies

ICT is increasing day by day and we use various ICT devices and equipment to accomplish specific tasks in our everyday lives. Today we have various devices/ technologies that impact our lives in different ways.

Emerging technologies refer to technological innovations that are currently developing and are expected to be available within five to ten years. Emerging technologies will have significant impact on our daily life, business, communication, travel, etc.

1.1.1 Artificial intelligence (AI)

AI computer systems are created to behave like humans e.g., game playing, robotics, expert systems, languages, etc. The impact of AI in our daily life may include safer transport, improved medical care, speech recognition, problem solving, etc.

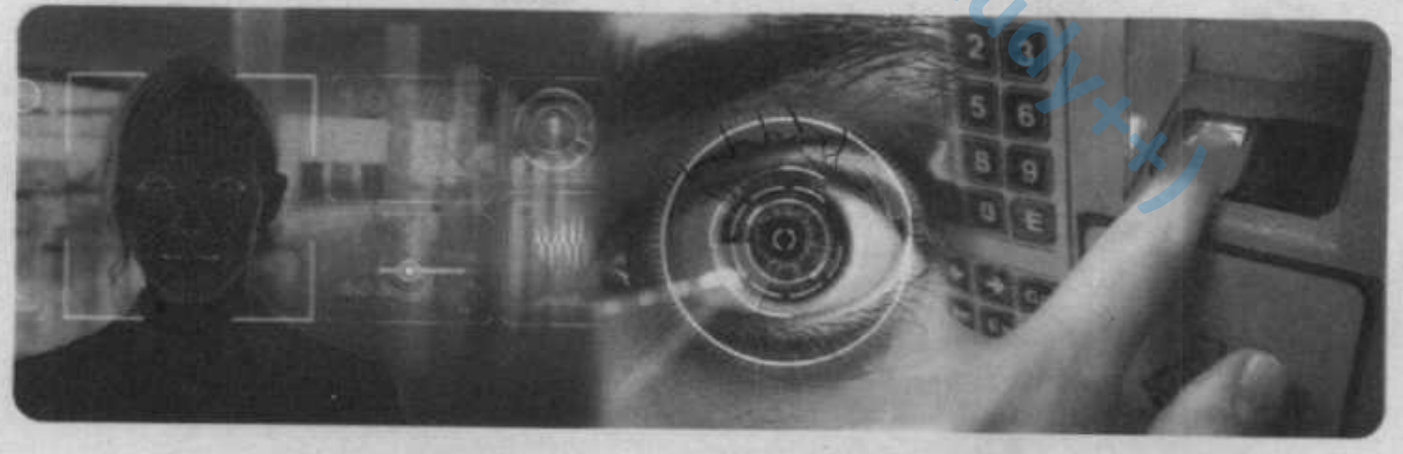


Artificial Intelligence

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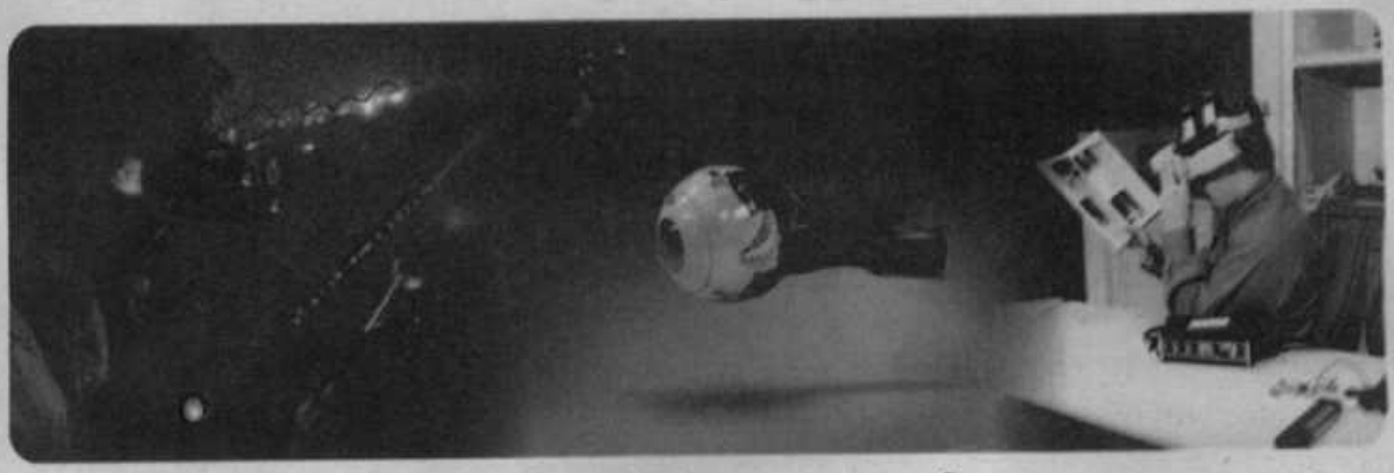
1.1.2 Biometric

Biometric is where parts of a person's body are used for identification purpose e.g., finger prints, eye recognition, face recognition, voice recognition, etc. Biometric data can be used to access information on smart phones, ATM, laptops, etc.



1.1.3 Vision Enhancement

Vision enhancement is used to help people to see objects better by using zoom facilities or enlarged text e.g., night vision goggles can send images to ICT devices to be processed and enhanced.



1.1.4 Robotics

Robotics refers to technology that produces machines, called robots, to perform tasks that were done traditionally by human beings. These tasks include diffusing landmines and bombs, firefighting, space exploration, lifting heavy object, manufacturing and performing surgery, etc. Robots are even serving as waiters in restaurants nowadays. The impact of robotics in our daily life may include safer and more efficient working environment with improved quality.



1.1.5 Computer Assisted Translation

Computer Assisted Translation is a form of language translation which uses computer software to support and facilitate the translation process e.g. spell checkers, grammar checkers, electronic dictionaries, etc. It is helping tourist to communicate easily on their visit to other countries and places. It is also very effective in strengthening business relationships with other countries.



Computer Assisted Translation

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1.1.6 3D and holographic imaging

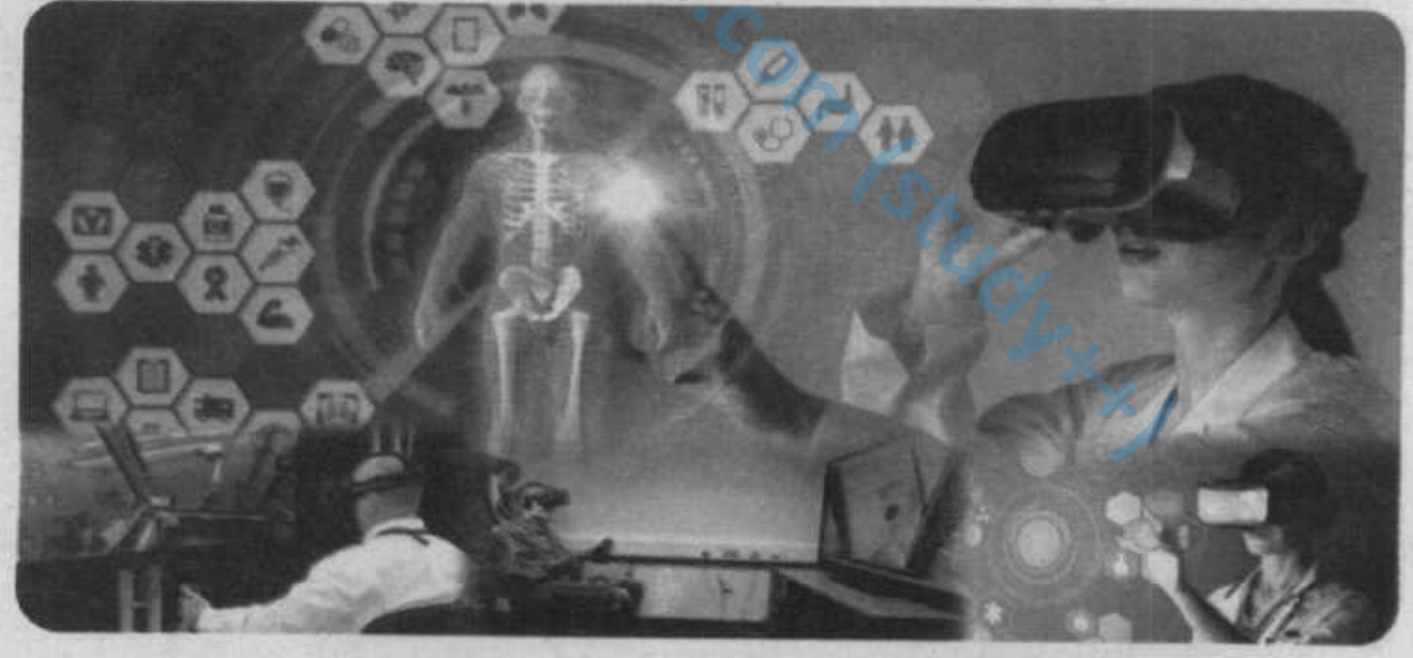
3D and holographic imaging displays products, objects, and animated sequences three-dimensionally. Holograms are revolutionizing the world in different ways like in military they are using 3D holographic maps of "battle-spaces". This technique allows soldiers to three-dimensional look around corners and help with mission training.



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1.1.7 Virtual Reality (VR)

Virtual Reality (VR) is computer-generated simulation of a three dimensional image or environment. It can be interacted with in a seemingly real or physical way by a person using special electronic equipment such as helmet with screen or gloves fitted with sensors.



1.1.8 Augmented Reality

Augmented Reality enhances or augments our experience of the world around us. It is not a simulation of reality rather it superimposes digital information (images/text) over a natural existing environment. For example, augmented reality is used in weather forecast by TV channels.



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1.1.9 Self-Driving Cars

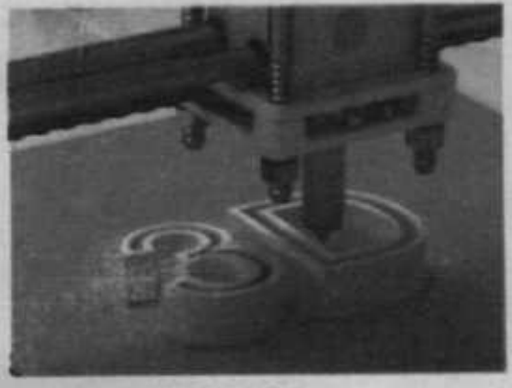
Self-Driving Cars rely on sensors, actuators, complex algorithms, machine learning systems, and powerful processors to execute software. Sophisticated software is used that accepts input from the sensors and sends instructions to the car's actuators. The car actuators control the steering, braking, speed and parking of the car. The software is designed to follow all the traffic rules. Various sensors create and maintain a map of car surroundings.



Self-Driving Car

1.1.10 3D Printing

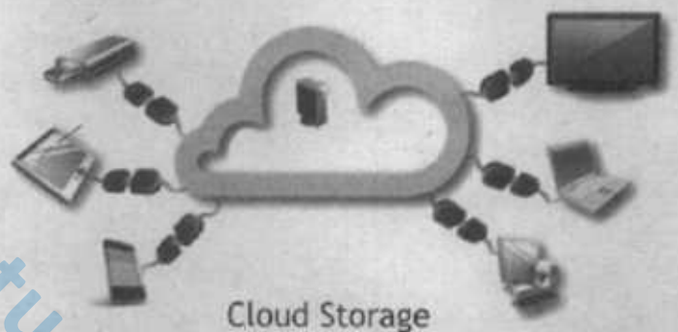
3D Printing uses a computer software to create a 3D object. The file of the object created on the computer can be stored on an SD card. The SD card reader inside the 3D printer is used to read the file and start printing, a computer is no longer necessary. The 3D printer uses material such as plastics and bio-materials (ceramics, glass, metals and polymers) to create objects of different shape, size and color.



3D Printing

1.1.11 Cloud Storage (CS)

Cloud Storage (CS) is a cloud computing model in which data is stored on remote servers accessed via the Internet or "cloud". Cloud storage works through data center vitalization, providing end users and applications with virtual storage.



Cloud Storage

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1.1.12 Open-source software

Open-source software is distributed with its source code and is available for modification. It is shared free of cost. It includes a license that allows programmers to modify or enhance it to best fit their requirements. Anyone can make changes in open-source software and distribute it as their own software. Open-source software examples are Open Office, LINUX and Mozilla Firefox.

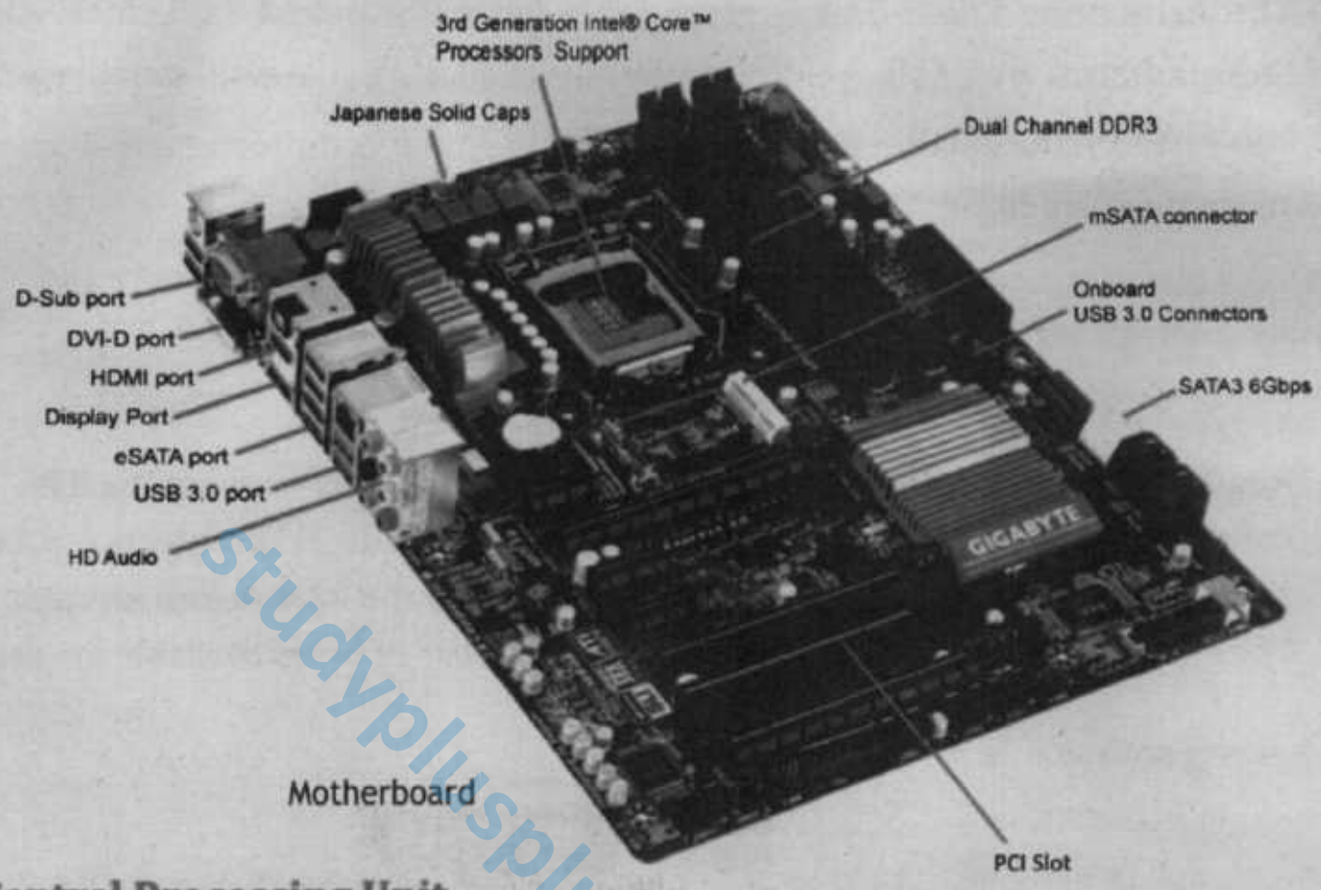
1.2 Main Components of System Unit

A system unit is the case that contains all the electronic components of computer system like motherboard, power supply, RAM, ROM, CPU (microprocessor), hard disk drive, Optical drive, etc.

1.2.1 Motherboard

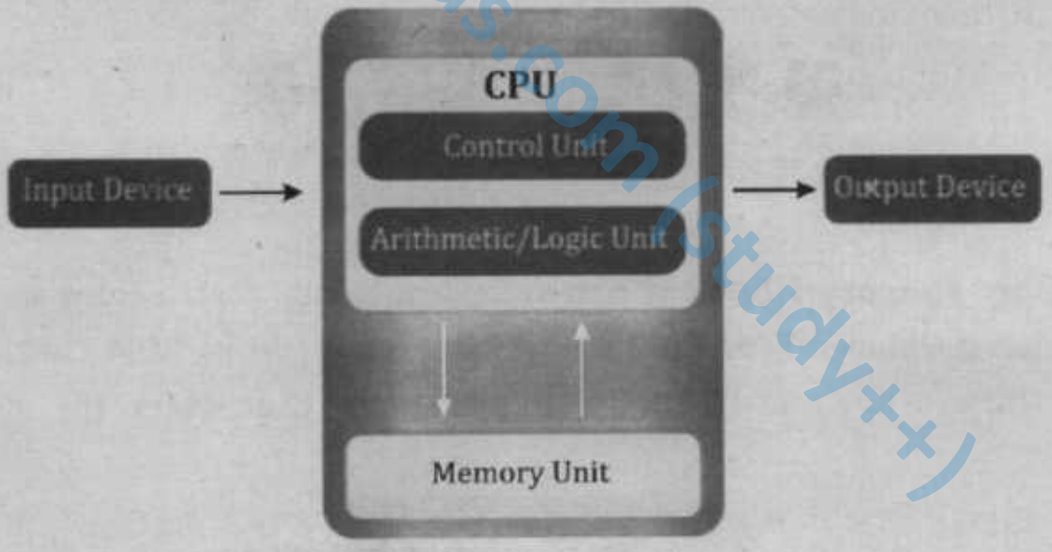
A motherboard (system board) is the main circuit board found in general purpose computers which serves as the central circuit hub. It connects all the peripherals and components of a computer e.g., CPU, Memory, etc.

The motherboard is mounted inside the case and is securely attached via small screws through pre-drilled holes. Motherboard provides ports to attach the hard drive and optical drives via ribbon cables. Motherboard carries fans and a special port designed for power supply. Motherboard carries a number of ports to connect the monitor, printer, mouse, keyboard, speaker, network cables, etc.



Motherboard

Central Processing Unit



Block Diagram of Computer

Central Processing Unit (CPU) is the primary component of a computer that processes and executes instructions. The speed of the processor is measured in Hertz (Hz). CPU consists of Control Unit (CU) and Arithmetic Logic Unit (ALU).



CPU

- **The Control Unit** controls the electronic flow of information around the computer. It coordinates the activities of all the other units in the system.

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- **The Arithmetic Logic Unit** is responsible for mathematical calculation and logical comparisons. ALU operates on the data available in the main memory and sends them back after processing again to main memory.

Memory Unit

The main memory (Primary Memory) is directly accessed by the CPU to store and retrieve information.

Different kinds of primary memory are:

- **Random Access Memory (RAM)** is used to read and write data but the data is volatile or temporary i.e., whenever the power is switched off the contents of RAM are lost. All computer programs must be loaded into the RAM before execution. The size of the memory is measured by the number of bytes available for use.



RAM

- **Read Only Memory (ROM)** is non-volatile memory. Instructions in ROM are embedded permanently at the time of its manufacturing. ROM contains Basic Input Output System (BIOS) and programs that start the computer.



ROM

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Units of Computer Memory Measurements

The most common units of measurement for memory are the byte, kilobyte, megabyte, gigabyte and terabyte.

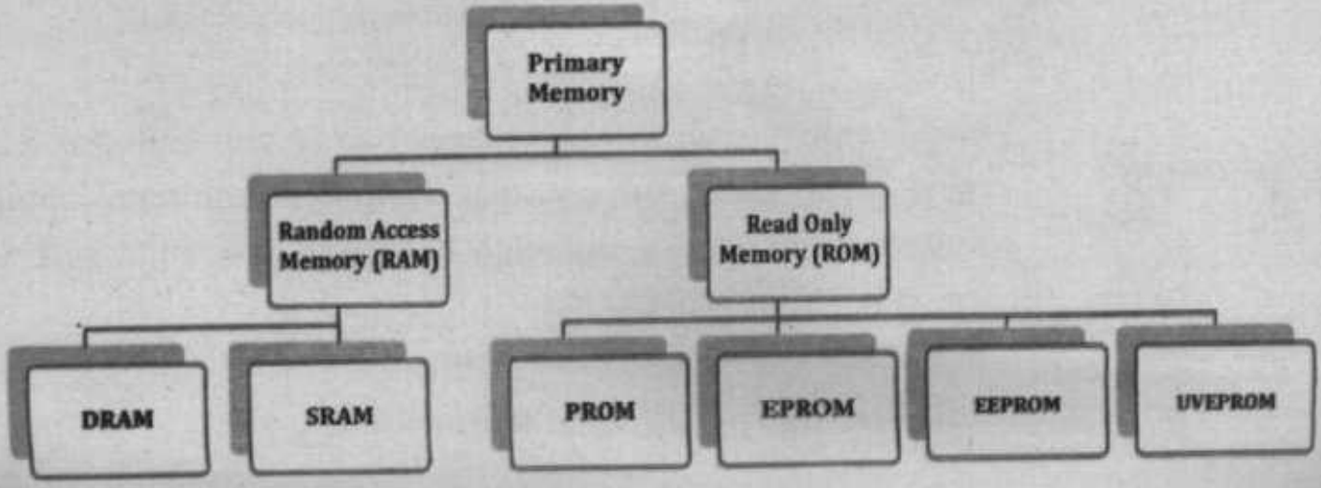
Do you know?

1 Bit	= Binary Digit
8 Bits	= 1 Byte
1024 Bytes	= 1 KB [Kilo Byte]
1024 KB	= 1 MB [Mega Byte]
1024 MB	= 1 GB [Giga Byte]
1024 GB	= 1 TB [Terra Byte]
1024 TB	= 1 PB [Peta Byte]
1024 PB	= 1 EB [Exa Byte]

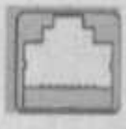
Difference between RAM and ROM

RAM	ROM
RAM stores operating system, application programs and data in use.	ROM contains programs used for booting up the computer and BIOS.
Data in RAM can be modified.	Data in ROM cannot be modified.
RAM is volatile memory.	ROM is non-volatile memory.
Types of RAM are: • Dynamic RAM • Static RAM	Types of ROM are: • PROM (Programmable ROM) • EPROM (Erasable PROM) • EEPROM (Electronically Erasable PROM) • UVEPROM (Ultra Violet Erasable PROM)

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1.2.2 Some Common Types of Communication Ports

Device	Description
 HDMI	HDMI (High Definifion Multimedia Interface) is a port that can transmit high quality audio and video data between devices.
 USB	USB is an interface that enables communication between peripheral devices such as mouse, keyboard, printer, scanner, external hard drive, etc. and the computer.
 USB Type-C Port	USB Type-C port is a new type of port for charging and transferring data. It is included in latest laptops, phones and tablets. It is replacement of old USB port as devices are becoming smaller and thinner. It can be connected to a large variety of devices.
 Card Reader	Card Reader is a small plug and play device used to copy, read and backup data from memory card.
 Ethernet	Ethernet is the most common network interface which accepts a network cable, which physically attaches the computer to the network.
 VGA	Video Graphics Array (VGA) is a three-row 15 pin connector. It is provided on many video cards, computer monitors, laptop computers, projectors and high definition television sets to carry video signals for display.

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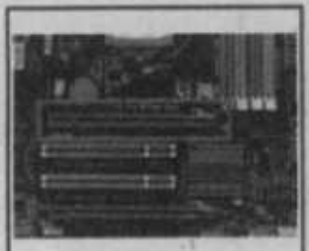
S- Video Port

S-Video port or jack is used to transmit only video signals through a cable by dividing the video data into a colour and brightness signal. These connectors transmit a medium quality analog video signal between devices and can only transmit standard-definition images. It does not send audio.



SATA Ports and Cable

Serial Advanced Technology Attachment (SATA) port is generally used to connect hard drive to motherboard. It has improved the data transfer rate between motherboard and hard drive. Generally, there are four SATA ports on the motherboard. A SATA data cable is used for connecting hard drive to the motherboard.



PCI-express Ports

A number of Peripheral Component Interconnect (PCI)-express slots are available on the motherboard. These slots are used to provide additional functionality to the computer. PCI-express slots come in various sizes designed for specific expansion cards. Graphics card is fixed in it for gaming, a sound card for sound and a network card for communication with other computers in a network system.

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1.3 Peripherals of a Computer System

All the input and output devices of a computer are known as peripheral devices or peripherals. Input devices are used to enter data in the computer and output devices display it on the monitor or print on paper. Commonly used input devices are keyboard, mouse, scanner, and webcam. Commonly used output devices are display screen and printer.

1.3.1 Input Devices

Keyboard

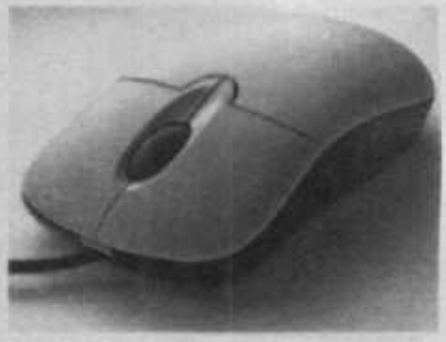
Keyboard is the most commonly used input device for entering data into the computer. It consists of many types of keys. It allows computer users to enter letters, numbers and special symbols (@, #, $, &, etc.) into the computer.



. Keyboard

Mouse

Mouse is a small hand-held pointing device with two buttons and a scroll wheel at the top. It controls the movement of the cursor on the screen. It is used for selecting folders, icons, files and various options in computer programs. It is also used for performing various operations such as drawing graphics and executing computer programs.



Mouse

Microphone

Microphone is an input device that allows computer users to input audio into the computer. It is plugged into the microphone port or USB port on the computer, tablet, or phone. It is very commonly used on social networks such as WhatsApp and Botim for chatting and web conferencing.



Microphone

Scanner

Scanner is an input device. It allows computer users to scan images, printed text or handwriting and converts it into digital images. Scanned material can be displayed on the screen, edited or used in a document.



Scanner

Webcam

Webcam is a video camera built into a laptop computer or tablet. It can also be attached to a desktop computer. It is an input device used to stream live video in real time. It is used in online meetings, web conferencing and online learning.



Webcam

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1.3.2 Output Devices

Display Screen

Display screen is the most commonly used output device that provides visual display (softcopy) of the user's interaction with the computer. It is used to display images, text, video and graphics information generated by the computer.



Display Screen

Printer

Printer is an output device. It accepts text, images and graphics from the computer and prints it on paper (hardcopy). Some printers can print in multi-color.



Printer

Speaker and Headset

Speaker is an output device that is used to produce sound. It is either built-in laptop, tablet or connected externally to make sound louder. A headset is very commonly used for chatting and web conferencing over the Internet. It consists of both microphone and speaker. It is fixed on the head.



Headset



Speaker

Multimedia Projector

Multimedia Projector is an output device that takes text, images, audio and video contents generated by a computer and projects on a screen or a wall. Multimedia projector has high resolution and is capable of displaying information in full-color.



Multimedia Projector

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1.4 Computer Network

Computer network is an interconnection between two or more computers for the purpose of communication.

1.4.1 Components of a Computer Network

A computer network has five basic components, i.e., servers, clients, transmission media, connecting devices and network operating system.

Server is a powerful computer that runs network operating system and stores data and application software that can be shared over the network. It can share printer and Internet connection as well.



Server

Client is a computer that accesses the shared resources of a server. A personal computer in a network is a client.



Client

Transmission media are the pathways that connects computers in a network over which information is transferred between the computers. Information can be transferred through a cable or wireless connection.

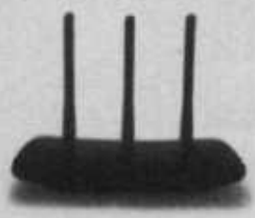


Transmission Media

Connecting devices such as NIC, switch, router or Wireless Access Point (WAP) connect servers with clients.



NIC (Network Interface Card)



Router



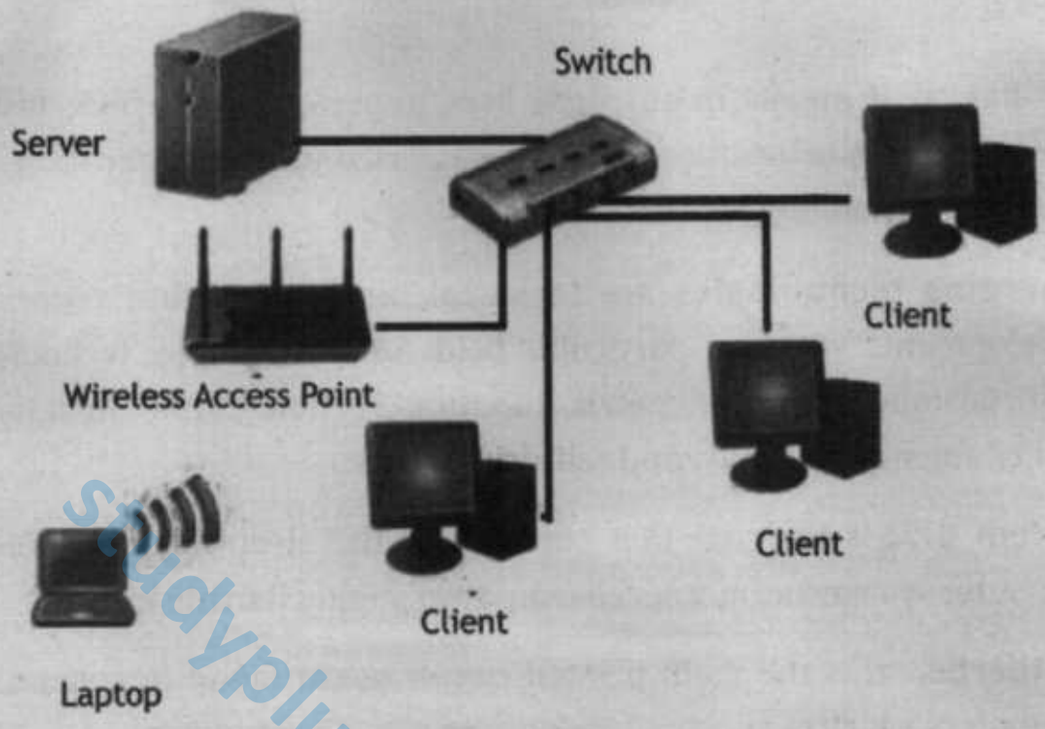
Switch



Wireless Access Point

Network operating system is installed on the server to facilitate clients to access the shared resources of server, such as, documents, application software, printer, Internet, etc.

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A Basic Computer Network

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Summary

- **ICT** has great impact in our daily lives in performing various tasks. Some examples are data handling, microprocessor-controlled applications, booking systems and banking applications.
- **Emerging technologies** are technical innovations that represent new developments within a particular field. Some emerging technologies are artificial intelligence, biometric, robotics, 3D holographic imaging, virtual reality, augmented reality and self-driving cars.
- **System unit** is the case that contains all the electronic components of a computer system like motherboard, power supply, hard disk, etc.
- **Motherboard** is the main printed circuit board found in general purpose computers which connects all the peripherals of a computer.
- **Central Processing Unit (CPU)** is the primary component of a computer that processes and executes instructions. It consists of arithmetic logic unit and control unit.
- **Computer memory** consists of RAM and ROM. RAM is temporary memory. It stores data and programs which are being used by the computer. ROM permanently stores programs that start the computer when it is turned on and controls all the input/output operations of a computer.
- **A port** is part of motherboard that provides interface to connect input/output and storage devices. Some examples of ports are HDMI, USB, VGA and SATA ports.
- All the input/output devices of a computer are known as **peripherals.** Input devices are used to enter information into the computer. Output devices display information on the display screen or print on the printer. Input/output devices provide interaction between the user and computer.
- **Computer network** is interconnection between two or more computers for the purpose of communication. It has five basic components; servers, clients, transmission media, connecting devices and network operating system.

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Exercise

Multiple choice questions:

1. System unit is the casing that contains following electronic components of computer system.
   (a) Motherboard, power supply, RAM, CPU
   (b) Keyboard, Monitor, Touchpad, CD
   (c) Printer, Scanner, Joystick, HDD
   (d) Motherboard, Display Screen, Speaker, Projector
2. Which of the following is volatile memory?
   (a) Optical Memory
   (b) Read Only Memory
   (c) Random Access Memory
   (d) Flash Memory
3. Which of the following is permanent memory?
   (a) Read Only Memory
   (b) Registers
   (c) Random Access Memory
   (d) Cache Memory
4. Identify the correct order of memory units:
   (a) TB>MB>GB>KB
   (b) MB>GB>TB>KB
   (c) TB>GB>MB>KB
   (d) GB>MB>KB>TB
5. Which device is used to input audio into the computer?
   (a) Mouse
   (b) Webcam
   (c) Microphone
   (d) Scanner
6. The device used to obtain text, images and graphics on paper is:
   (a) Monitor
   (b) Printer
   (c) Scanner
   (d) Keyboard
7. The device used to stream live video in real time is:
   (a) Printer
   (b) Microphone
   (c) Scanner
   (d) Webcam
8. Which technology uses fingerprint for identification purpose?
   (a) Robotics
   (b) Vision enhancement
   (c) Biometrics
   (d) Virtual reality
9. Which technology is related with creation of computer systems that behave like humans?
   (a) Virtual reality
   (b) Artificial intelligence
   (b) Biometrics
   (d) Augmented reality

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10. A computer that accesses the shared resources of a server is called:

(a) Personal Computer
(b) Server
(c) Client
(d) Remote Computer

Short response questions:

1. What is a system unit?
2. Draw the block diagram of a computer.
3. State the use of any two ports that are used to connect external devices.
4. What is artificial intelligence?
5. Differentiate between RAM and ROM.
6. What type of tasks can be performed by robots?
7. Define peripherals with the help of examples.
8. Write down the use of a scanner.
9. What is the purpose of using a multimedia projector?
10. Differentiate between server and client.

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Activities

1. Demonstrate system unit and its parts to the students and explain the functionality of each part.
2. Demonstrate the operation of the peripherals to students.
3. Videos of emerging technologies are to be shown to students.
4. Make groups of students to present a mini-project based on any emerging technology.
5. Prepare a chart to describe the generations of computers with a picture of the main device used in each generation.
6. Prepare a chart that defines a computer network and explains functions of each component.

2 Digital Skills

Learning Outcomes

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

- develop and demonstrate word-processing and presentation skills (using various software tools e.g. MS Word, MS PowerPoint, Prezi, Canva, Photo Story, Movie-maker, etc.)
- get introduced to electronic mailing systems (e-mail) and learn appropriate usage

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2.1 Word Processor

A Word Processor is an application software used for composing, editing, formatting and printing documents. It has variety of uses and applications at homes, business, educational institutions, etc. Following are some popular Word Processors:

- Microsoft Word
- Apple iWork
- Google Docs
- Libre Office



2.1.1 Working with Microsoft Word

- Start by clicking on the bottom left corner icon on the desktop.
- From Programs, click on Microsoft Office → Word
- You have the option of selecting a blank document, opening a recent document, or choose from a template.
- Blank document is generally selected.



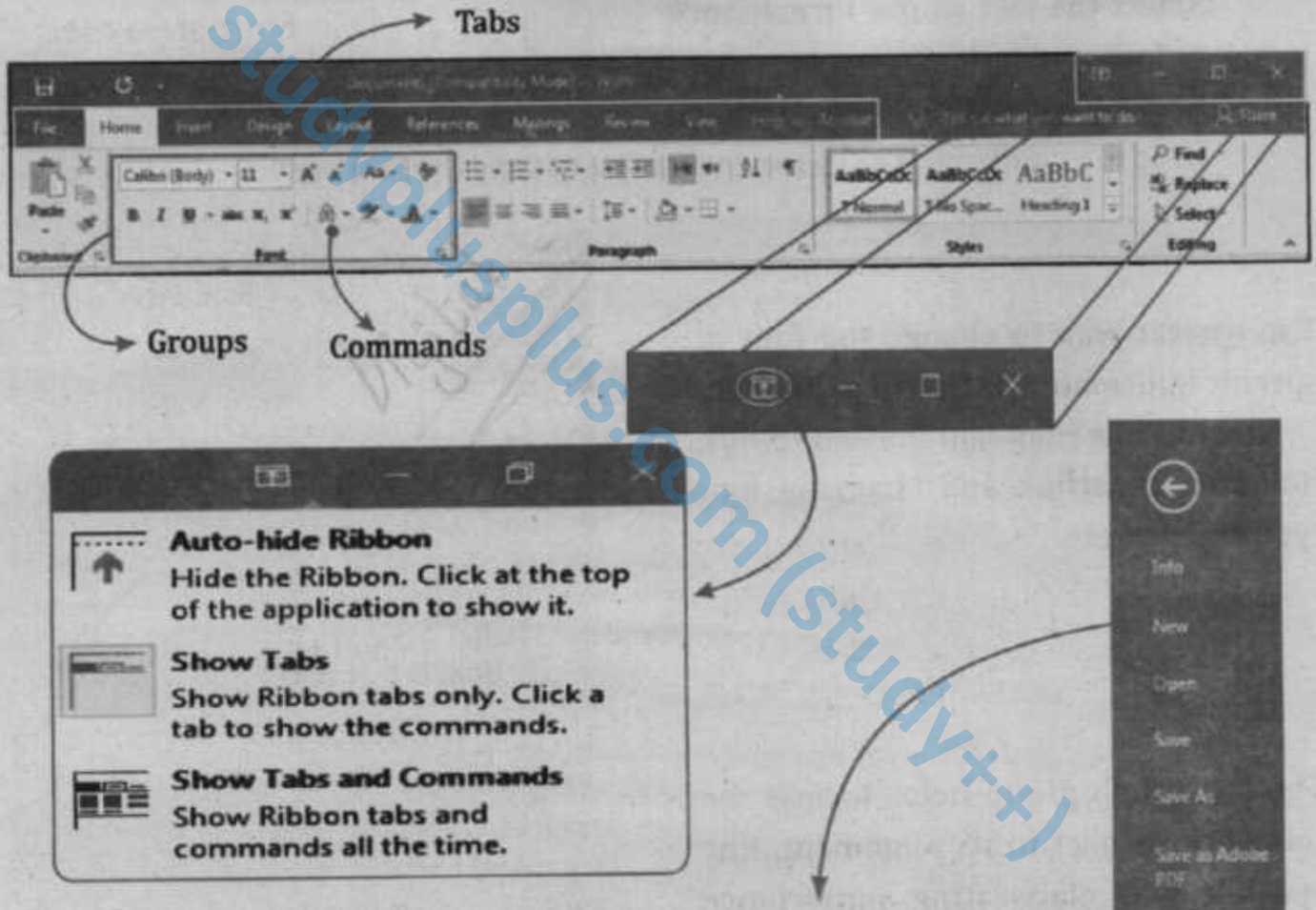
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2.2 Microsoft Word : Interface

2.2.1 Microsoft Word "Ribbon"

Ribbon is a set of toolbars at the top of window that organizes commands into series of tabs.

- **There are three parts in the Ribbon: Tabs, Groups and Commands/Buttons. The ribbon is the work bar located at the top of the document.**
- **Hiding and unhiding the ribbon is optional by clicking on the upper right hand corner of the page.**



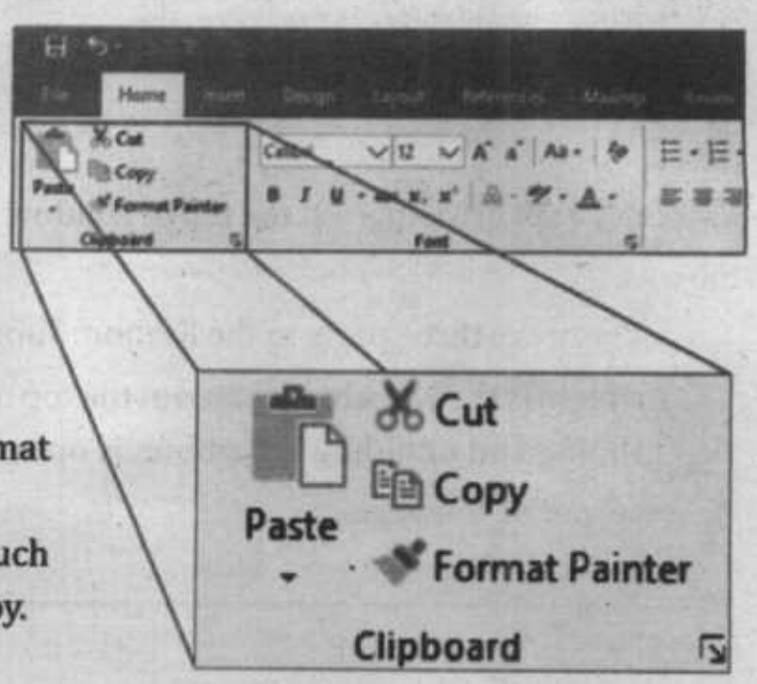
2.2.2 File Menu

- **From the File tab you can open, save or create a new document**
- **You can open existing documents by clicking on Open and browse for your document.**
- **You can use 'Save As' option to save a file with a new filename and /or file format.**

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2.2.3 Home Tab

The Home Tab comprises of the following features:

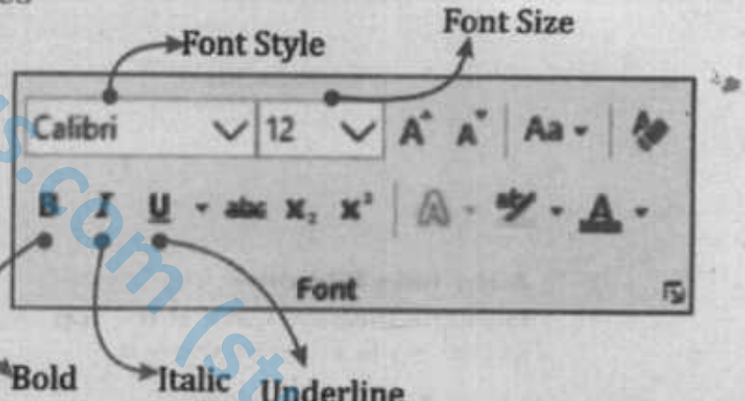


Clipboard Group Provides Following Features:

- Cut, Copy and Paste
- Format Painter helps copy the format of one text to another
  - ➡ Select the text whose format such as font, and style you want to copy.
  - ➡ Click on Format Painter button.
  - ➡ Drag the painter across the text you want to copy the format too.

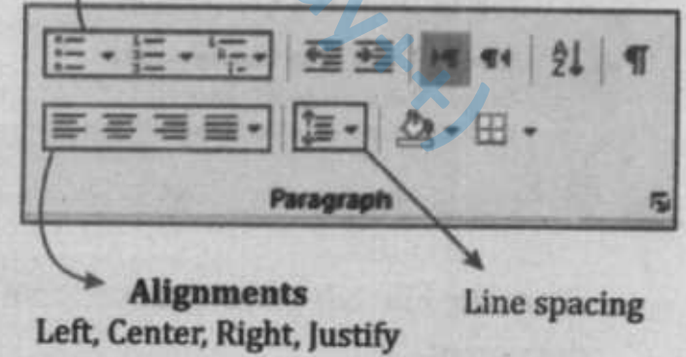
Font Group Provides Following Features

The easiest way to change the font of specific information is by using the given commands like Highlight the text (Bold), Italicize, Underline and changing font type and size, etc.



Paragraph Group Provides Following Features:

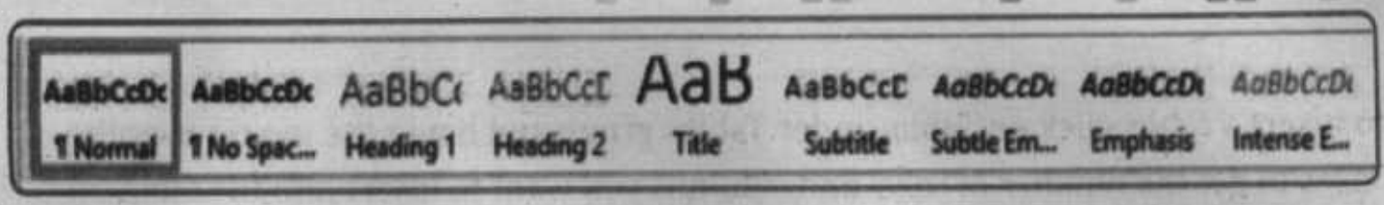
The Paragraph group helps format the text with respect to its alignment, line spacing and elaborating importance through bullet and assigning numbers, etc.



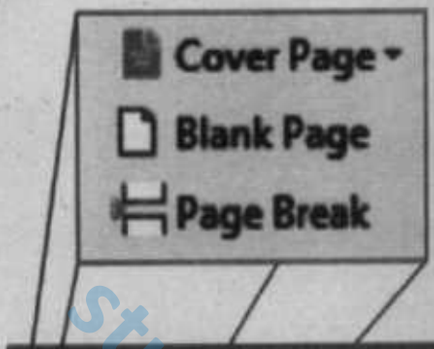
Styles

You have several styles to choose from the Styles menu.
Select the text and click on the style you would like to apply such as a heading, title or subtitle.

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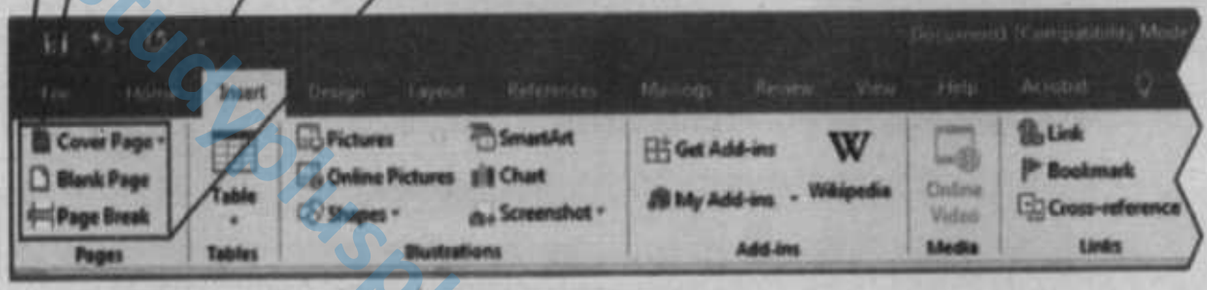


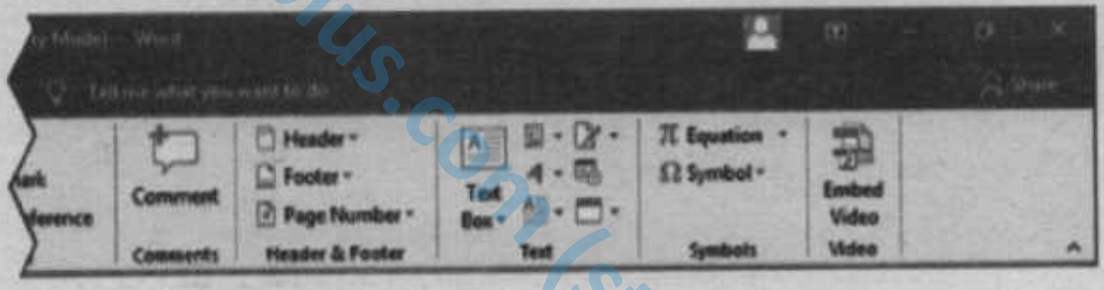
2.2.4 Insert Tab



Inserting a Page Break

- A page break places text on to a new page.
- To put a Page Break into a document, click Page Break under the Pages group.





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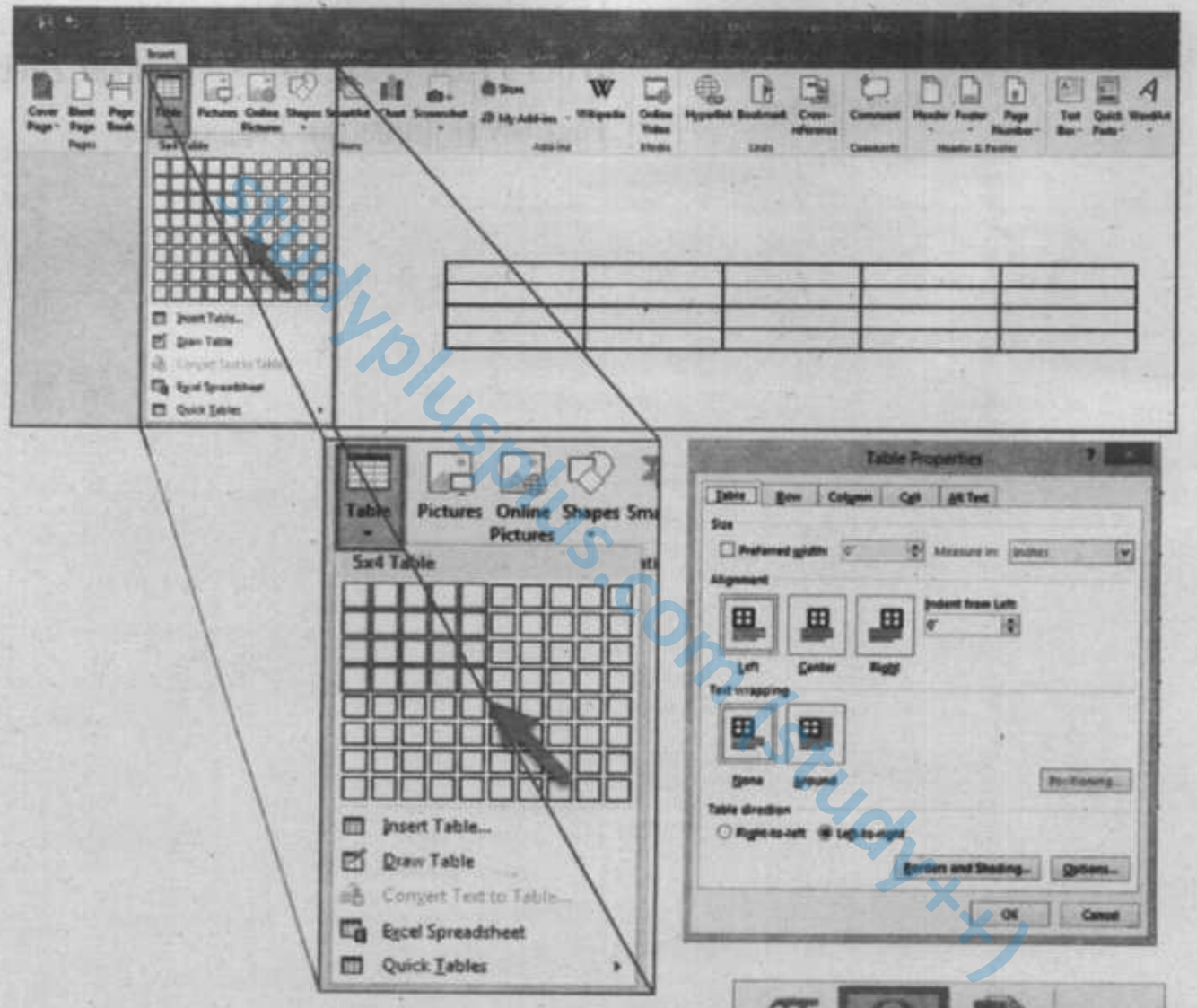
Insert Text Box

1. Select the **Insert** tab, then click the **Text Box** command in the **Text** group.
2. A drop-down menu will appear.
3. Click and drag the mouse anywhere on the document to create the **text box.**
4. The insertion point will appear inside the **text box.**



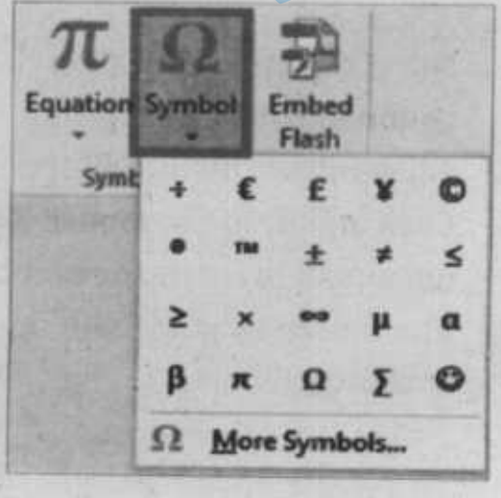
Inserting a Table

To insert a table, click on Table, under Tables group and hover the mouse over the boxes to get the number of rows and columns you want to insert into the table. From the pop-up menu, 'Table Properties' will provide options to adjust table and cells, accordingly.



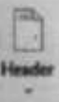
Inserting a Symbol

- Click on the small arrow under the Symbols group and select the symbol you want to insert.
- If the symbol you are looking for is not displayed, select More Symbols

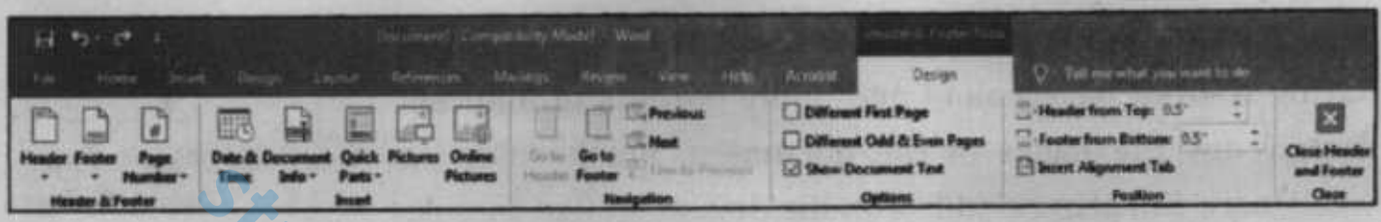


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Inserting a Header and Footer

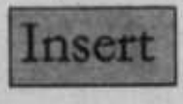
- To add a header, go to Insert → 

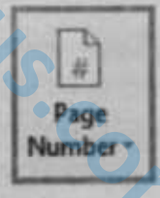
- Choose the type of header you desire
- The Design tab will appear as soon as you begin to type your text into the header.

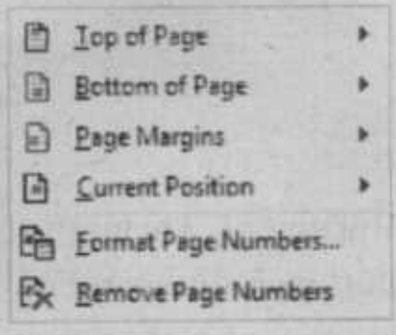


- To add a footer, click on the footer button in the Design tab.
- Once you are done click on: 

Adding Page Numbers

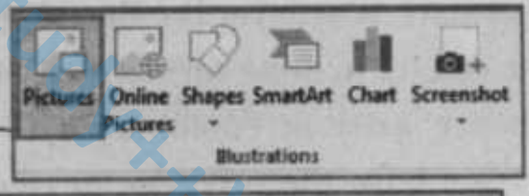
Click on 

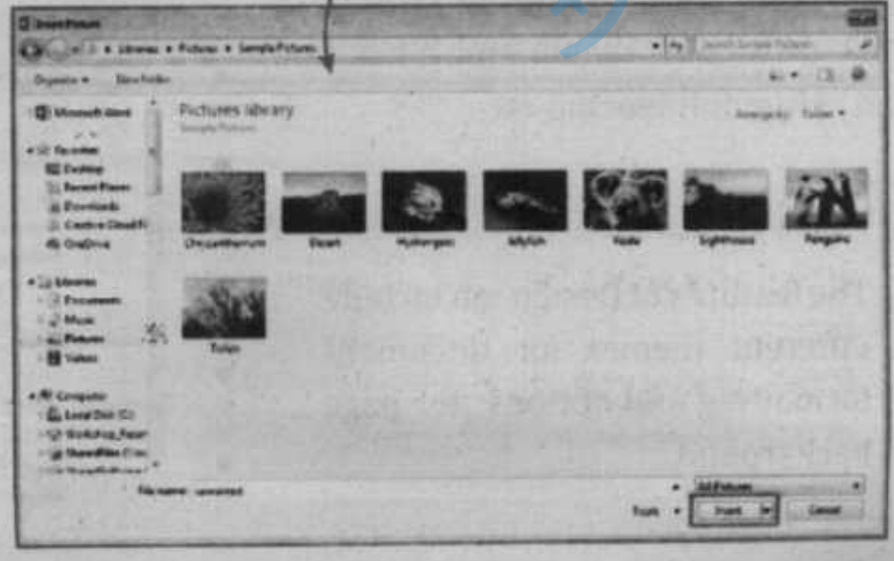
→ 

→ 

Inserting and Formatting an Image

- Click on Pictures in the Insert tab.
- Browse for the image you want to insert into the document and select Insert.





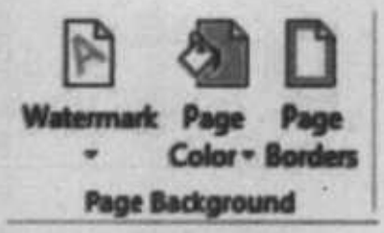
- The image will appear on the document.

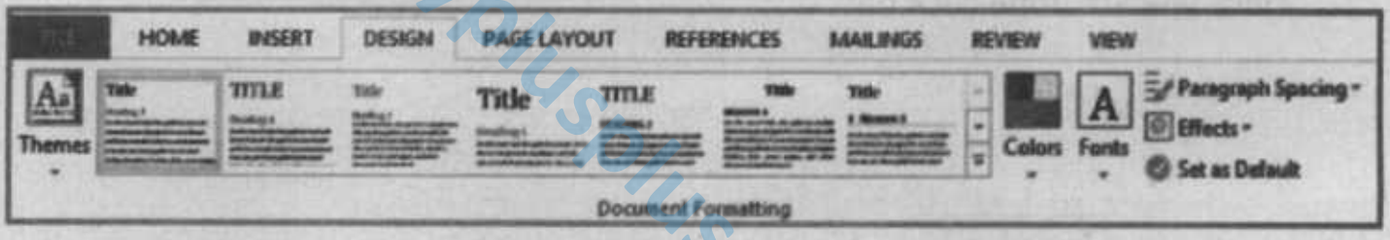
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2.2.5 Design Tab

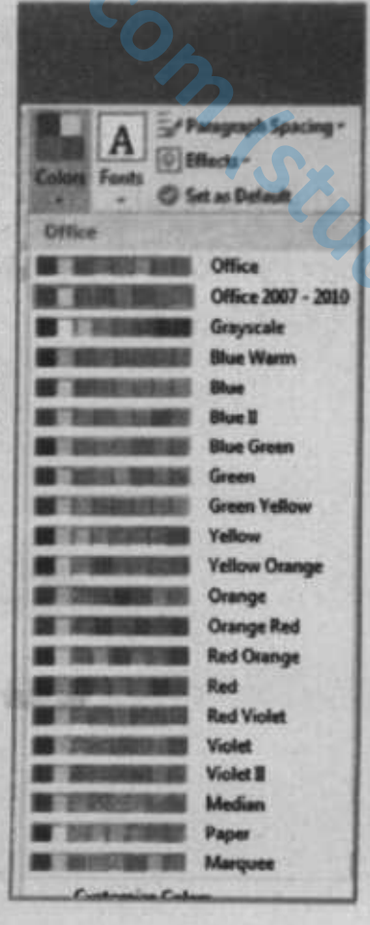
The design tab consists of formats, the layouts and themes for a document, to make it attractive. To make it further appealing, page backgrounds and color schemes can also be applied through the design tab. The main categories in the design tab are Page Background and Document Formatting.

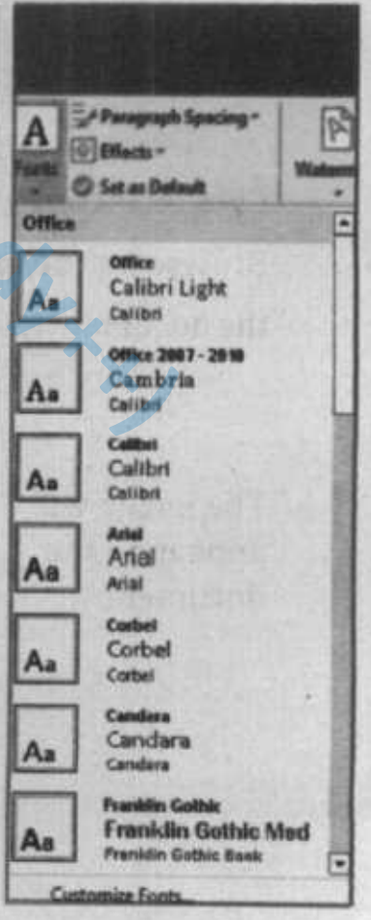
Page Background section provides you with an option of having colored background and apply borders of different designs for the pages of the document. Furthermore, a watermark can also be added on the document like Sample, Copyright Protected, Personal, Private, etc.





Document Formatting supports in document preparation providing the options of a thematic color and style formats. Whenever the theme changes, it results in style formats as well and hence exist in combination. Besides, users have the privilege to customize their own color theme and fonts, line and paragraph spacing, etc.





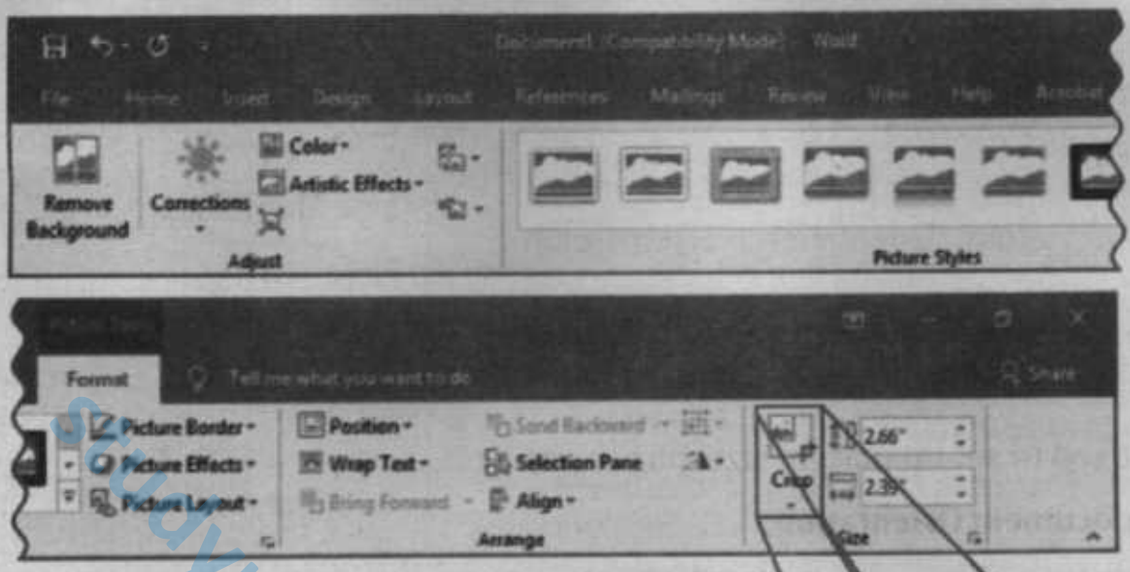
Design tab

The features of Design tab include different themes for document formatting and options for page background.

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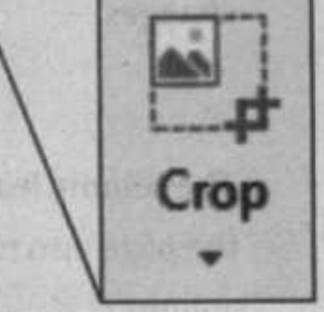
2.2.6 Format Tab

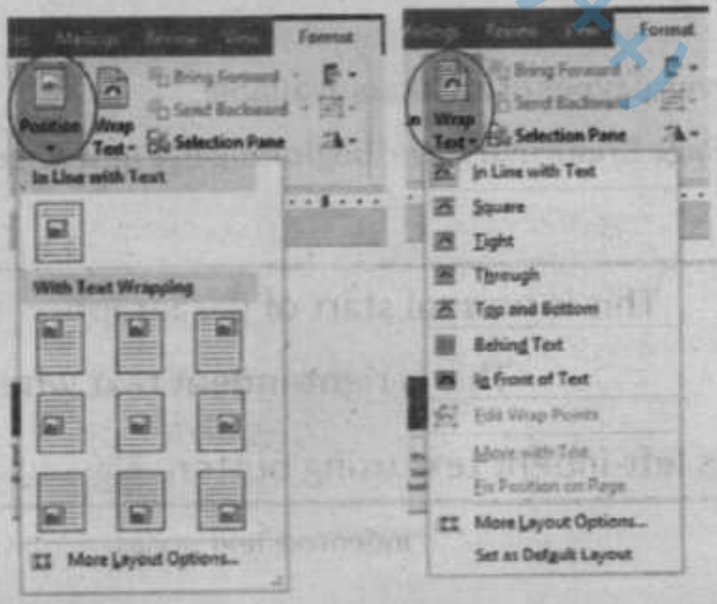
The format tab is used to edit the image. It appears by clicking the image



The images' position can be specifically defined by:

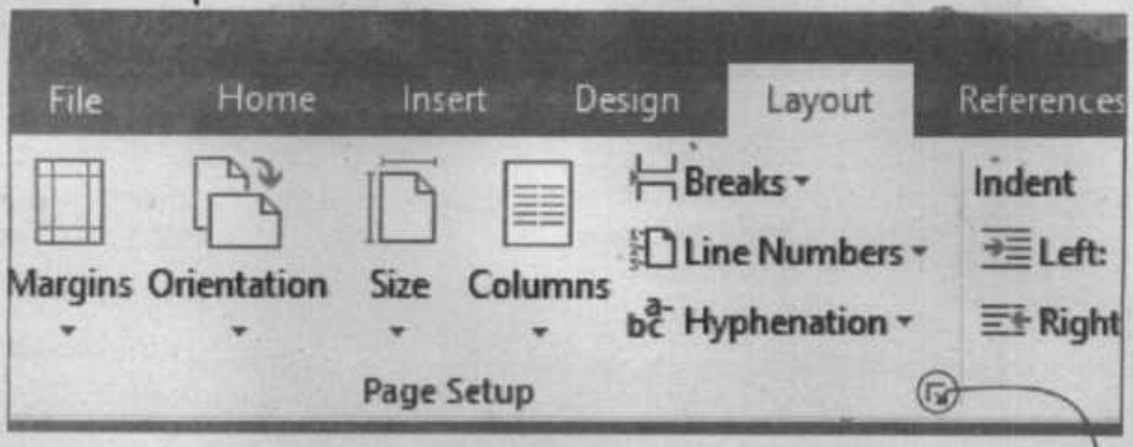
- Arrange Group.
  - Position: Multiple options as per the location of images on the document are available. Any text around it will automatically wrap around the image.
  - Wrap Text: Feature used to set up how text wraps around the image.
  - You can align the image on the page or rotate it.
- Cropping option is also available.
- You can add text in an image by inserting a Text-Box.



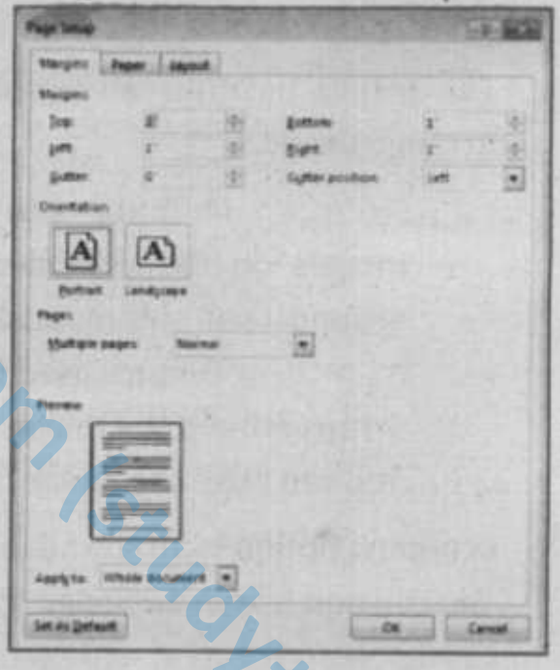


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2.2.7 Layout Tab



- Used to set up margin size, paper size or document Orientation.
- Click on the small diagonal arrow in the lower right-hand corner of the Page Setup group, and the Page Setup dialog box will appear to make necessary changes.



Columns

The column feature allows you to split the page into two, three, left and right columns.

Breaks

- Adding several types of breaks is available.
- Adding a Page Break marks the beginning of a new page.

Indent

This is normal start of paragraph

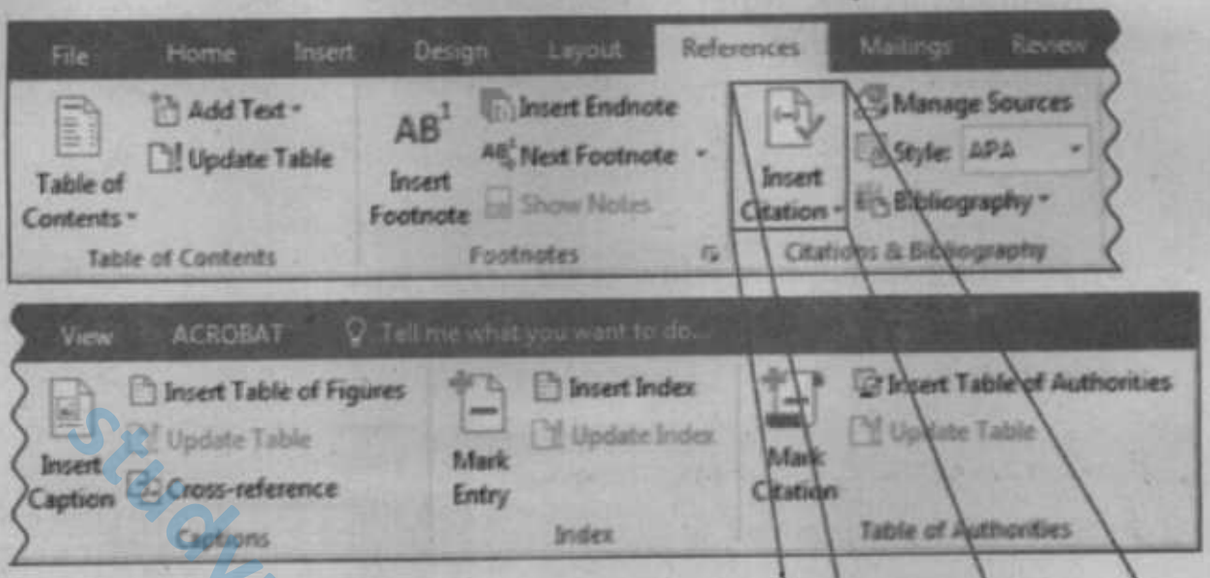
This is right-indent text when is pressed

This is left-indent text using button

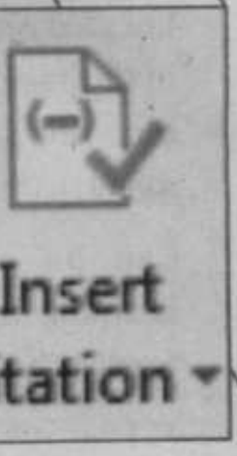
Indented Text styles

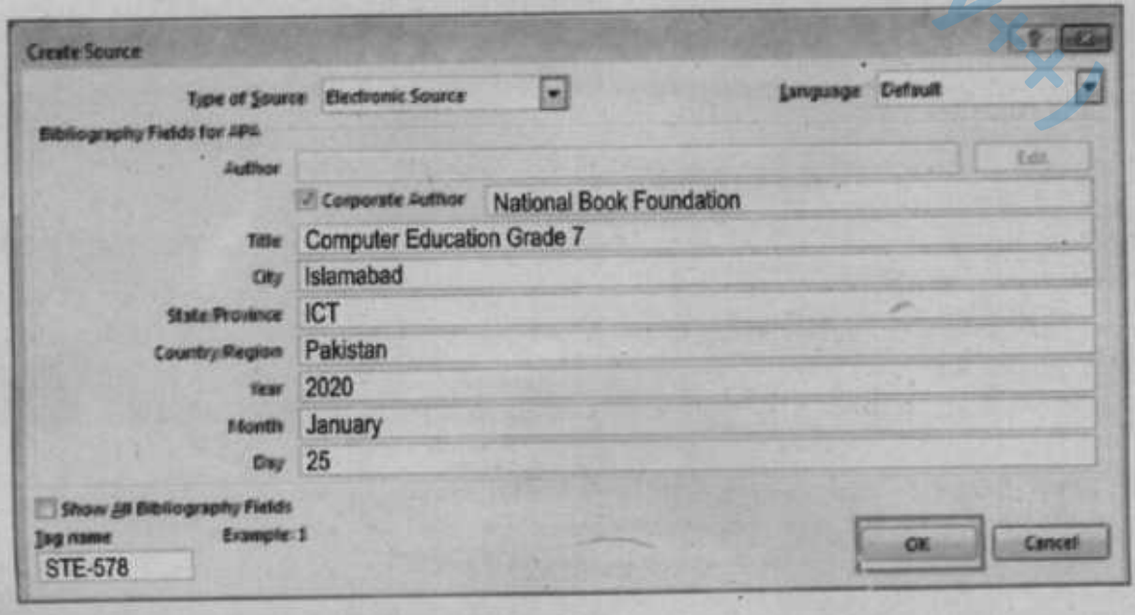
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2.2.8 References Tab



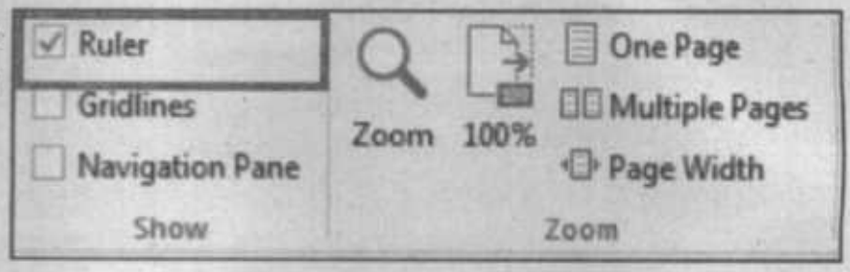
- This tab is mainly used for scholarly papers, writing and publishing purposes, table of content.
- To insert a citation, click on Insert Citation and select Add New Source.
- Type in the information for the required fields and click OK when finished.
- Later, numbered/ bulleted list can be opted and modified as desired.





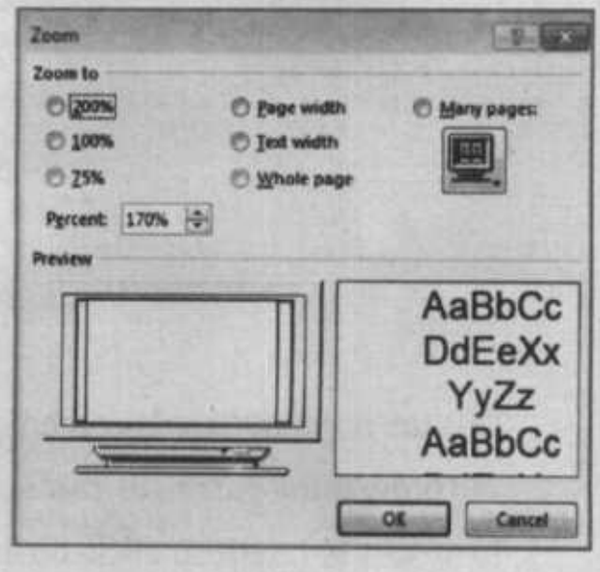
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- To show the ruler on the document, check Ruler on Show/Hide group.



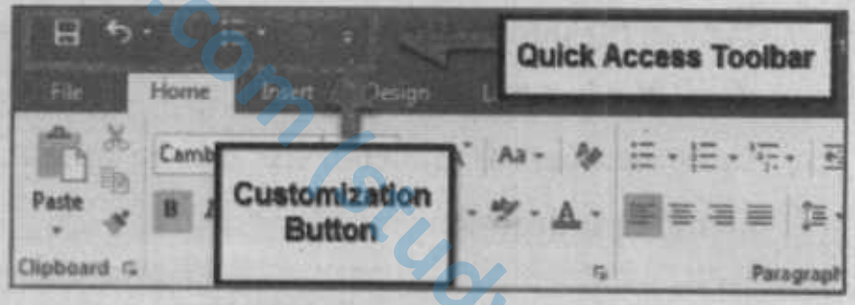
Zoom Group

- By selecting Zoom, a window pops up with a variety of sizes to zoom in or zoom out.



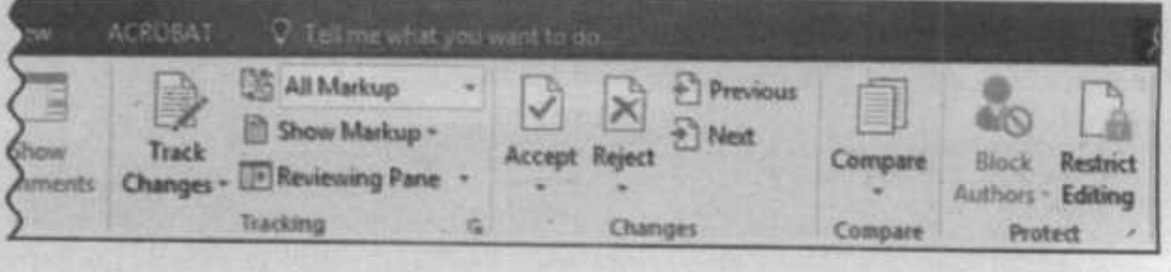
The "Quick Access" Toolbar

- Located on the upper left hand corner of the page, used to save changes made to a file, undo or redo any changes made to the document.
- Can be customized to facilitate the quick access to other buttons.



2.2.9 Review Tab

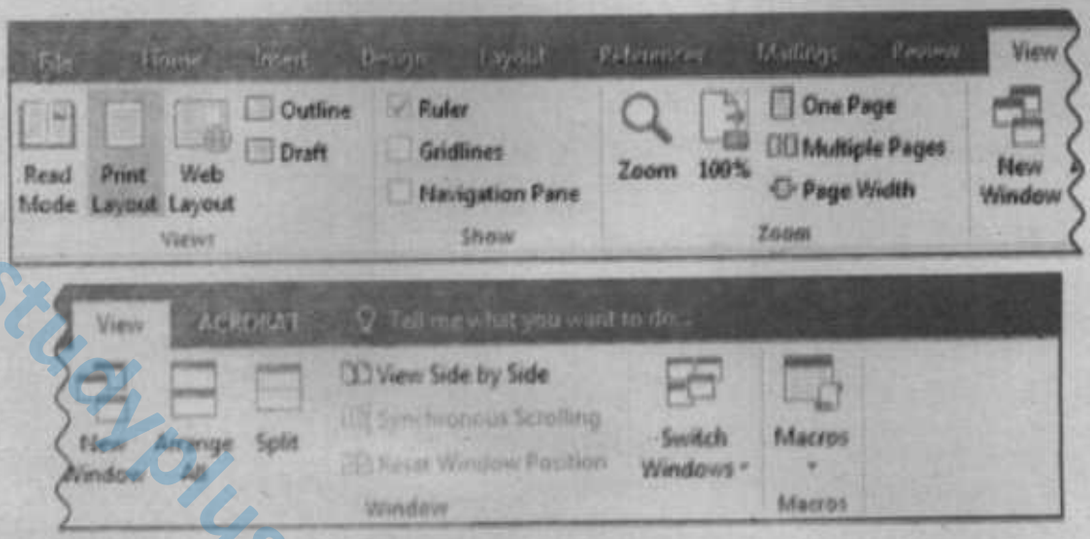




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- Spelling and Grammar, Thesaurus, Word Count can be checked from the Review tab.

2.2.10 View Tab



Views Group

There are three ways to view the screen:

- Read Mode: Splits the screen in order for the document to be viewed in two pages.
- Print Layout: This is the default screen in which documents are viewed on the screen.
- Web Layout: This shows what the document would look like if published as a web page.

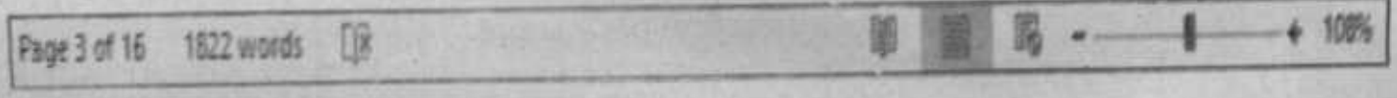
Scroll Bars

A vertical or horizontal bar is commonly located on the far right or bottom of a window that allows you to move the window viewing area up, down, left, or right.



Status Bar

Microsoft Word displays a status bar at the bottom of a Word document. Word status bar displays information such as word count, number of pages, current page etc.



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2.2.11 Some common shortcut keys:

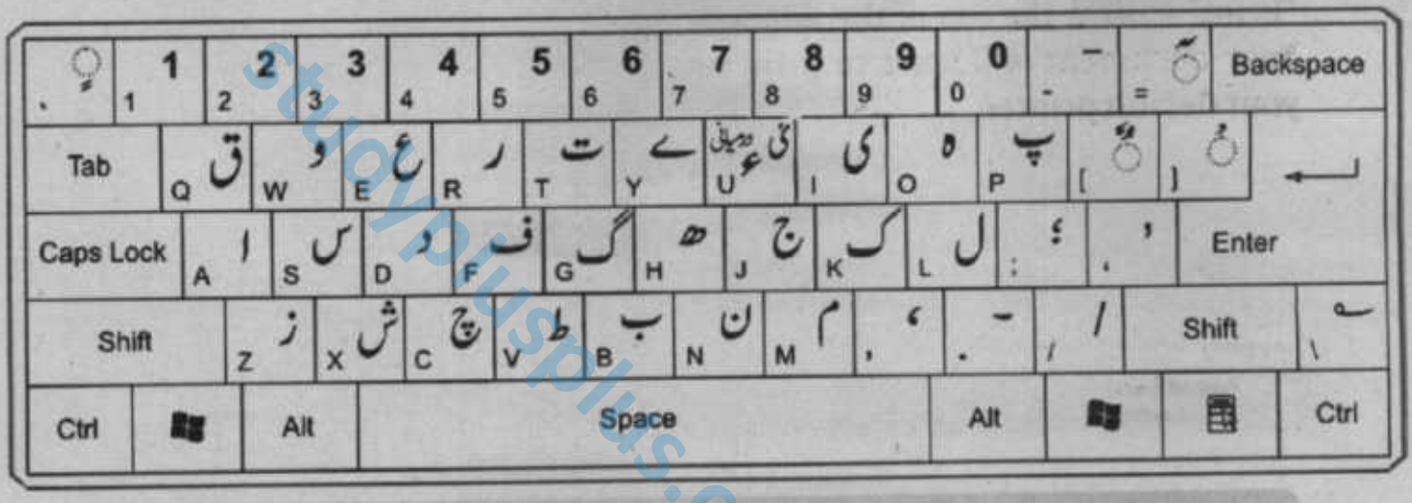
Shortcut Key	Description
Ctrl+A	Select all contents of the document.
Ctrl+B	Bold highlighted selection.
Ctrl+C	Copy selected text, picture, table, etc.
Ctrl+X	Cut selected text, picture, table, etc.
Ctrl+V	Paste copied text, picture, table, etc.
Ctrl+D	Open font window
Ctrl+E	Aligns the line or selected text to the center of the page.
Ctrl+F	Open find box
Ctrl+I	Italic highlighted selection.
Ctrl+J	Aligns the selected text or line to justify the page.
Ctrl+N	Opens new, blank document window.
Ctrl+P	Open the print window.
Ctrl+R	Aligns the line or selected text to the right of the page.
Ctrl+S	Save the open document.
Ctrl+U	Underline the selected text.
Ctrl+W	Close the currently open document
Ctrl+Z	Undo last action
Ctrl+Y	Redo the last action performed.

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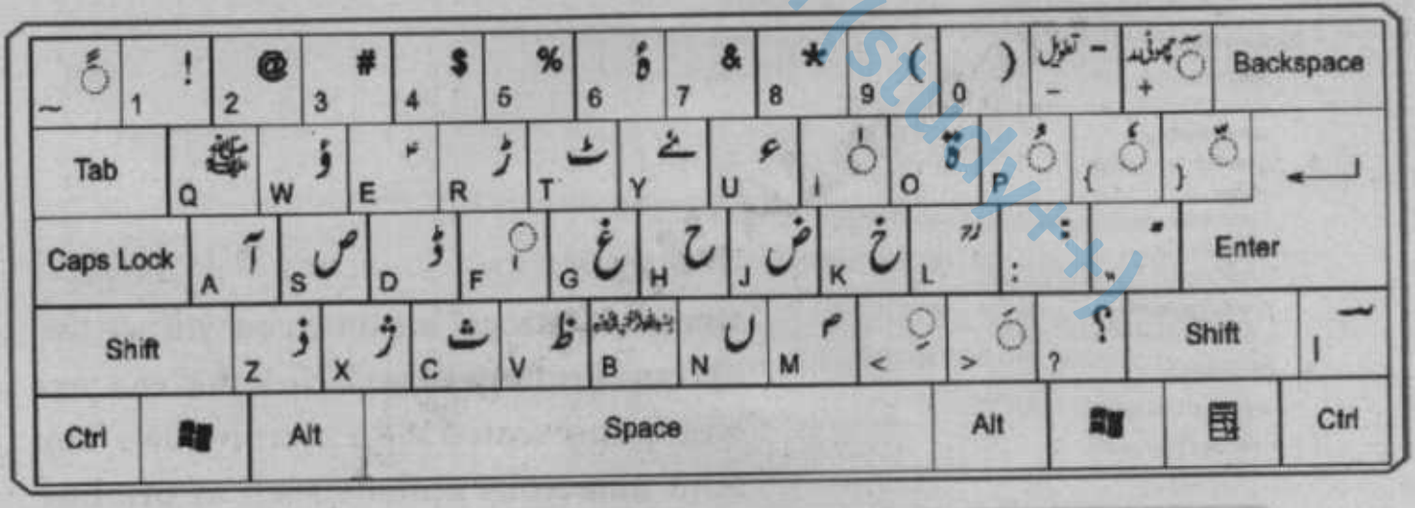
2.3 Urdu Typing



Pak Urdu Installer performs all steps automatically without CD i.e. activates Urdu language support, installs Urdu keyboard layout and installs necessary Urdu Fonts. After installing Pak Urdu Installer, your computer will support complete Urdu then you can easily read and write Urdu at any place. To choose from different styles 'Ctrl+D can be pressed and all available fonts are shown.



Pak Urdu Installer key board with Caps lock off or without shift key



Pak Urdu Installer key board with Caps lock on or holding shift key

Activity

Students may explore Urdu Typing Options in Microsoft Word.

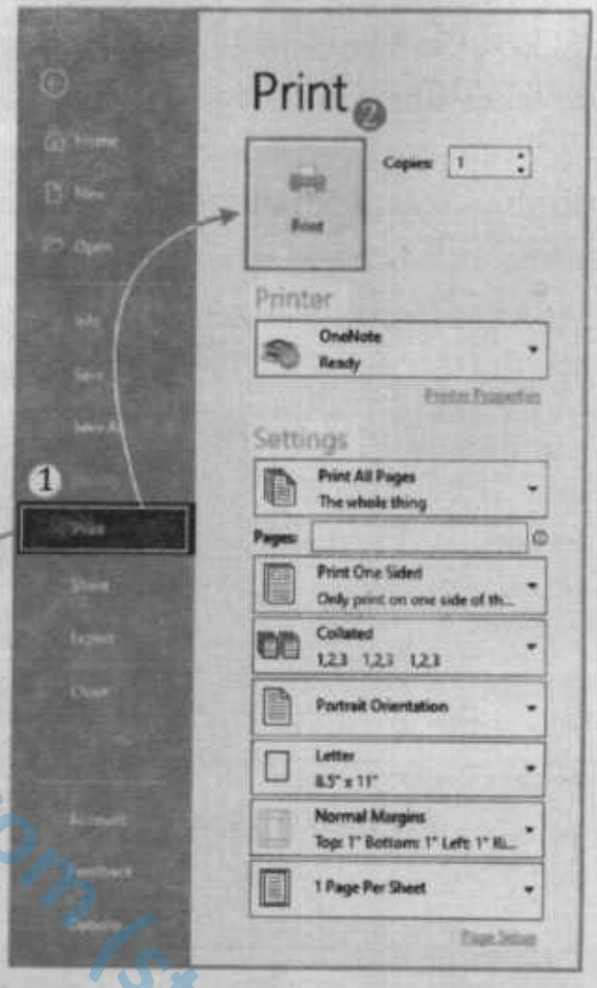
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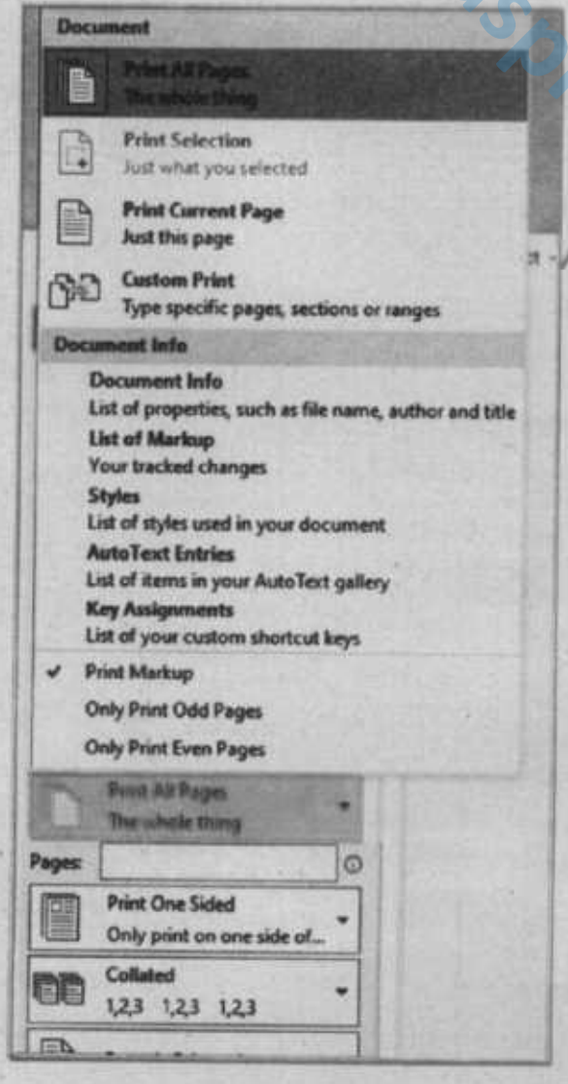
2.4 Using Different Print Options

Option # 1

The Standard Print

To print a document just click **"File"**, click the **"Print"** tab and then the big "Print" icon at the top of the window. Your document will start to print on your default printer.



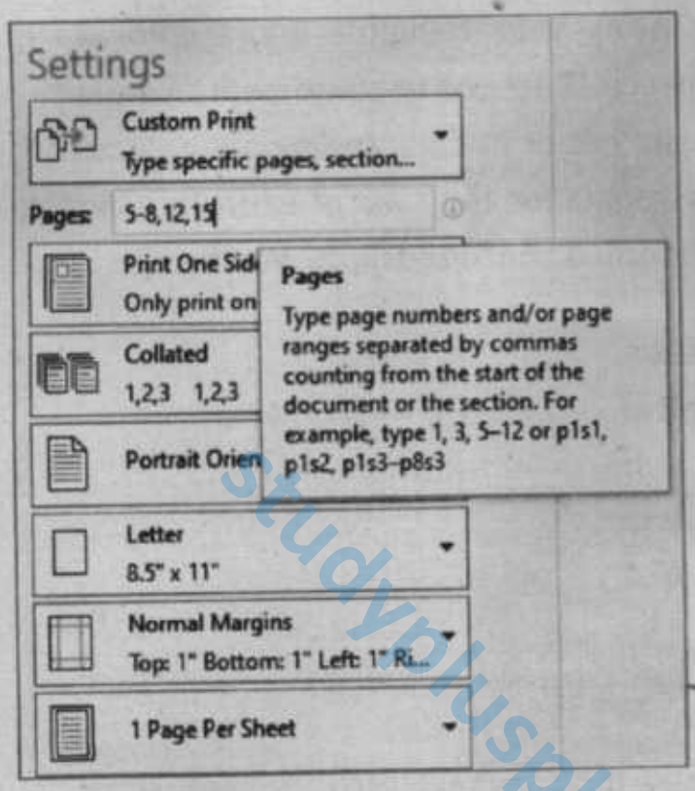


Option # 2

The Print All Pages Dropdown Options

Under "Settings" heading you will see the option "Print All Pages", click this and you will be presented with a drop-down box with numerous options such as printing just the current page, or choosing just to print either the odd or even pages.

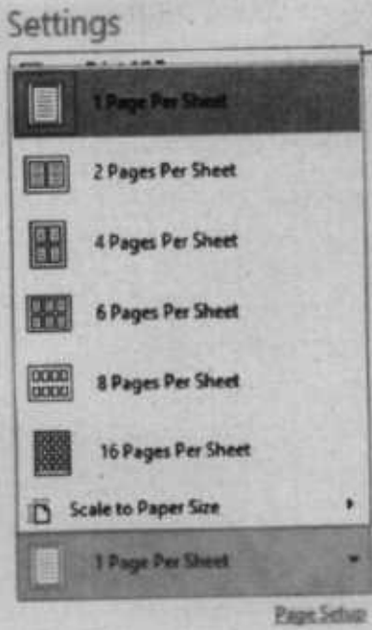
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Option # 3

Printing Only Specific Pages

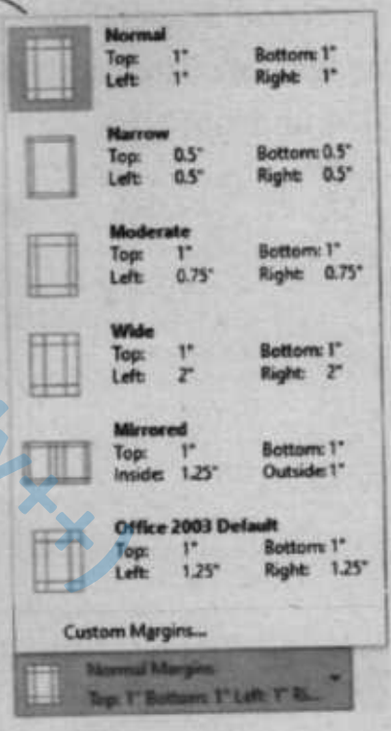
In Custom Print drop-down option is another option called "Pages", next to this you can enter the pages that you want to print. For example, you can either enter an individual page, or multiple pages separated by commas, or enter a range indicated by a hyphen between numbers.

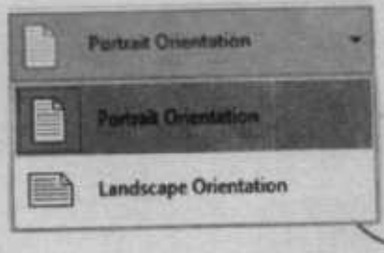


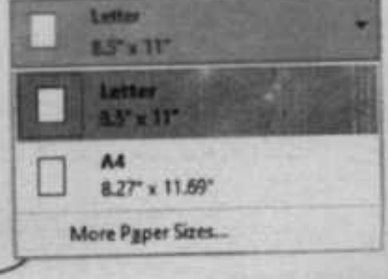
Option # 4

Other Advanced Options

- Page orientation, whether it is portrait or landscape.
- The final option in the list allows you to print multiple sheets per page which can be useful if you are printing notes and want to save on paper.







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2.5 Multimedia Presentation

Presentations are an effective way to convey your thoughts and opinion to the audience, rather than traditional oral speech. The use of multimedia content in presentations not only helps the audience in better understanding but enhances the standard of the session. Similarly, in classrooms for the sake of education and skill development, multimedia presentation is adopted and found quite worthwhile.

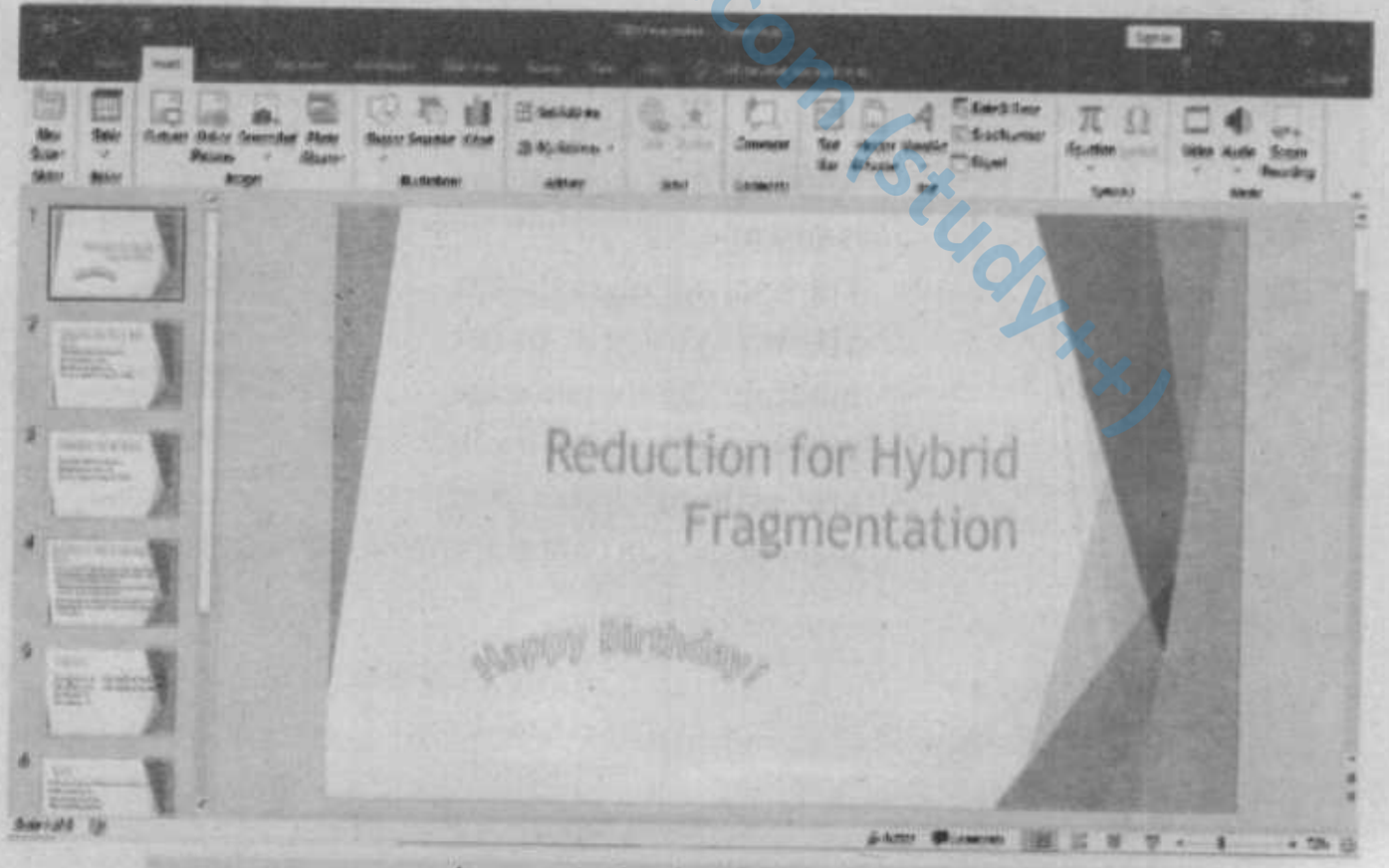
Multimedia presentation includes information presented with slides, video, or digital representations and includes sound which might be narrative, music or sound effects. It is mostly used for business and school presentations.



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2.5.1 Working with PowerPoint

Microsoft PowerPoint, presentation software includes text, pictures, animations and images, etc. Text can be formatted in the same way as in Microsoft Word including color, size, and font type.



A presentation in MS PowerPoint

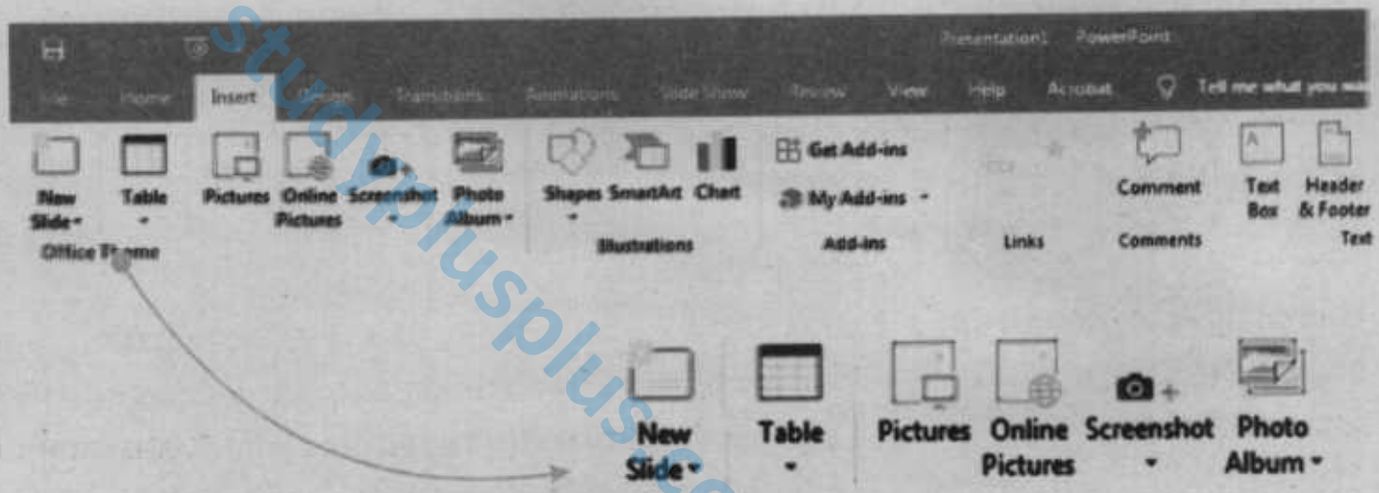
2.5.2 How to create or add a Slide/Objects in Microsoft PowerPoint?

In **Microsoft Powerpoint**, a presentation is made up of multiple slides. There are several ways to create or add a slide in a PowerPoint presentation.

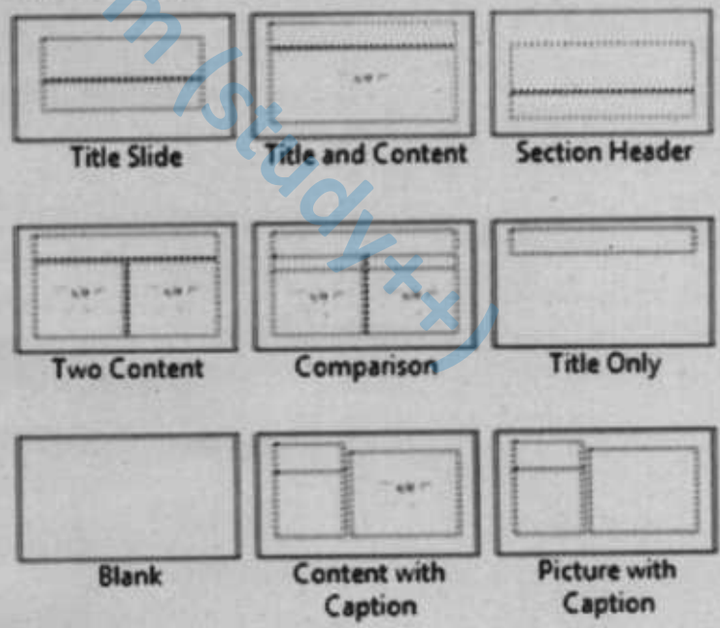
Insert new slide

To insert a new slide into a presentation, follow the steps below:

1. In the MS PowerPoint ribbon on the Home or Insert tab, click the New Slide option.



2. In the drop-down menu that opens, select the type of slide to insert. The new slide will be edit into the presentation where you clicked in step 1 above.



Tip

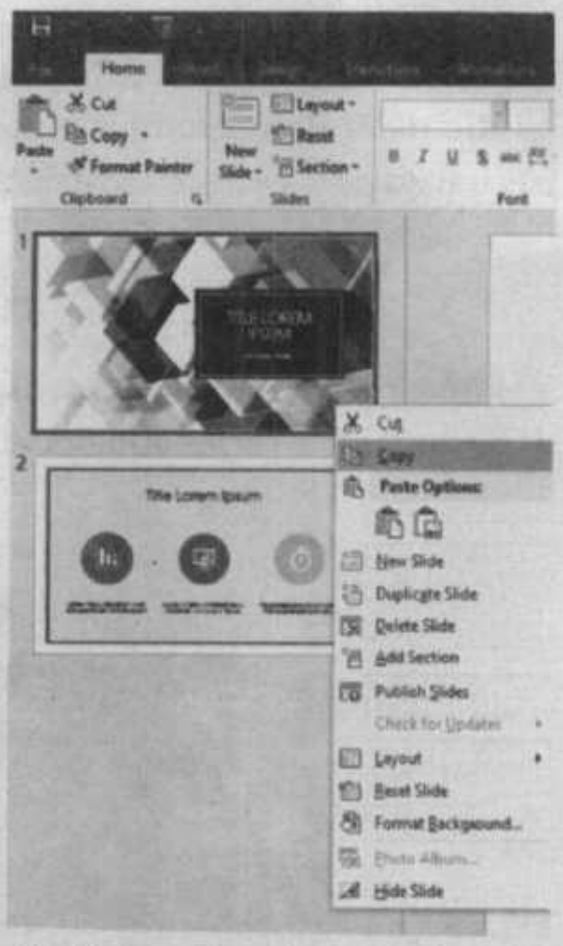
A Microsoft PowerPoint file is saved as a .ppt or .pptx file extension

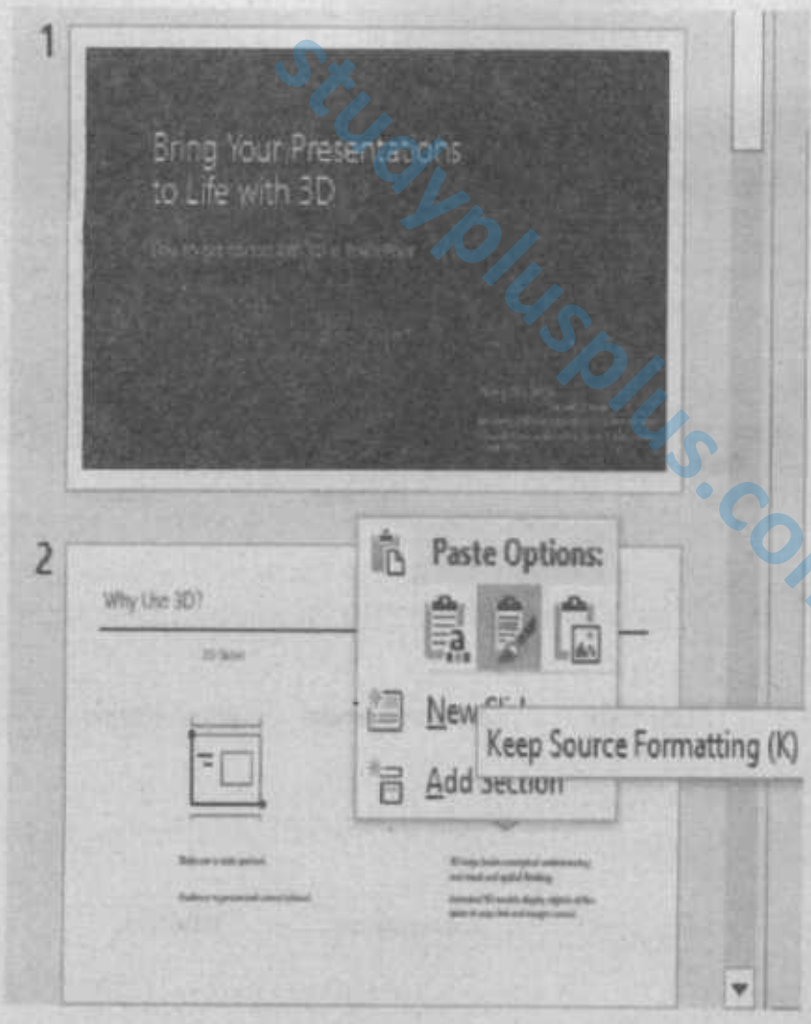
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Copy and paste existing slide

To add a copy of an existing slide to a presentation, follow the steps below:

1. In the slide preview pane on the left, find the existing slide you want to copy.
2. Using your mouse, right-click on that slide and select Copy in the pop-up menu.





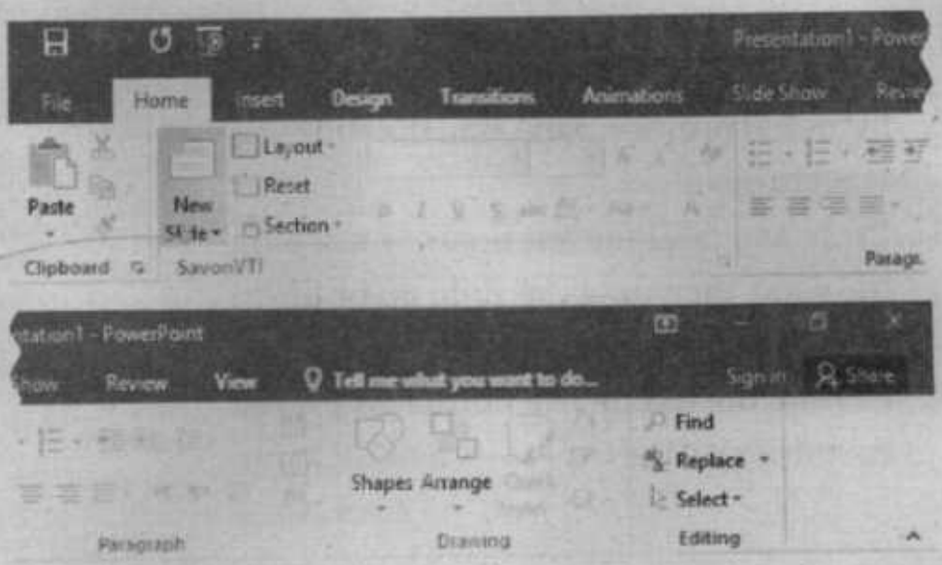
3. Determine where you want to add the copied slide. Right-click on the slide above where you want to paste the copied slide.
4. In the pop-up menu that appears, in the Paste Options section, click the middle paste option icon to paste the slide. The middle paste option will paste the slide using the same formatting as the slide you copied.

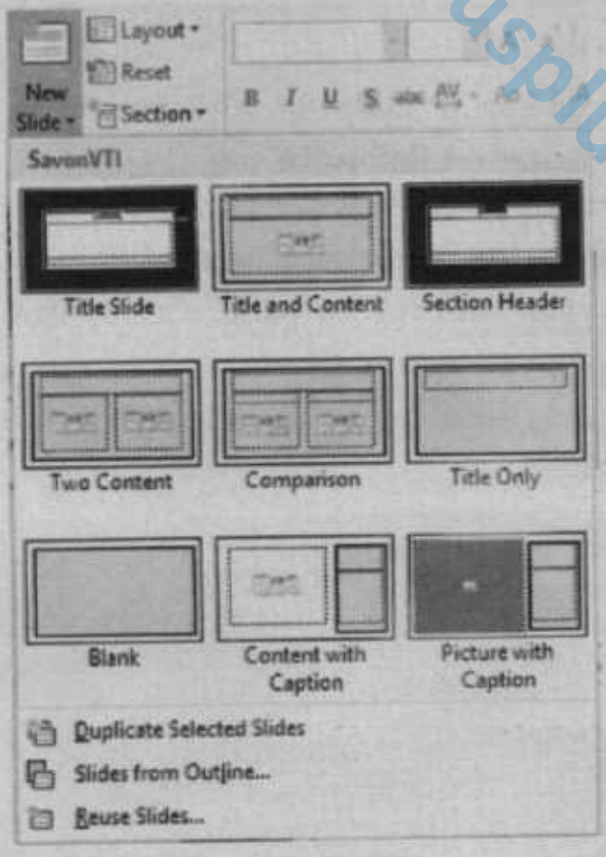
Insert slide from another presentation

To add a slide from another presentation, follow the steps below:

1. In the slide preview pane on the left, left-click with your mouse in-between two slides where you want to insert a slide.
2. In the PowerPoint ribbon, on the Home or Insert tab, click the New Slide option.

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3. In the drop-down menu that opens, click the Reuse Slides option at the bottom.
4. In the Reuse Slides pane that opens on the right, click the Browse button and select Browse File.
5. Find the PowerPoint presentation file that contains the slide you want to add to the currently open presentation, and click the Open button.
6. A preview of the slides is displayed below the Browse option. Left-click on the slide you want to insert into the currently open presentation. A new slide will be inserted, with text from the selected slide included in the new slide.
7. To also apply the formatting of the selected slide to the newly inserted slide, right-click on the selected slide and select Apply Theme to Selected Slides.

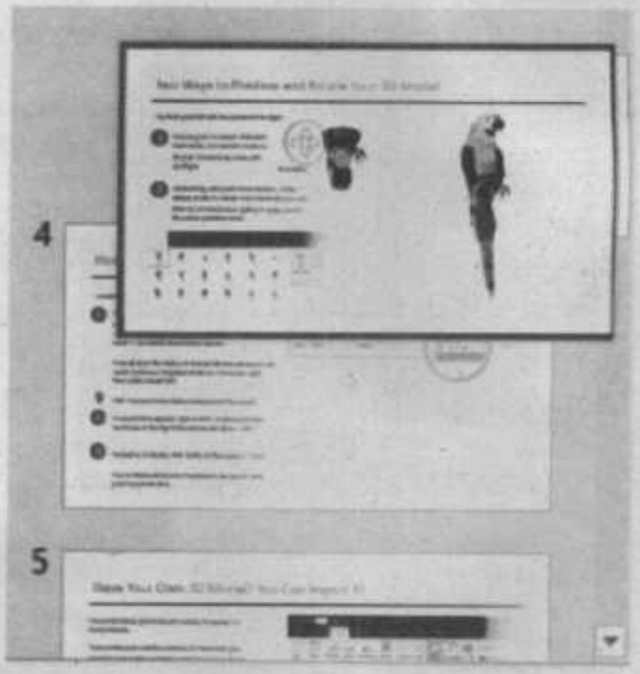
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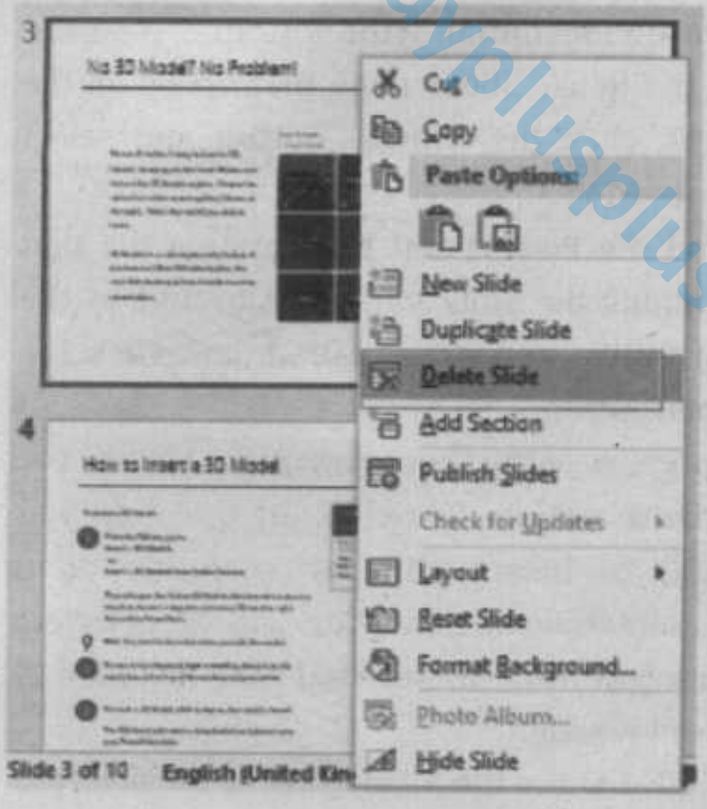
Move a slide

To move a slide to another location in a PowerPoint presentation, follow the steps below:

1. Open the PowerPoint presentation.

2. In the left preview pane, find the slide you want to move.
3. Press and hold the left mouse button on the slide, then drag the slide up or down to where you want to move it.
4. Release the left mouse button when you have dragged the slide to its new location.





Delete a slide

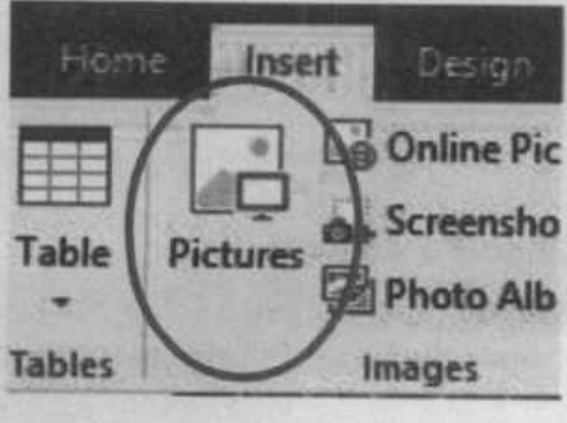
To delete a slide in a PowerPoint presentation, follow the steps below:

1. Open the PowerPoint presentation.
2. In the left preview pane, click on the slide you want to delete.
3. Press the delete key to delete the slide.

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How to insert a picture in Microsoft PowerPoint

Adding pictures to a Microsoft PowerPoint presentation can be useful in making it more clear and understandable. Pictures can also help to add excitement and draw interest to the presentation.



To add a picture to a PowerPoint slide, follow the steps below:

1. Open a PowerPoint presentation.
2. Click the Insert tab on the Ribbon bar at the top.
3. In the Images section, click the Pictures icon.
4. In the Insert Picture window, find and select the picture file you want to insert, then click OK.
5. After inserting the picture, you can move the picture to the desired location on the slide.
6. Repeat the steps above to insert pictures on additional slides.

Tip

To make presentation beautiful, additional pictures can be downloaded by clicking the "Online Pictures" icon.



How to add a video to a Microsoft PowerPoint presentation

Microsoft PowerPoint has built-in features that allow a video to be played from a slide. Users can insert a video into the slide itself or link to an external video source on the Internet. To add video follow the steps below:

1. Open the Microsoft PowerPoint program.
2. Select the slide where you want to insert the video.
3. In the Ribbon menu bar at the top of the program window, click on the Insert tab.
4. On the Insert tab, click the Video option, then click the "Video on My PC" sub option (as shown in picture).
5. In the Insert Video window, navigate to where the video file is located on your computer, select it, and click the Insert button.
6. The video can be played by clicking the Play icon.



Add Internet video link to a slide

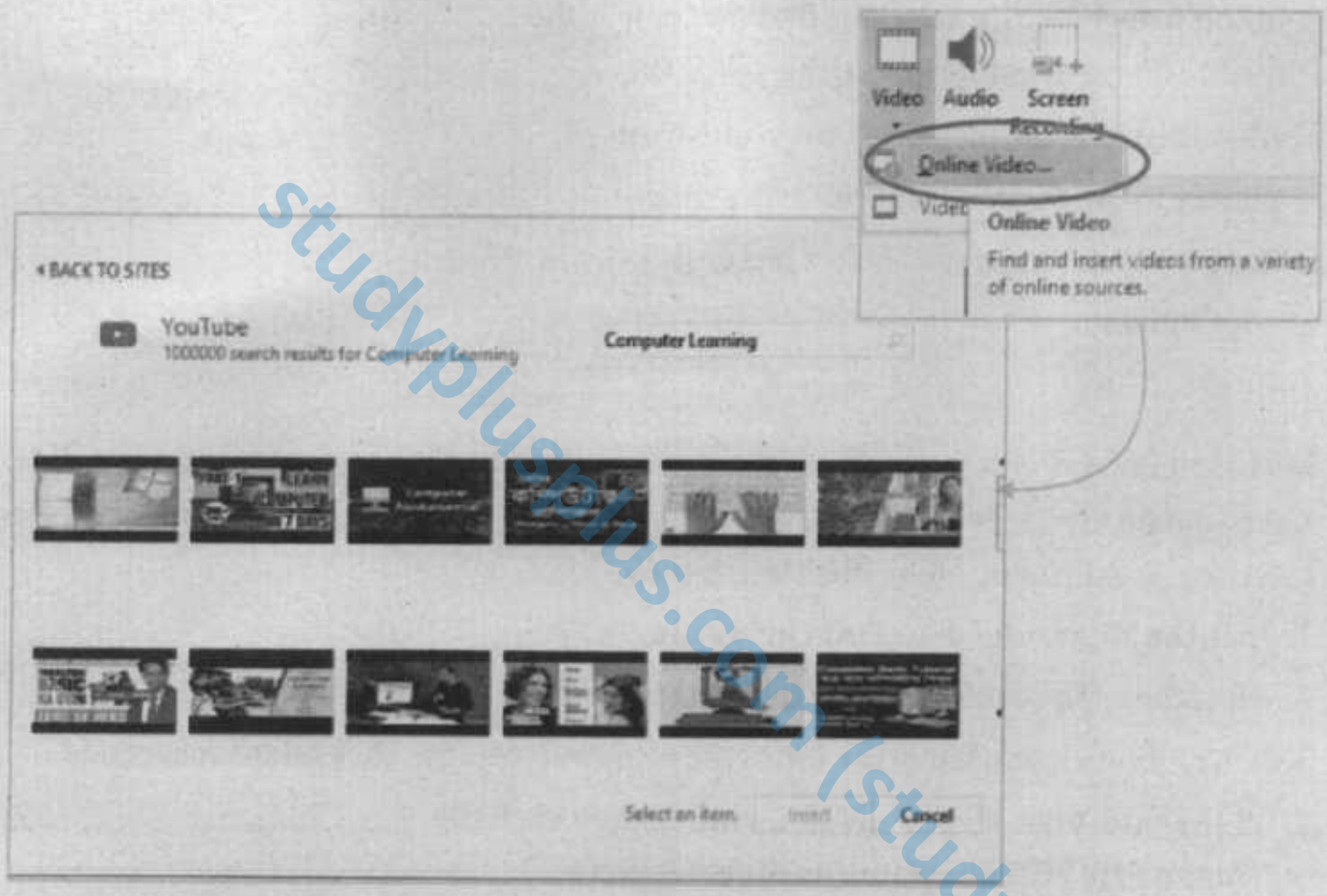
If you would prefer to add a hyperlink to a video on the Internet into a slide, rather than the video itself, follow the steps below:

1. Open the Microsoft PowerPoint program.
2. Select the slide to which you'd like to add the link.



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3. Type a name for the video link. For example, you can type "Link to video" on the slide, which will become a clickable link after following the rest of the steps below.
4. Select and highlight the name you typed for the video link.
5. In the Ribbon menu bar at the top of the program window, click on the Insert tab.
6. On the Insert tab, click the Hyperlink option (circled in red).



7. In an Internet browser, find the Internet video to which you want to link, and then copy its URL.
8. In the Insert Hyperlink window, paste the video URL into the Address field and click the "OK" button.
9. A clickable link will be created that plays the desired video.

Tip

The Internet connection may be slow, unstable, or stops. Therefore, it is recommended to download the video to a computer or flash drive, and then insert the video into the PowerPoint slide.

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How to insert a sound file into a PowerPoint presentation?

Adding sound to a Microsoft PowerPoint presentation can be useful in making a presentation more interesting and engaging. PowerPoint supports all common types of sound files including MP3 (MPEG-1 Audio Layer III), WAV (Waveform Audio File Format), FLAC (Free Lossless Audio Codec), MIDI (Musical Instrument Digital Interface) and WMA (Windows Media Audio). To insert a sound file into a PowerPoint slide, follow the steps below:

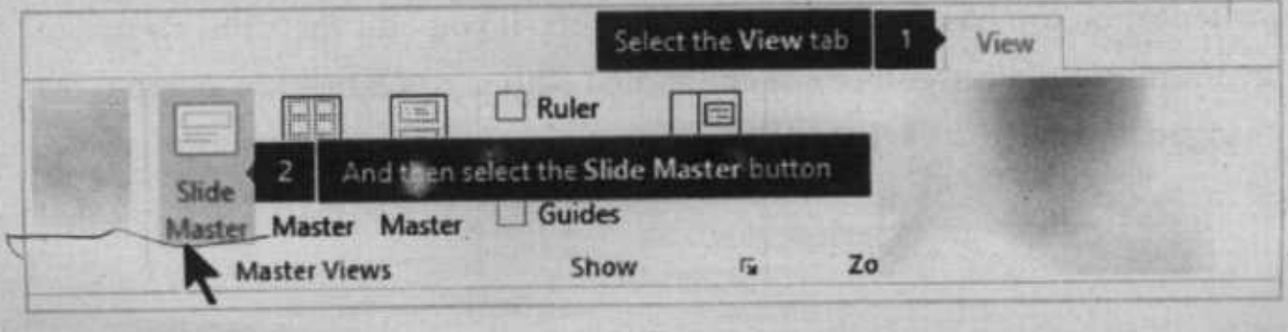
1. Open a PowerPoint presentation.
2. Click on the Insert tab.
3. In the Media section on the Ribbon bar, click the Audio icon.



4. In the drop-down menu that opens, select the Audio on My PC option.
5. In the Insert Audio window, find and select the sound file you want to insert into the PowerPoint slide, then click OK.
6. After the sound file has been inserted, an icon that looks like a speaker with sound coming out of it will appear. You can move the sound icon to another location on the slide.
7. Repeat the steps above to insert sound files on additional PowerPoint slides as desired.

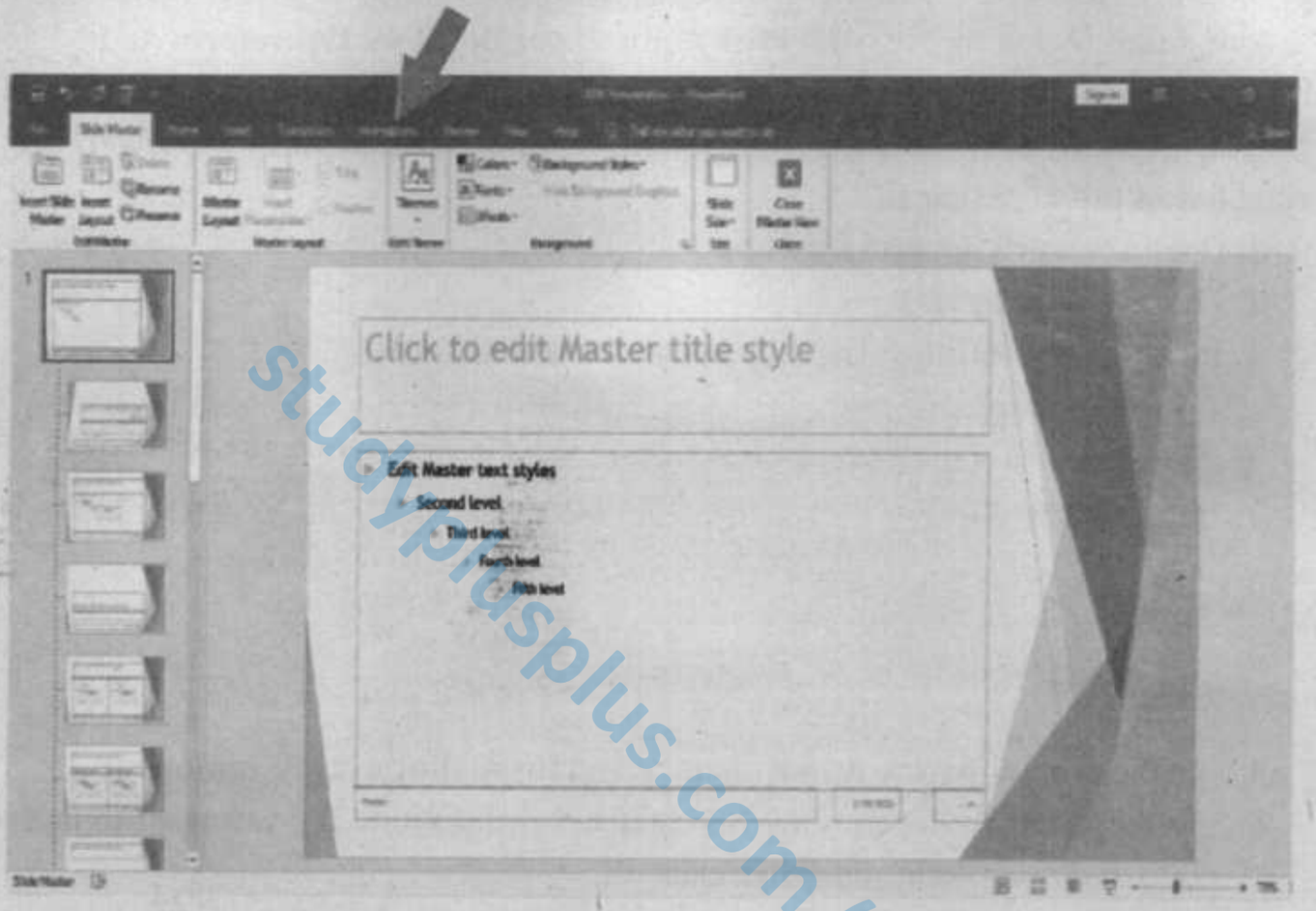
2.5.3 Slide Master

When you want all your slides to have the same fonts and images (such as logos), you can make those changes in one place the Slide Master, and they will be applied to all your slides. To open Slide Master view, on the View tab, select Slide Master.



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The master slide is the top slide in the thumbnail pane on the left side of the window. The related layout masters appear just below the slide master .



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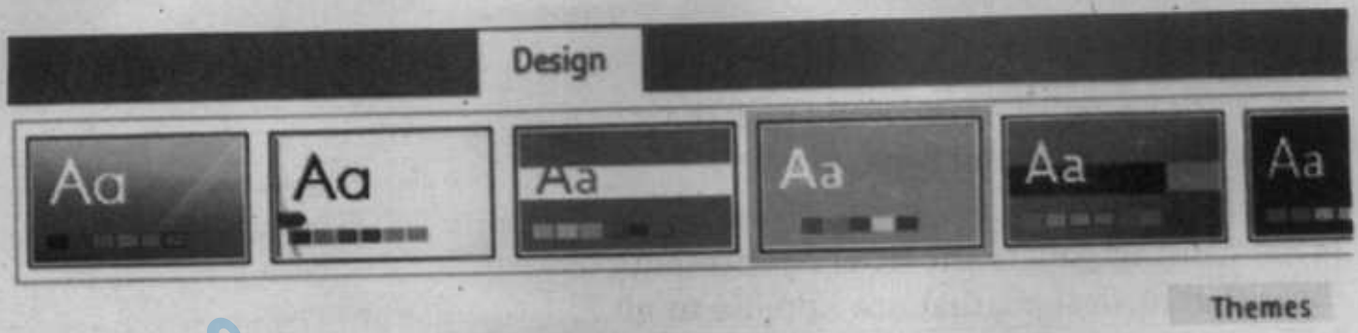
When you edit the Slide Master, all slides that are based on that master will contain those changes. Features like, animation to text and images can be added by selecting the text/image and clicking on the 'Animation' tab and selecting desired event when that animation should occur.

Tip

It's a good idea to edit your slide master and layout masters before you start to create individual slides. That way, all the slides that you add to your presentation are based on your custom edits. If you edit the slide master or layout masters after you create individual slides, you'll need to reapply the changed layouts to the existing slides in your presentation in Normal view.

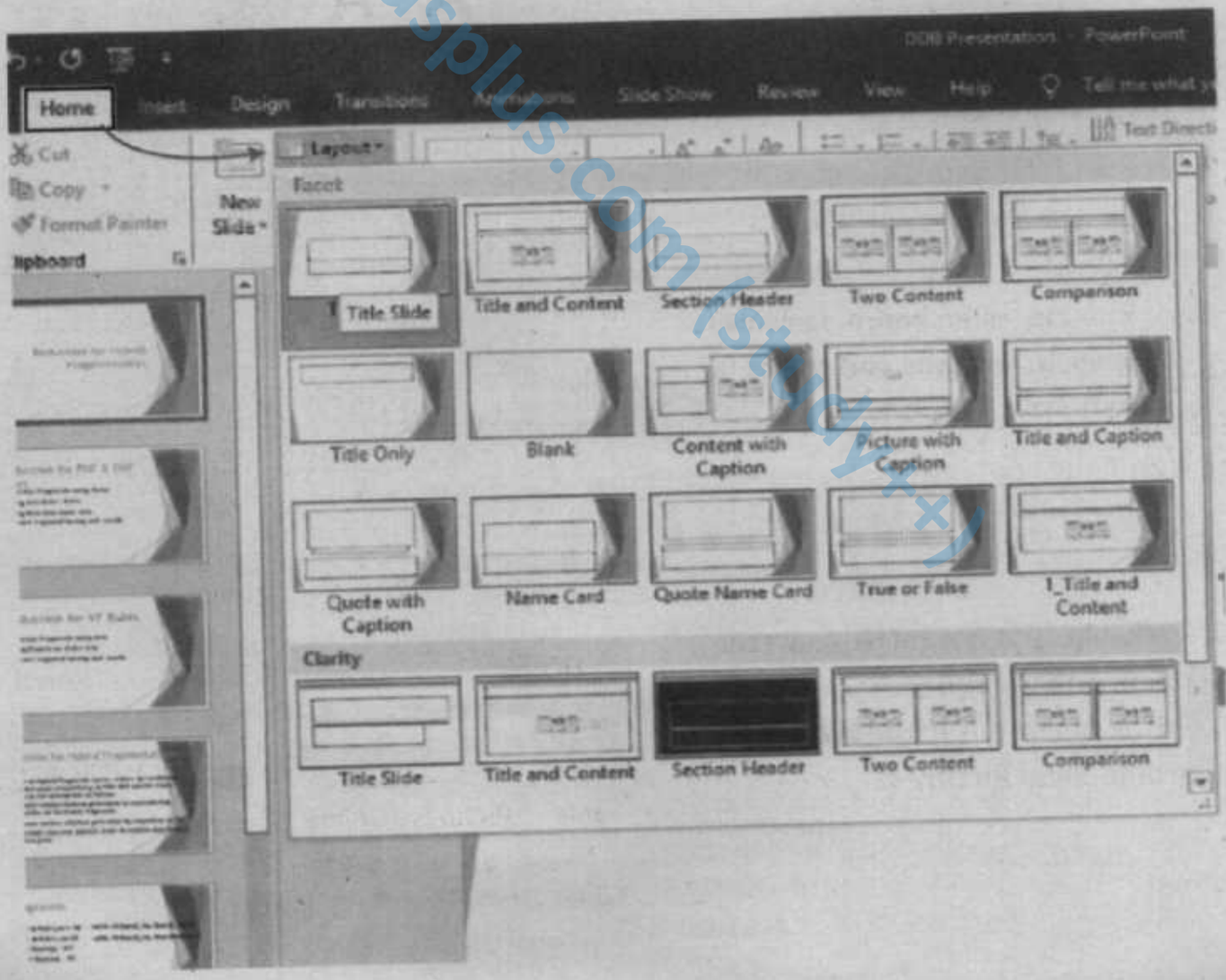
Themes

A theme is a palette of colors, fonts, and special effects (like shadows, reflections, 3-D effects, and more) that complement one another. Pre-designed themes are available to you on the Design tab in Normal view.



Slide Layouts

You change and manage slide layouts in Slide Master view. Every theme has several slide layouts. You choose the layouts that best match your slide content; some are suitable for text and some for graphics.



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Insert Word Art

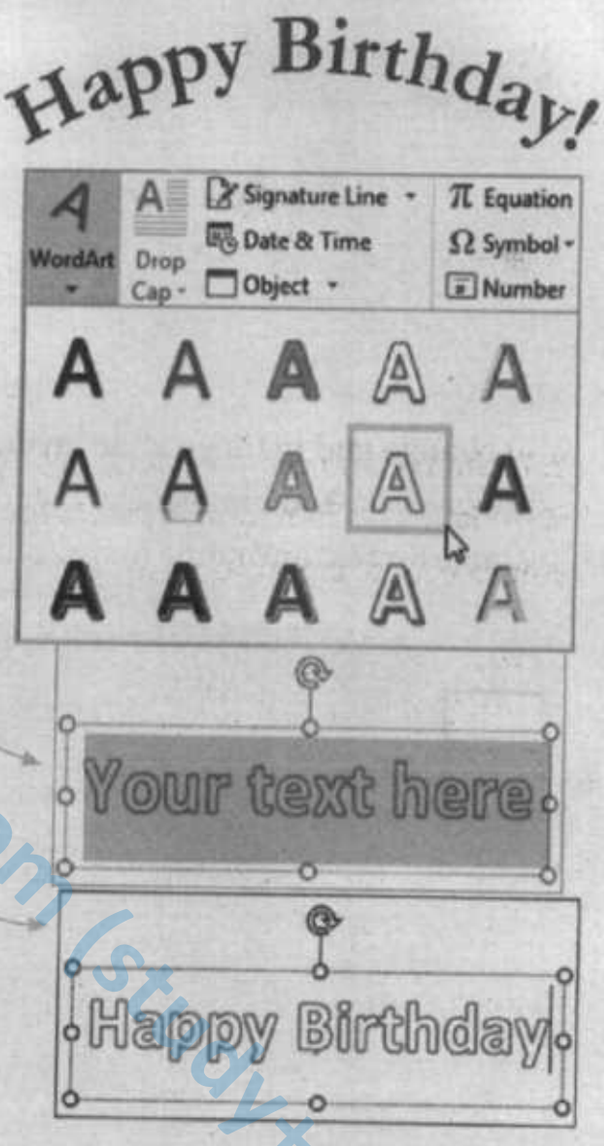
WordArt is a quick way to make text standout with special effects. You begin by picking a WordArt style from the WordArt gallery on the Insert tab, and then customize the text as you wish.

1. Click Insert > WordArt, and pick the WordArt style you want.

In the WordArt gallery, the letter A represents the different designs that are applied to all text you type.

2. Placeholder text "Your text here" appears, with the text highlighted.

Enter your own text to replace the placeholder text.



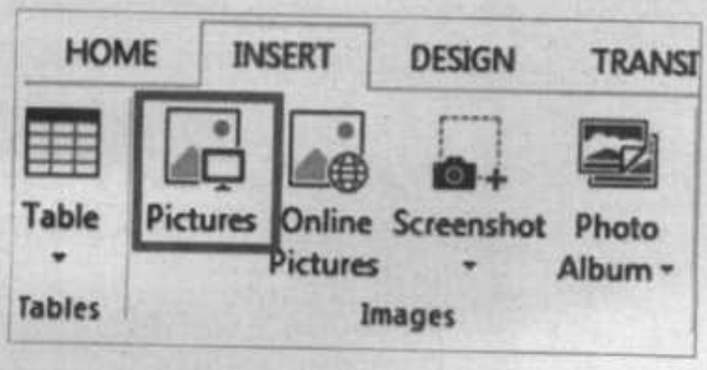
Tip

You can enter entire sentences, symbols, and even paragraphs, as WordArt..

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Insert a picture from your computer on your slide

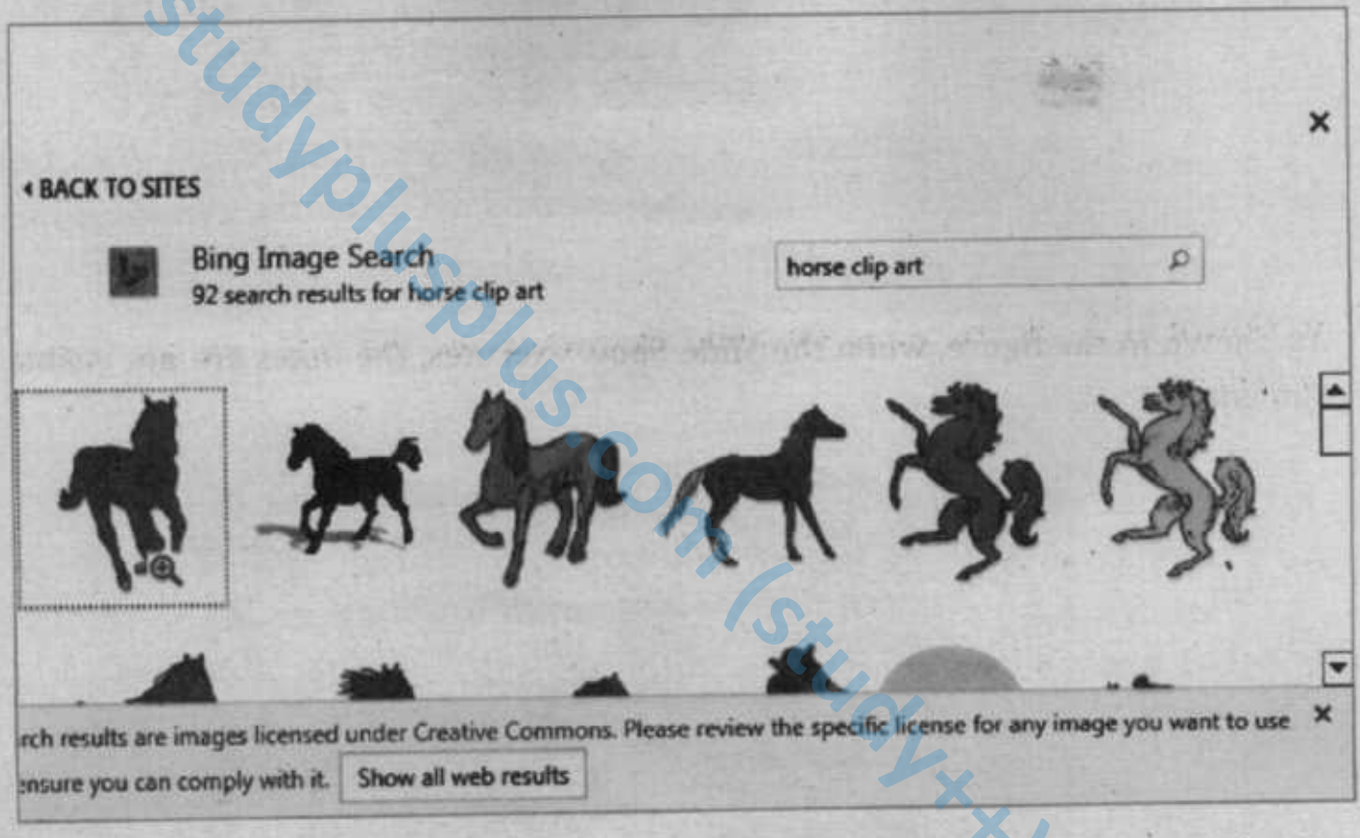
1. Click where you want to insert the picture on the slide.
2. On the Insert tab, in the Images group, click "Pictures".



3. In the dialog box that opens, browse to the picture that you want to insert, click that picture, and then click Insert.

> **Tip**
>
> If you want to insert multiple pictures at the same time, press and hold the Ctrl key while you select all the pictures you want to insert.

You can also insert picture from the web by using online pictures option.



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Important: You are responsible for respecting copyright law, and the 'license filter' in Bing can help you choose which type of license is associated with images which are suitable for your use.

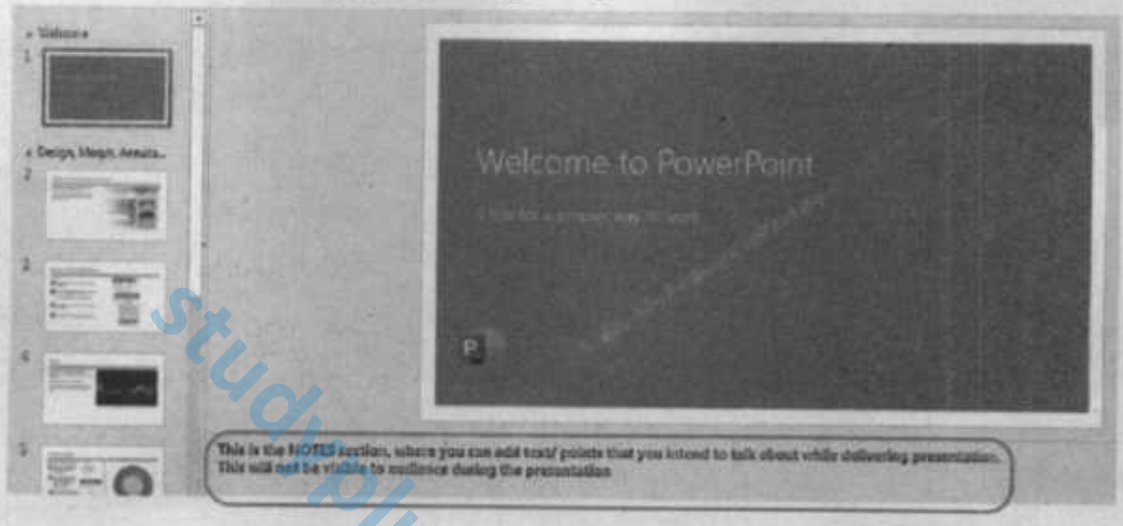
Insert a picture into the Slide Master

If you want a picture to appear on every slide of a specific type in your PowerPoint template, add it to the Slide Master.

If you want a picture to appear as background without affecting all slides in a Master, change the background settings for the slide.

Adding Notes in the Presentation

While preparing a presentation, the points of focus are generally added in the textual part of the presentation. However, additional material that the presenter wants to speak during the presentation, can be added in the NOTES section. This way, important and related points are not skipped during the presentation.



As, shown in the figure, when the Slide Show executes, the notes are not visible to audience.



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Tip

If you want to run your presentation on another computer and unaware whether suitable environment exists, a good practice is to create an executable file by clicking "Save As" and opt for 'Power Point Show'. This way, an executable file will be created.

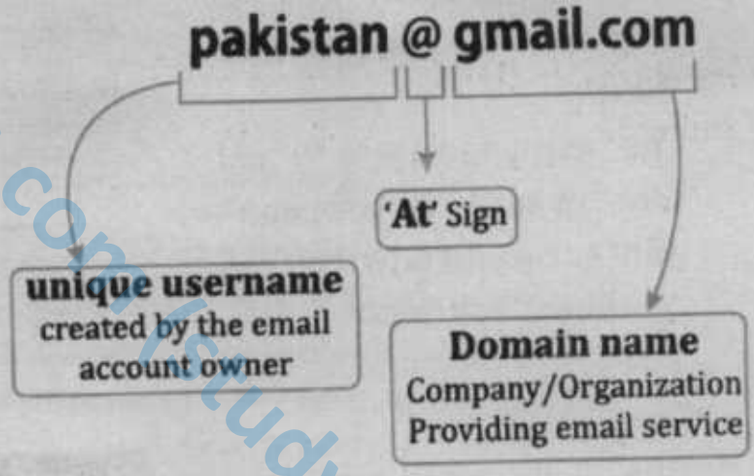
2.6 Email

Electronic mail is a method of exchanging messages between people using electronic devices. It offers an efficient, inexpensive and real time mean of communication.



2.6.1 Email Address

- An email address is a unique identifier for an email account. It is used to send and receive email messages over the Internet. Similar to physical mail, an email message requires an address for both the sender and recipient in order to send it successfully. Every email address has two main parts: a username and domain name e.g. pakistan@gmail.com is an email address where Pakistan is the username and gmail.com is the domain name.
- The username and the domain name are separated
- by @ (At) symbol.
  E-mail addresses are not case sensitive.
- Use of space is not allowed in email address.



2.6.2 Username and Password

- A username is a name that uniquely identifies someone on a computer system.
- A password is a word or string of characters used for user authentication to prove identity or access approval to gain access to email address.
- The username/password combination is referred to as a login, and is often required for users to log in to email account.

Tip

Some websites use email and password for authentication and for that purpose they require a valid email address. Hence, you can use your gmail address and create a respective password, accordingly.

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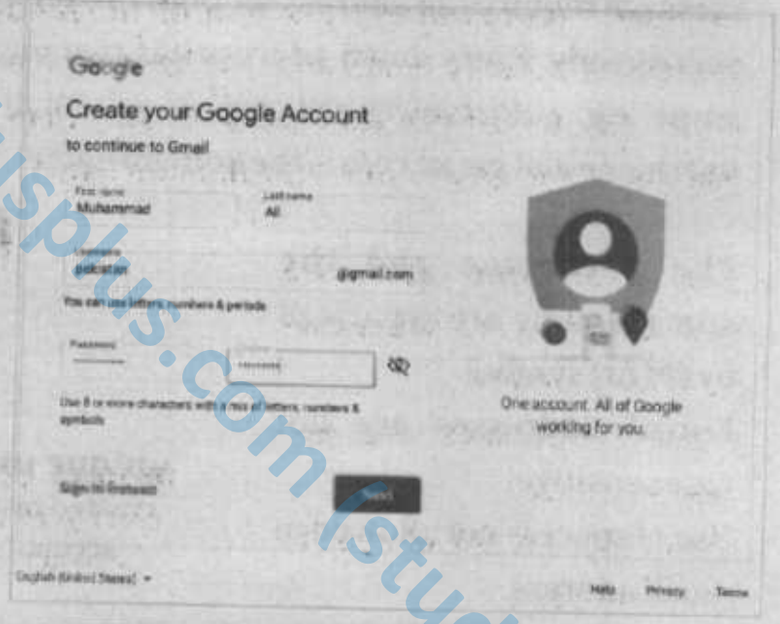
2.6.3 E-Mail Service Provider

- An Email Service Provider (ESP) is a company or an organization that offers a service to send, receive and manage email messages. Most popular ESPs are gmail.com, yahoo.com, hotmail.com/ outlook.com, etc.



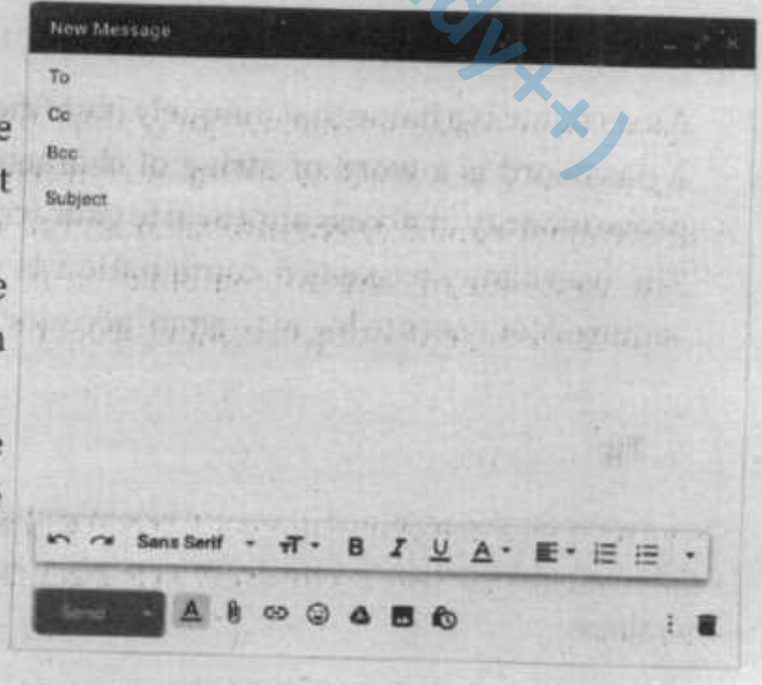
2.6.4 Create / Sign In an Email Account

- As we know there are various email service providers, here we will guide how to create an email account using gmail.com.
- Open gmail.com in your internet browser and click "create an account".
- Now a form will appear. Fill your details here and click "Next".
- This step allows you to add your picture. If you don't want to upload now, you can do it later. Click "Next".



2.6.5 Email Message Parts

- The **From** field indicates the sender's address i.e. who sent the email.
- The **To** field indicates the recipient's address i.e. to whom the email is sent.
- The **Subject** field indicates the purpose of email. It should be precise and to the point.

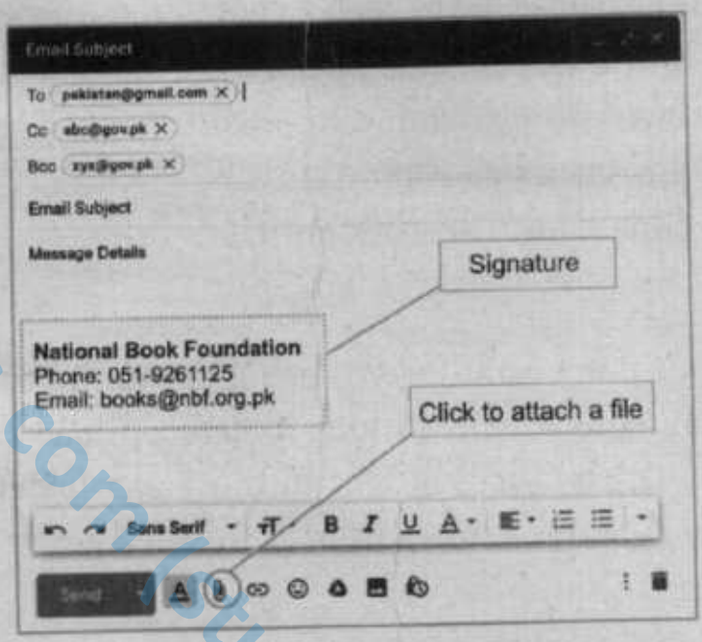


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- **CC** stands for Carbon copy. It includes those recipient addresses whom we want to keep informed but not exactly the intended recipient.
- **BCC** stands for Blind Carbon Copy. It is used when we do not want one or more of the recipients to know that someone else was copied on the message.
- **Attach File** (Attachment) is used to attach file with the email message.
- Text represents the actual content of the message.
- Signature is the final part of an email message. It includes the name of sender, address, and contact number etc.

2.6.6 Composing and Sending Email

- Before sending an email, we need to compose a message.
- When we are composing an email message, we specify the following things:
- Recipient's address in "To" field
- Cc (if required)
- Bcc (if required)
- Subject of email message
- Text
- Attach file



Once you have specified all the above parameters, it is time to send the email. The mail program provides a Send button to send email, when you click Send, it is sent to the mail server and a message mail sent successfully is shown.

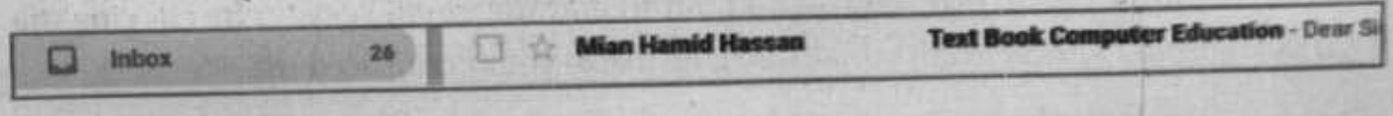
Tip

You should specify the correct email address; otherwise it will send an error back to the sender

2.6.7 Sending / Receiving Email

Every email program offers you an interface to access email messages. Generally, email is stacked in Inbox. In order to read an email, you just have to click on that email. Once you click a particular email, it gets opened.

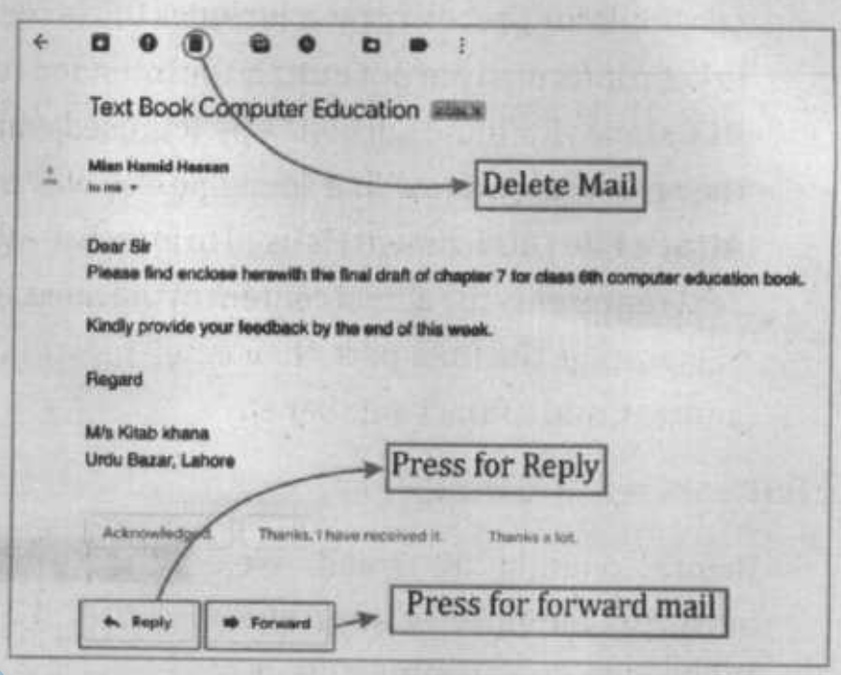
The opened email may have some files attached to it. The attachments are shown at the bottom of the opened email with an option called download attachment.



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2.6.8 Replying Email

After reading an email, you may have to reply that email. To reply an email, click "Reply" option. Once you click on "Reply", it will automatically copy the sender's address in to the "To" field.



2.6.9 Forwarding Email

It is also possible to send a copy of the message that you have received along with your own comments if you want. This can be done using "Forward" button.

2.6.10 Deleting Email

If you don't want to keep email in your inbox, you can delete it by clicking "Delete" option. The deleted mail is sent to the Trash folder which can be restored from it, if needed.

Tip

When you receive a forwarded message, the original sender address is marked with in < > characters.

2.6.11 Email Account Folders

The messages in email accounts are organized in different folders. Some important folders are:

- Inbox:It is the default folder where all the incoming or received emails are stored.
- Sent:It keeps the record of all the outgoing or sent messages
- Trash: All the deleted emails are sent to trash folder.
- Spam:It is a folder where undesired and suspicious emails are sent.



2.6.12 Signing out of an Email Account

Email account should be properly signed out to end the email session by clicking the "Sign Out" option. This prevents unauthorized use of your email account.

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2.7 Email Protocols

Generally, two protocols are used for the sake of sending/accessing emails, as follows:

- **SMTP (Simple Mail Transfer Protocol)**
  SMTP is a MTA (Message Transfer Agent) for sending the message to the receiver. It transfers the email from sender's computer to the email box of receiver's email server.

- **POP3 (Post Office Protocol 3)**
  POP3 is a MAA (Message Access Agent) for accessing the messages from the email box. It allows the receiver to receive emails from mailbox on his email server. For example, if a person is using Yahoo email service, he will receive his email from the Yahoo email server.

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2.8 Authentication

It is the process to identify a user who wants to access a system/network or a device. Authentication can be done by:

- Username and password or PIN (Personal Identification Number)
- Using a token such as bank card and PIN
- Using biometrics such as fingerprint, face or voice recognition

Summary

- A **word processor** is application software used for composing, editing, formatting and printing documents.
- The **Home tab** provides groups of clipboard, editing, styles, font and paragraph; to change settings of documents such as font type and size, bullets, etc.
- **Insert tab** helps to insert diferent objects in the document, like tables, word art, symbols, header, footer, text boxes, equations, etc.
- **Page layout** tab is used to set margins, page orientation, page size, line numbers and paragraph, etc.
- **Design tab** includes options for table and cell formatting.
- **Reference tab** furnishes with table of contents, footnotes, citations, etc.
- The **Review tab** is used to review a document for tasks like spell check, track changes, comments, translation, etc.
- **Multimedia presentation** includes information presented with slides, video or digital representations and includes sound which might be narrative, music or sound effects.
- **Multimedia presentation** is used mostly for business and school presentations.
- **Microsoft PowerPoint** is a presentation software in which text can be formatted similar to Microsoft Word.
- **Slide Master** allows all slides to contain the same fonts and images.
- A **theme** is a palette of colors, fonts and special effects. Every theme has several slide layouts, to choose a suitable for text/graphics. During presentation, additional material for presenter to speak during the presentation, can be added in Notes section.
- **Electronic mail** is a method of exchanging messages between people using electronic devices.
- Email account should be properly signed out to end the email session by clicking the Sign Out option.

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Exercise

Multiple choice questions:

1. Which of the following application Program is used for composing, editing and formatting documents?

(a) Microsoft Outlook (b) Microsoft Word
(c) Microsoft Excel (d) Microsoft Access

2. The Ribbon is the work bar located at_____.

(a) right of document (b) left of document
(c) bottom of document (d) top of document

3. Status bar displays the information like_____.

(a) size of document in MB, GB
(b) location of document in computer
(c) name of document file
(d) word count, number of pages, current page

4. Home tab contains the following features.

(a) Header and footer, page layout, print layout
(b) Insert picture, word art, mail merge
(c) Tables inserting, table formatting
(d) Clipboard Menu, Font Menu, Paragraph Menu

5. The Apply Design Template command is used to_____.

(a) change the order of the slides
(b) change the shape of the slides
(c) change the background and fonts of the entire presentation
(d) create a new, empty presentation

6. The process of removing unwanted part of an image is called_____.

(a) hiding (b) bordering
(c) cropping (d) cutting

7. During a slide show, pressing the Esc key_____.

(a) displays the last slide (b) displays first slide
(c) ends the slide show (d) displays the previous slide

8. Microsoft PowerPoint is best described as_____.

(a) presentation software (b) database software
(c) drawing Software (d) desktop publishing software

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9. On a single slide, you can have_____.

(a) single video file (b) two video files

(c) three video files (d) many video files

10. You can re-arrange slides in_____.

(a) slide view (b) sorter view

(c) notes Page View (d) slide Show View

11. Email is a method of exchanging message among people using_____.

(a) post office service (b) electronic devices

(c) post man to collect and deliver email. (d) telegraph

12. The correct format of an email address is_____.

(a) www.Pakistan.com.pk (b) Pakistan#$@gmail.com

© Pakistan786@gmail.com (d) Gmail.com@pakistan

13. The username of electronic mail accounts are_____.

(a) not case sensitive (b) always unique for each user

(c) spaces are not allowed in email address (d) only numeric

14. Examples of Email Service Providers are_____.

(a) gmail.com & outlook.com (b) Chrome

(c) Internet explorer (d) Mozilla Firefox

15. While composing email option "BCC" stands for_____.

(a) Blind carbon copy (b) Blank carbon copy

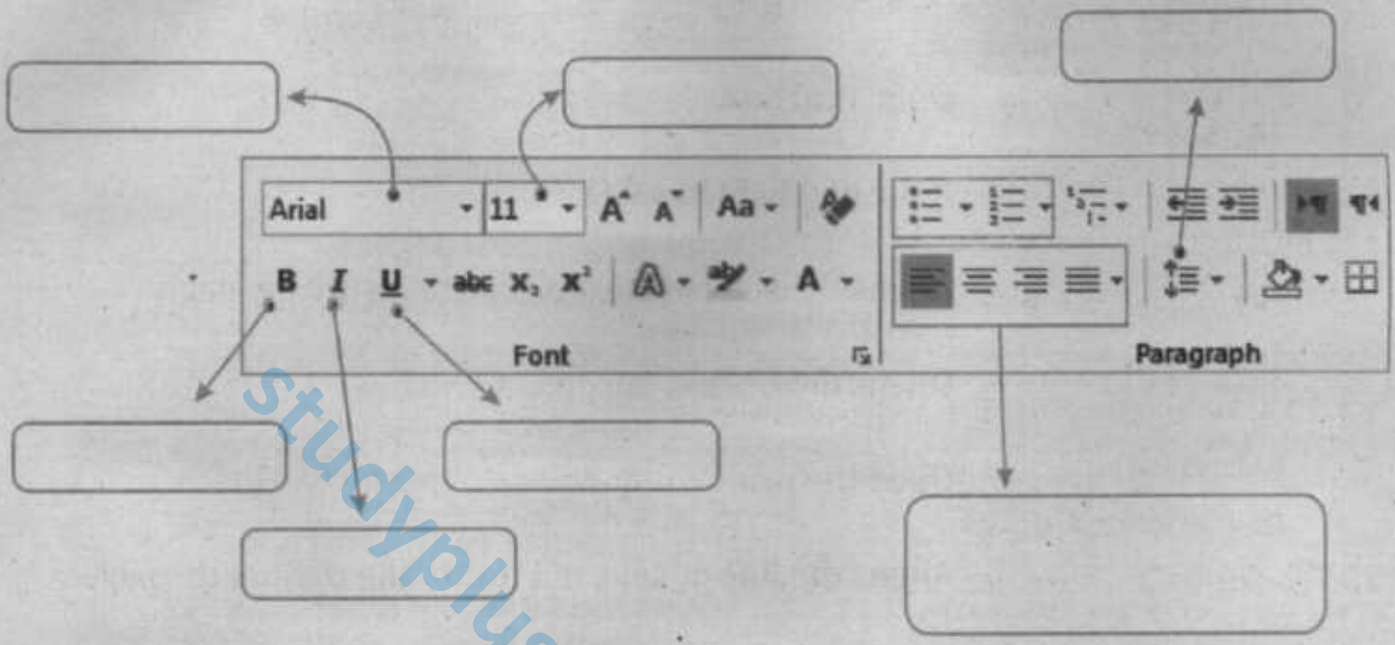
(c) Black carbon copy (d) Bank carbon copy

Short response questions:

1. Define the term "word processor". Give some examples of word processing programs.
2. List three ways to view screen in Microsoft Word?
3. Write down purpose of three insert options available in "Insert Tab" of Microsoft Word.
4. Write down is the purpose of Multimedia Presentation?
5. Differentiate between the terms 'Slide' and 'Slide Show'.
6. Write the procedure to add a picture as Background effect to a Presentation.
7. Sketch the steps to add a new slide to a presentation.
8. Define the term email and write the uses of email address.
9. Define any two of the following options used in composing an email. To, CC, BCC, Signature.

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11. Write down the purpose of inbox, sent, trash, spam.
12. Label the appended button in paragraph and font tabs:



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Activities

- Write a letter / application with font size 11, font type "Calibri" , font color to blue, enter signatures at end of document ,mention your name , school name, class name , section.
- Prepare a Curriculum Vitae (CV) with picture, academic details in table form, personal interests, etc. using different format, style and design and take a print
- Prepare a story in English or Urdu by inserting related pictures.
- Ask the class to make a Power Point presentation to give concept about geometrical figures: triangles, squares, rectangles, parallelograms, circles, trapezoids, and rhombuses.

Hint:Insert graphic objects and use transitions and animation.

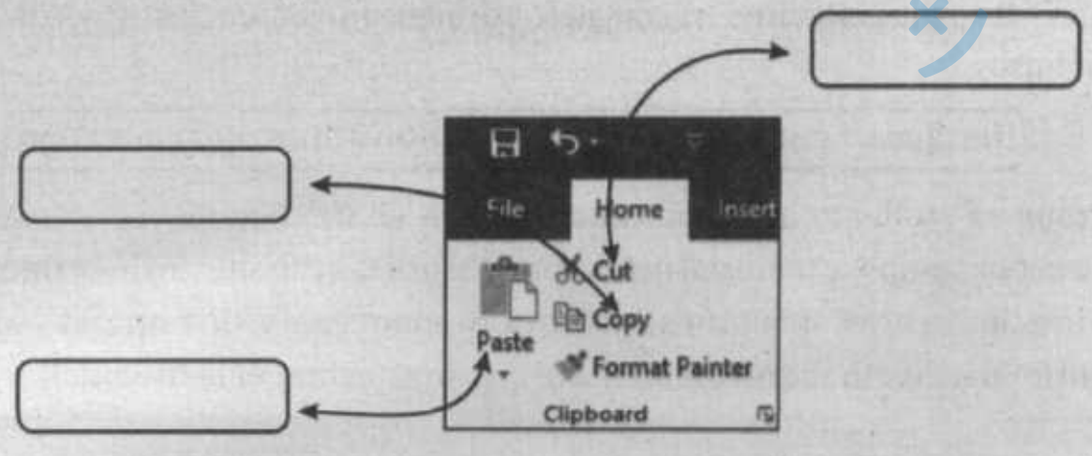
- A group of students are required to search about" The Seven Wonders "on Internet or compose material in Microsoft Word that should include minimum 7 pictures and a brief about those pictures. Students are then required to draft an email for teacher to share research work as an attachment of the email.

5. Write down shortcut keys for the descriptions given below:

Shortcut Key	Description
	Open find box.
	Italic highlighted selection.
	Aligns the selected text or line to justify the page.
	Opens new, blank document window.
	Open the print window.
	Aligns the line or selected text to the right of the page.
	Save the open document.
	Underline the selected text.
	Close the currently open document.
	Undo last action.
	Redo the last action performed.

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6. Write down shortcut keys.



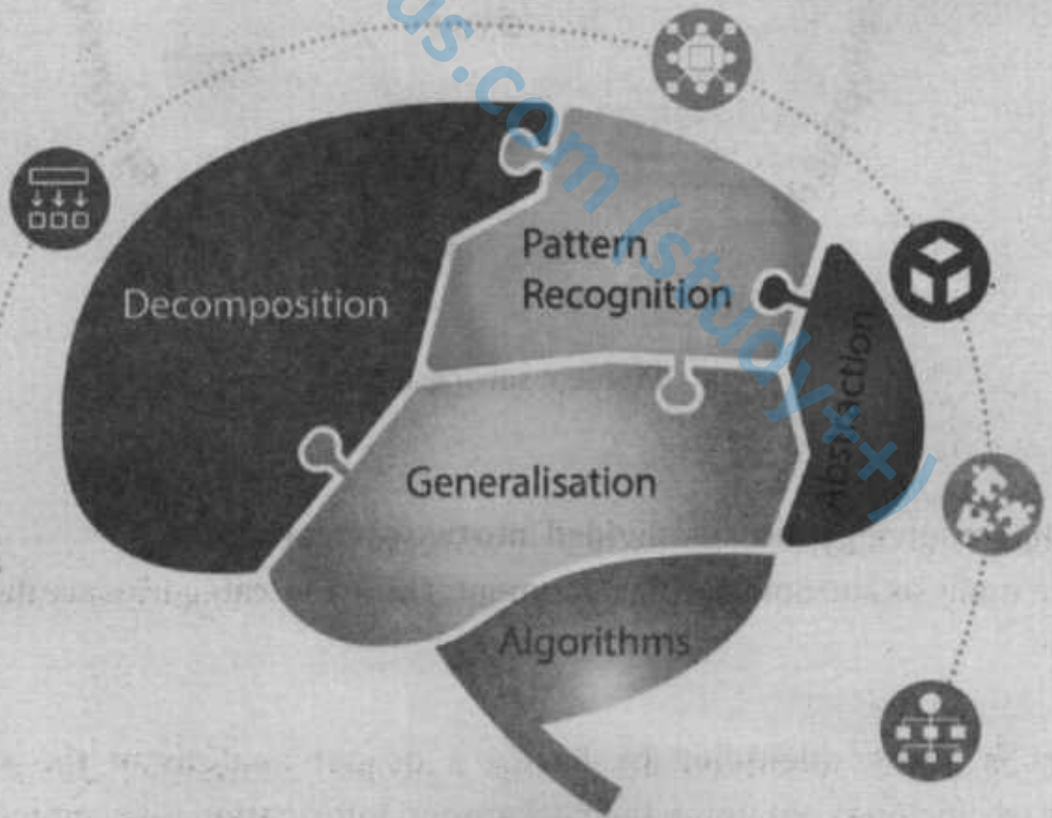
3 Algorithmic Thinking and Problem Solving

Learning Outcomes

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

- apply the concept of computational thinking to handle complex problems
- apply concepts of conditional statements, finite and infinite loops to write different algorithms

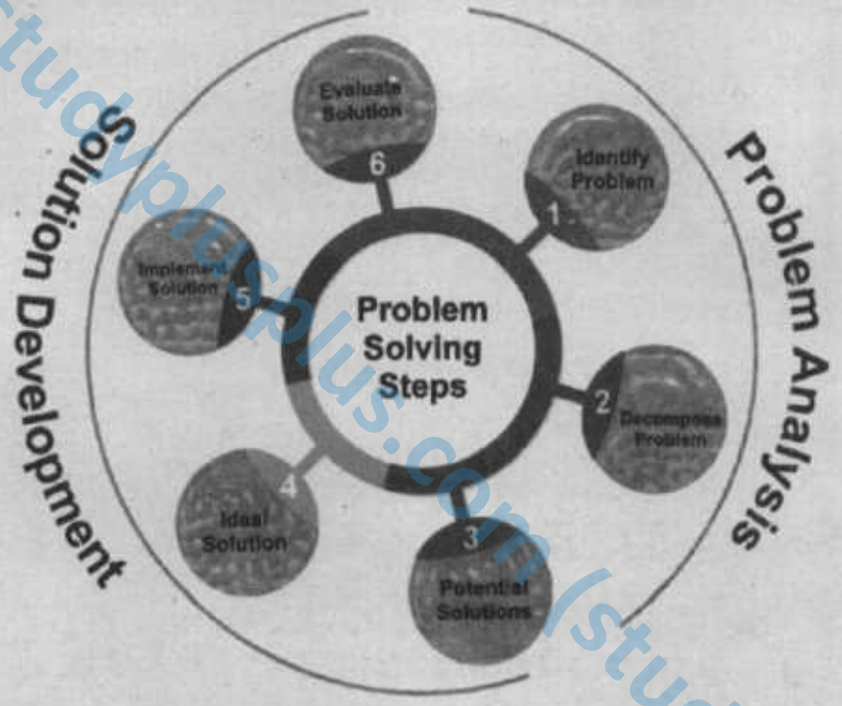
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3.1 Problem Solving

A problem is a challenge or situation for which a solution is required. Problem Solving defines the process of analyzing some particular situation and accordingly behaving in order to generate some response. In Class 6, we not only identified but also solved some of our daily life problems

Now a days, Computers are used to solve problems in a faster and more reliable way. It is important to understand that computers follow the input-process-output model. The computer solves the problems by taking some kind of input, performing some operations on the input, and accordingly producing some kind of output.



Problem solving steps

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3.1.2 Problem Solving Process

The problem solving process is divided into two categories:
Problem Analysis and Solution development. These two categories are discussed below in detail:

a. Problem Analysis

Problem is always identified by having a deeper analysis of the situation. This particularly includes obtaining the background information relevant to that situation. Since, computers are used to solve problems from various domains and disciplines such as industrial, argiculture, healthcare, technology and so on. Background information helps to better understand the problem area and identify an exact problem.

Identify Problem

There are multiple ways to identify the problem such as through brainstorming, discussions, and many more.



After understanding and identifying a problem, the problem is stated in a clear and precise way and typically it is written in the context of need. For this purpose, you may write a detailed problem statement.

Decompose problem



Sometimes, even when you understand what is the problem, it may be too big to fix the problem all at once. In this situation, dividing the problem into small and manageable components could be a useful trick not only to better understand the problem but also to provide a better solution.

> **Tip**
>
> A clearly defined problem is much easier to solve than a poorly defined problem.

b. Solution Development

Solution design is to propose solutions to meet the needs identified during problem analysis.

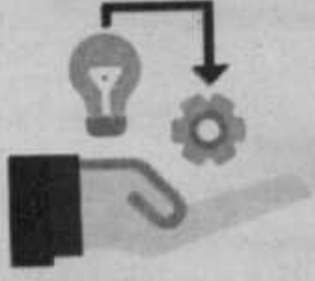
Identify Potential Solutions

Always identify a solution before designing it because there might be many ways to solve a problem or a particular component of that problem.

Identify Ideal Solution

Among the available alternatives, best one is selected by eliminating the less desirable or unreasonable solutions. The ideal solution is effective, efficient, and has the fewest side effects. Now it's time to design that solution.

This solution should be designed in a way that can effectively be carried out by a computer. The design may involve drawing a flow chart or writing an algorithm.



> **Tip**
>
> Among the alternatives that you have short-listed, the ones that are not selected should not be discarded completely. You may require them in future.

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Implement Solution

The solution is implemented according to some plans. For example, in a case, the problem is decomposed into sub-problems, each of these sub-problems could be implemented in phase or parallel fashion. The problems where the computer is used as a tool, the implementation is done by converting the solution design into some programming language such as Scratch, Python or Java.

Evaluate Solution

After successful implementation, the solution is evaluated by seeking feedback and if required each step is performed repeatedly until an acceptable solution is found. Every step of problem-solving plays an equal role in its success.

Tip

Good Problem Analysis → Good Design → Good Implementation

3.2 Computational Thinking

Computational thinking is another problem-solving approach that divides the problem into smaller components, extracts relevant ideas, recognizes patterns to enable problem solution planning. This way duplication and less relevant actions are avoided and ultimately improves the effectiveness of the problem-solving process.

3.2.1 Properties of Computational thinking

- **Decomposition:** Breaking down larger problems into smaller/manageable ones and focusing on them one at a time.
- **Abstraction:** By stripping away unnecessary details to a solution, so you could be able to reduce what information is important and what can be left out.
- **Pattern Recognition:** Examining the problem for a pattern or similarities between and to solve problems.
- **Algorithm Design:** Developing a step-by-step solution of the problem.

Tip

Solving problems in this way gives you the confidence to take on complex problems.

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3.2.2 Solution Elements

There are three elements or basic tools used for designing a solution.

a. Sequence

Normally all the steps of an algorithm are interpreted in its defined sequence, however sometimes we have to break the sequence to interpret the steps that are defined at some other location of the algorithm.

b. Repitition

In real world, you would have observed that most of the things that occur naturally in the environment seem cyclic in nature. For example, the cyclic nature of the day, as shown in the figure. Another example of loop is the car racing track where a car needs to perform multiple laps.



Day-night Cycle

All such repetitions are handled through the use of a loop, the loop is an act or instance of doing something again and again.

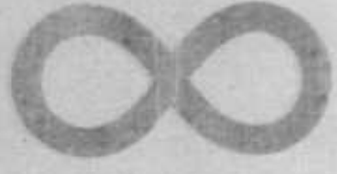
Types of loops

The loops could be either finite or infinite(endless). The most common one is the finite loop. The finite loop is used where the act of doing something is needed for a fixed number of times. However, the infinite loop prevent termination.


Car Racing track

Finite loops are of two types:	Infinite Loop
• It terminates the loop on performing the task for a number of repetitions (Counting) • As assessed situation gets false (Event-Controlled)	• It works for indefinite period of time - never ending


Finite Loop


Infinite Loop

Recall

The algorithm is a sequence of steps to solve the problem in a precise and systematic way. When a loop is incorporated in some algorithm that means repeating the sequence of steps. The one complete execution of a sequence of steps is called an iteration of the loop.

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Example 1:

Let's us take an example of a kid getting ready for school and apply the properties of computational thinking.

(I) Decomposition: Divide the process of "getting ready for school" into sub-problems

- getting the dress ready
- taking shower
- getting dressed
- gathering schoolbooks



(ii) Abstraction: Stripping unnecessary details by eliminating the choices of clothes and only focussing on uniform

(iii) Pattern Recognition: When a child goes outside, he usually combs hair, so while getting ready for school, the child combs his hair with a brush using previous knowledge of hair brush. He recognizes it as a hair brush, though he has never seen that particular hair brush before.

(iv Algori Let's take one sub-problem from the Property (i) i.e "getting dressed" and write its steps

- wear the uniform
- button them
- put on the shoes
- comb hair

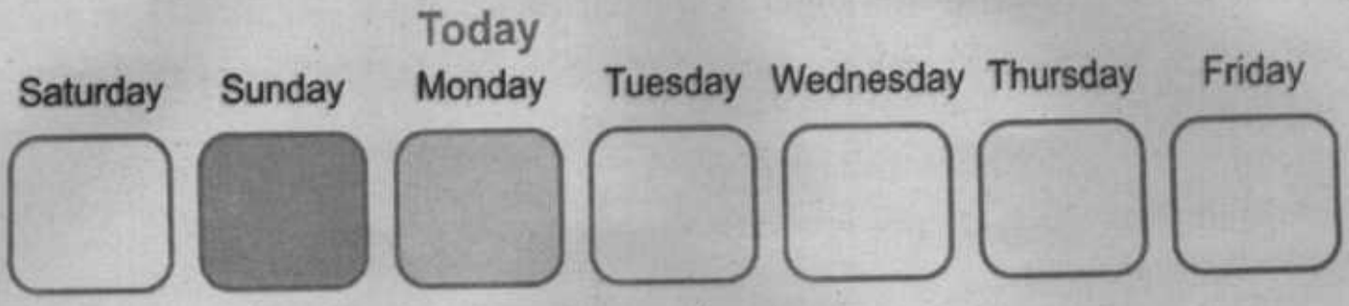
c. Conditional Statement

On daily basis, you face the situations that first need to be accessed before you make a decision of handling that situation.



Recall, in Class 6, we handled some of such situations. For example
If today is Monday, then yesterday was Sunday.
In this example, the situation accessed is the day and the decision is about yesterday.

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Algorithmically analyze the situation being accessed "If today is Monday" but what if today is not Monday?

Yes, exactly if "today is not Monday" then "yesterday was Not Sunday"

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Let's write this IF-THEN-ELSE condition

IF today is Monday
THEN yesterday was Sunday
ELSE yesterday was NOT Sunday

Example 2:

Rethink the problem of example 1

We handled the situation of one day activity of "getting ready for school "means one iteration. However, we know that the child daily goes to school so its cyclic in nature and we can handle this with the help of finite loop.

Does the child daily go to school? No, not on weekend. So this can be handled with the conditional statement as follows:

IF it is weekend
THEN wear any dress and do weekend activities
ELSE get ready for school

Let us take an example of a real-life situation for creating algorithm.

Example 3:

How to brush teeth

1. Put toothpaste on the toothbrush
2. Use toothbrush to clean lower teeth
3. Move onto upper teeth
4. Spit out any excess toothpaste
5. Repeat step 2, 3 and 4 until all teeth are clean
6. Rinse the teeth
7. Rinse toothbrush



Example 4:

Going to the market to purchase bread.

1. Get dressed up to go to the market
2. Check your wallet for money
3. If there is no money in the wallet, replenish it
4. Go to the bakery
5. Ask for your favorite bread
6. If bread is available, go to step 7 else go to step 10
7. Give money to the shopkeeper
8. Keep the purchased bread in shopping bag
9. Go back home
10. Ask for any other bread
11. Go to step 7.

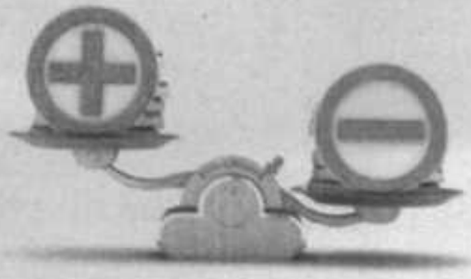
    Step 4 in this algorithm is in itself a complete task and separate algorithm can be written for it.



Example 5:

Let us now create an algorithm to check whether a number is positive or negative.

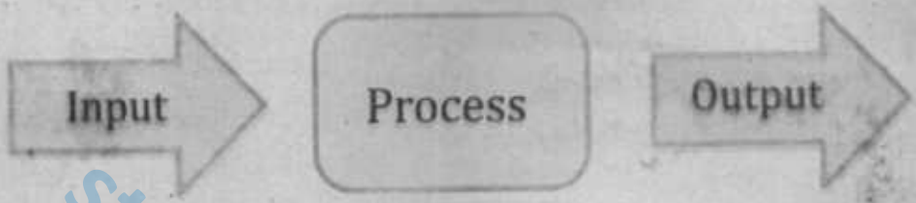
1. Take a number as input
2. If the number is 0, print "you entered 0"
3. If the number is greater than 0, print "you entered a positive number"
4. If the number is less than 0, print "you entered a negative number"



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3.2.3 Flowcharts

Flowcharts are a graphical representation of your algorithm; it means all those actions that were needed step by step to solve a problem, now should be drawn. Computer use the input-process-output model to solve problems and flowcharts are also designed accordingly.



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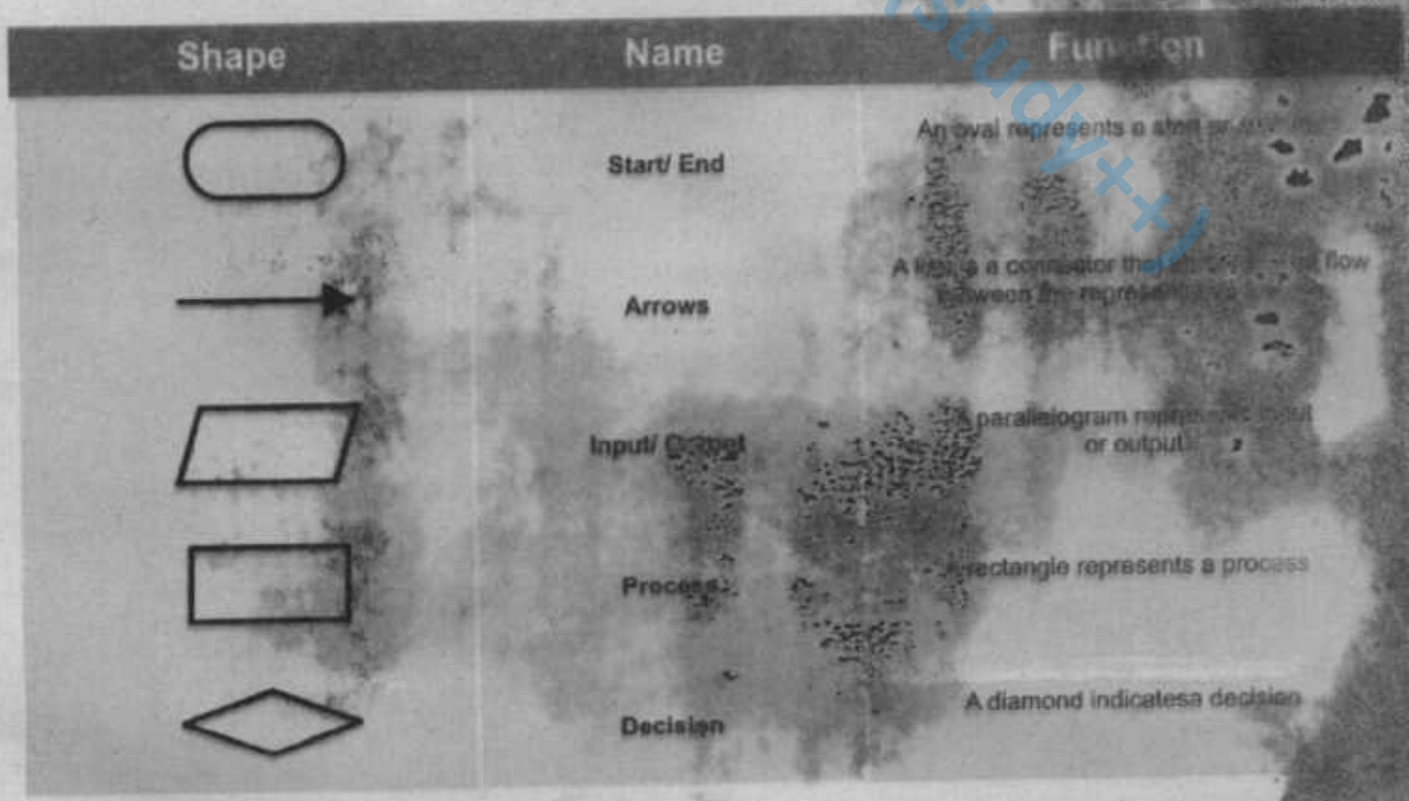
The flowchart is a tool to analyze the weaknesses of the algorithm for various inputs and identify logical errors that exist, if any.

Flowcharts always start from the top and flow downwards, that is the reason the 'Start' is on the top and 'End is at the bottom.



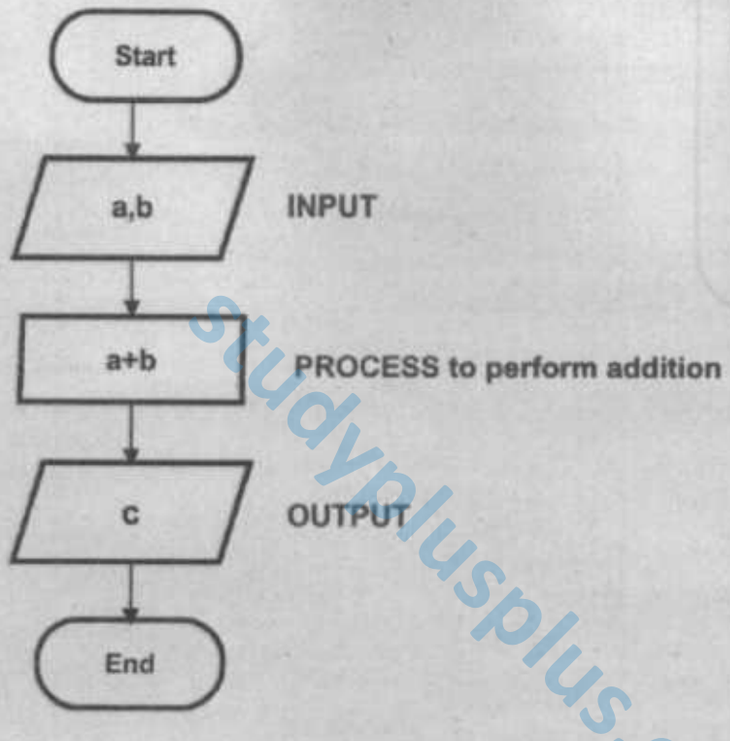
Symbols of flowchart

There are five basic symbols.



Example 6:

Finding sum of two numbers using flowcharts



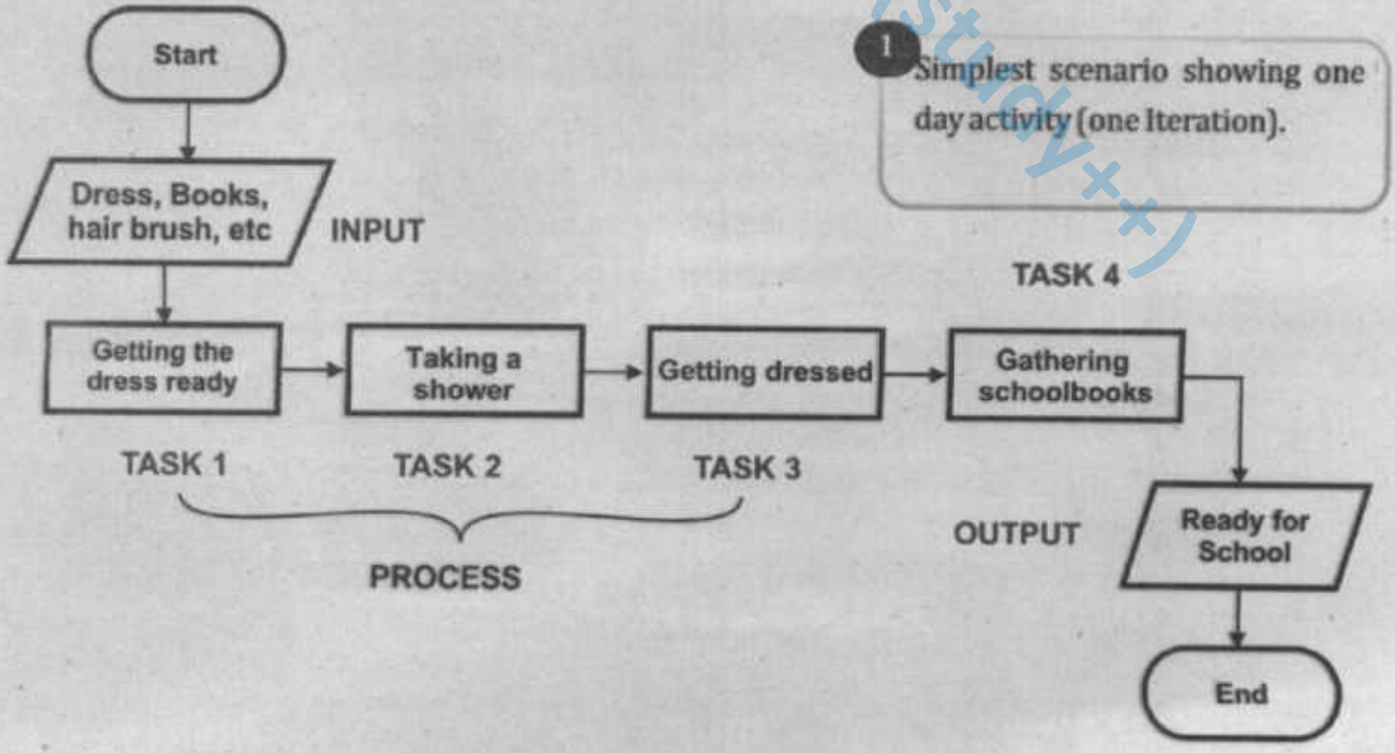
The steps of algorithm for the given problem will be as under:

- Take input of two numbers: let us say a and b
- Perform sum of a and b
- The result of sum will be stored in c

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Example 7:

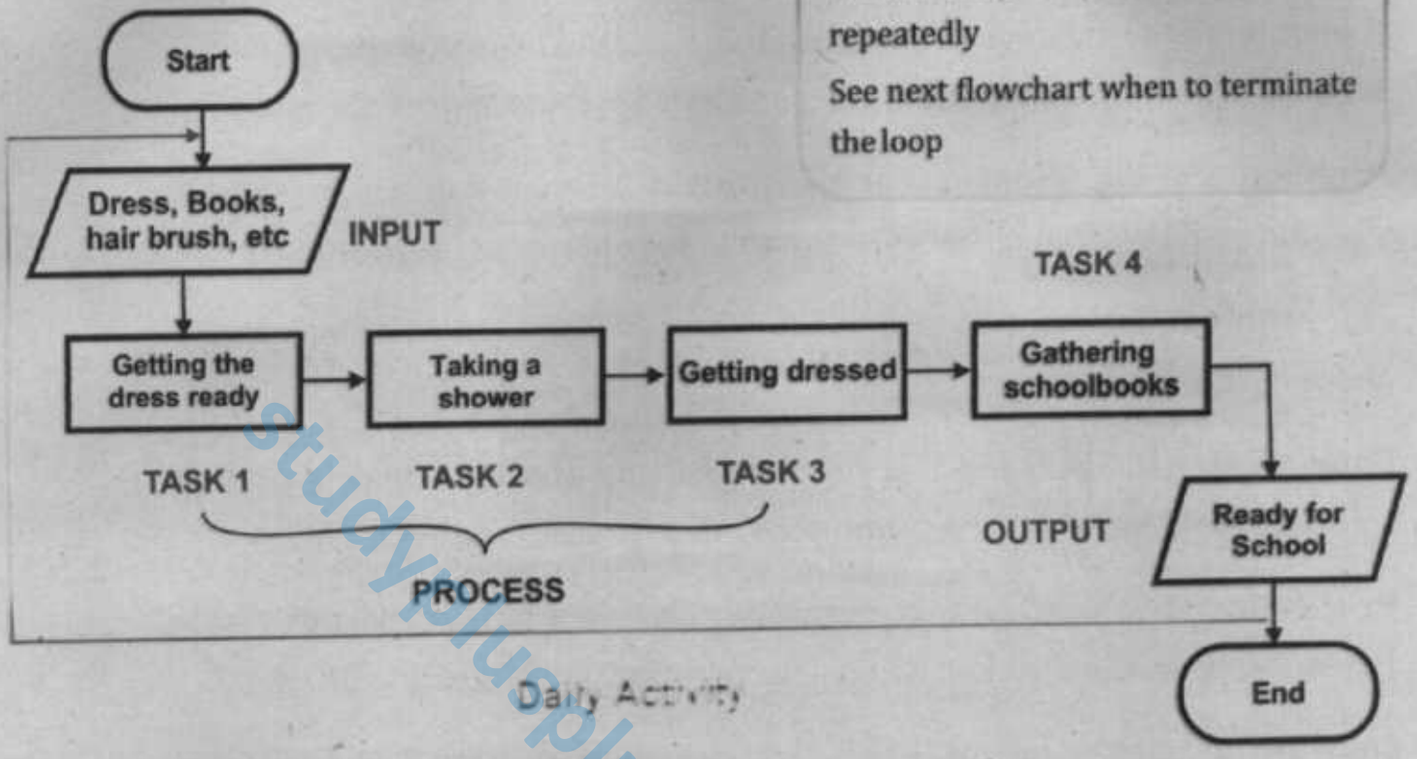
Flowchart for a child getting ready for school



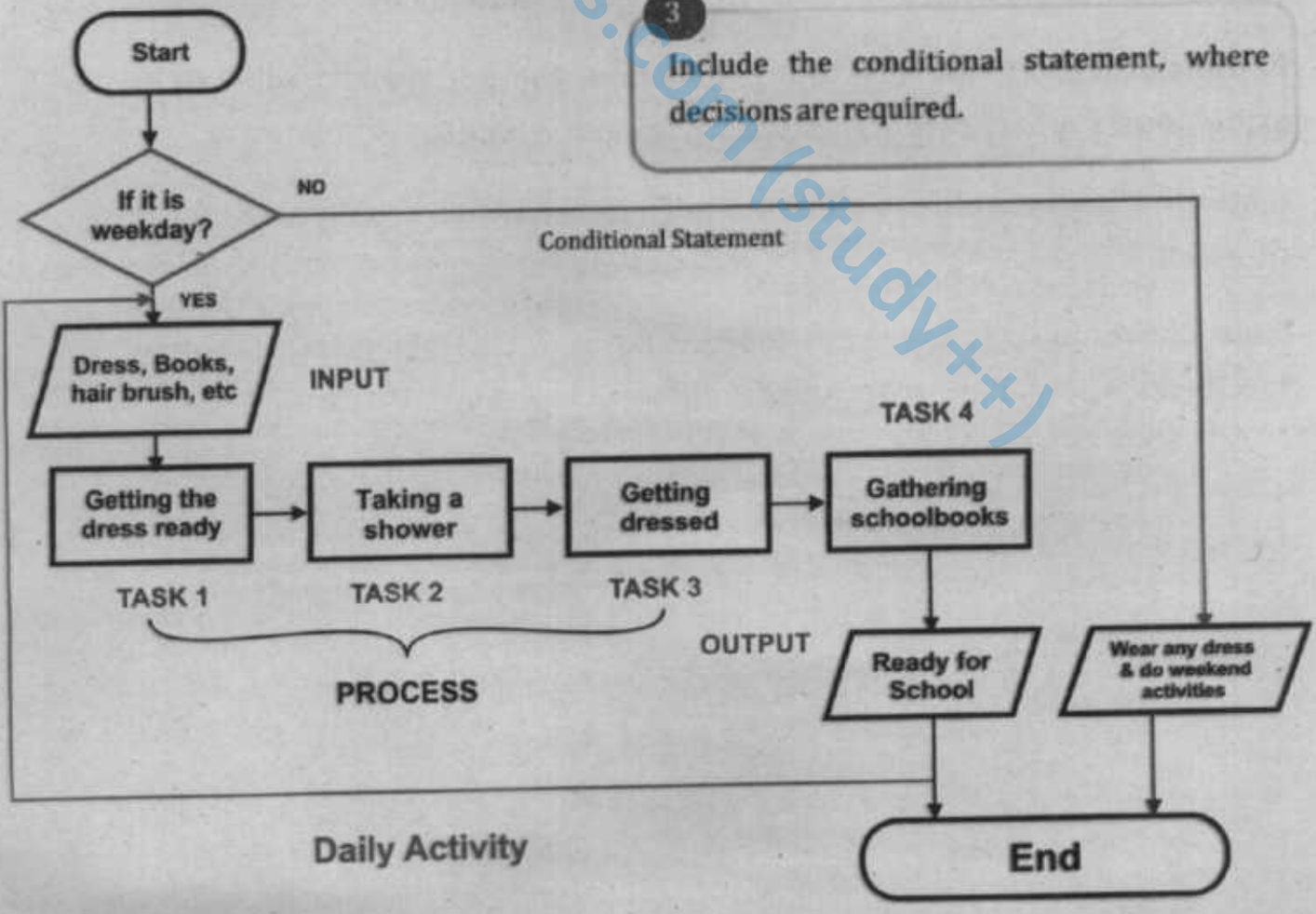
1 Simplest scenario showing one day activity (one Iteration).

2 Include loop to perform the tasks repeatedly

See next flowchart when to terminate the loop



3 Include the conditional statement, where decisions are required.



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Summary

- A **problem** is a challenge or situation that needs to be overcome, in daily life we assess different situations and accordingly generate appropriate solution.
- **Problem Solving** is defined as the process of analysing some particular situation and accordingly behaving in order to generate some response.
- The **problem-solving process** has two broad categories: problem analysis and solution development.
- **Computational Thinking** is a problem-solving approach that is useful to solve the problems using the computer's input-process-output model.
- **Properties of Computational Thinking**: There are four properties that are Decomposition, Abstraction, Pattern Recognition and Algorithm Design.
- **Solution Elements** are required for solution designing. The basic three elements are Sequences, Repetition and Condition statements.
- **Repetition** refers to the act of doing any action again and again, this is done by using loops. The loops are of two types: finite and infinite.
- **Condition Statements** are when we need to behave according to the given situation.
- **Flow Charts** are the graphical representation of the algorithm. Different specified shapes are used to represent different functions.

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Exercise

Multiple choice questions:

1. When a problem is poorly defined, it means_____.
   (a) it is not properly understood and identified
   (b) an acceptable solution could not be designed
   (c) an acceptable solution could not be developed
   (d) all of above
2. What should be written in the problem definition?
   (a) Solution (b) Situation
   (c) Need (d) Behavior
3. Once a solution of a problem is implemented, how are you going to ensure it is a correct solution? Through_____.
   (a) programming language (b) feedback
   (c) problem decomposition (d) input
4. A key to a good implementation is_____.
   (a) good problem analysis (b) good design
   (c) feedback (d) all of the above
5. Flowchart is the best way to depict_____.
   (a) problem background (b) proposed solution
   (c) evaluation (d) all of the above
6. An algorithm takes _____ and returns_____.
   (a) Input, Output (b) Problem, Solution,
   (c) Solution, Problem (d) Parameters, sequence of action #
7. The first step of problem analysis is _____.
   (a) problem decomposition (b) problem identification
   (c) problem solution (d) problem design
8. Breaking a complex problem down into smaller problems and solving each one individually is called _____.
   (a). decomposition (b) abstraction
   (c) programming (d) algorithmic thinking

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Short response questions:

1. Why do we need to understand the problem area?
2. How to identify the problem?
3. If the problem identified is too big to be fixed all at once, what mechanism could help you to better solve the problem?
4. Can we have more than one decision symbols in flow charts?
5. Differentiate between a flowchart and an algorithm.
6. Write down an algorithm for adding two numbers.

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Activity

1. Write the following sentence using IF-THEN or IF-THEN-ELSE condition

If you do not win scholarship, your father will be very sad.

If you don't brush your teeth regularly, your teeth decays.

If it rains tomorrow, I will stay at home, otherwise I will go for picnic.



Activity

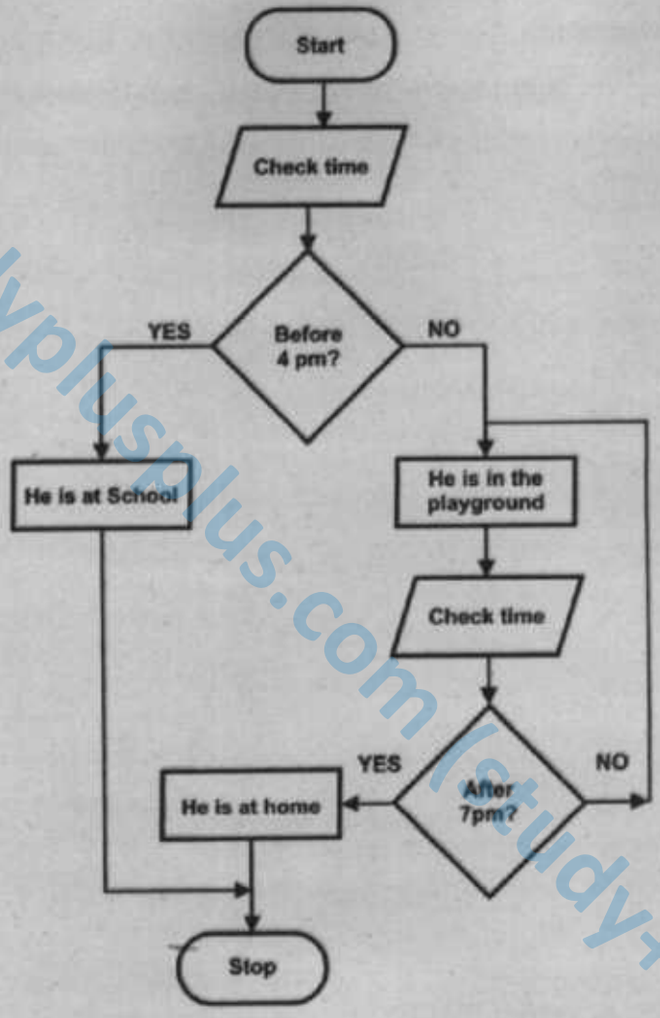
2. Draw a flow chart for the given situation for pass and fail remarks on the basis of obtained marks.

Grading Criteria

Marks obtained	Remarks
50% or more	Pass
Less Than 50%	Fail

Activity

3. See the following flowchart and define what was the problem for which this solution was designed.



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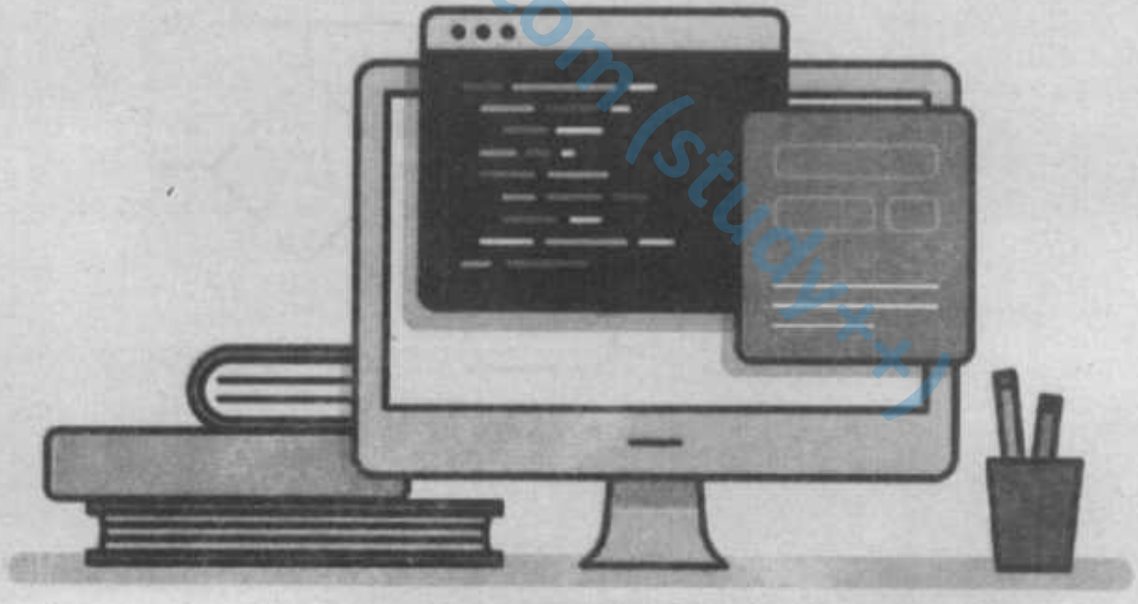
4 Programming

Learning Outcomes

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

- explain how computers encode and decode computer programs (i.e. conversion of decimal to binary and vice versa, representation of texts, images and sounds in computer)
- apply fundamental programming constructs to create multi-sprite programs using textual programming tools

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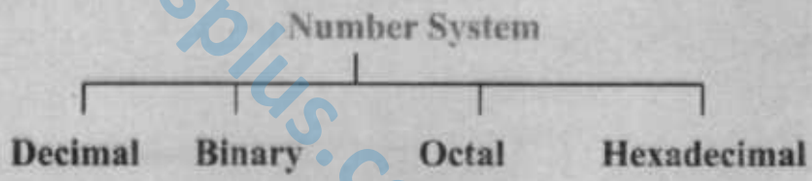
4.1 Information Representation in Computers

Data is processed and stored in the form of information. Digital devices store information in binary arrangement, i.e. in the form of '0's & '1's. The purpose is to store information that at the time of need, is easily recoverable.

For further understanding, imagine a file organizer, where records are kept. Each record is first put in envelope and tagged, then these records are organized in a particular order and lastly stocked in drawers. If some changes are needed on a record, the envelope is retrieved and corrections are applied on its copy before finalizing it on the main record.

Similarly, information is replicated from the computer's fundamental memory (Random Access Memory or RAM), and afterwards stored in the hard disk for permanent storage.

Number System: It is the way of representing information.



4.1.1 Decimal Number System

The everyday economics and business around us, especially in the form of currency, is based on decimal number system. Decimal number system comprises of 10 unit digits, on the basis of which decimal numbering system is developed i.e. 0,1,2,3,4,5,6,7,8,9. Hence, the combinations of these base 10 numbers represent various numbers and can be referred as base-10 number system.

A few instances of decimal numbers are:-

$(12)_{10}, (345)_{10}, (119)_{10}, (200)_{10}, (313.9)_{10}$

Every number communicated in base-10 number system has the worth of power of 10. It implies that the digit at the tenth place is more prominent than the digit at the unit place. Similarly, the hundredth place digit is more worthy than that on tenth place, and so on.

Examples are:

$(29)_{10} = 2\times10^{1}+9\times10^{0}$
$(234)_{10} = 2\times10^{2}+3\times10^{1}+4\times10^{0}$

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4.1.2 Binary Number System

Just like an electric switch has two states, one to start and other to stop a fan. Similarly, in binary number system, only 2 digits are used, 0 and 1; rather than 10 distinct digits that form the decimal system. The decimal numbers from 0 to 10 are represented in binary form as: 0, 1, 10, 11, 100, 101, 110, 111, 1000, 1001, and 1010, respectively. For example, $(101)_2$ is a binary number. The importance of binary number system is that computers understand instructions in the form of binary numbers, only.

4.2 Number System Conversion

4.2.1 Conversion of Binary Number to Decimal Number:

To convert a binary number into decimal, put the respective power of 2 on the binary digits from right to left side while starting from 0.

Example 1:

Find the decimal value of $(1001)_2$:

Binary number:	1	0	0	1
power of 2:	2^3	2^2	2^1	2^0

$(1001)_2 = 1x2^3+0x2^2+0x2^1+1x2^0 = (9)_{10}$

Example 2:

Find the decimal value of $(111001)_2$:

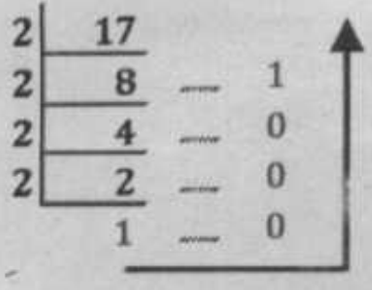
Binary number:	1	1	1	0	0	1
power of 2:	2^5	2^4	2^3	2^2	2^1	2^0

$(111001)_2 =$
$1x2^5+1x2^4+1x2^3+0x2^2+0x2^1+1x2^0 = (57)_{10}$

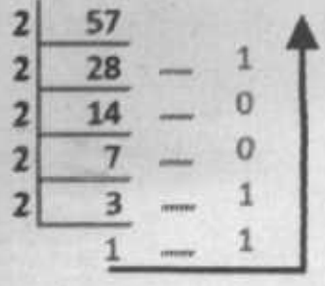
4.2.2 Conversion of Decimal Number to Binary Number:

To convert a decimal number into its corresponding binary number, first divide the number by 2, you will get an integer quotient and a remainder (even if it is 0). The integer quotient is repeatedly divided by 2 till the quotient is no further divisible by 2. Meanwhile, all the remainders are noted down in a sequence. When merged (from bottom up format as depicted by arrow), corresponding binary number is attained.

Example 3: $(17)_{10} = (10001)_2$

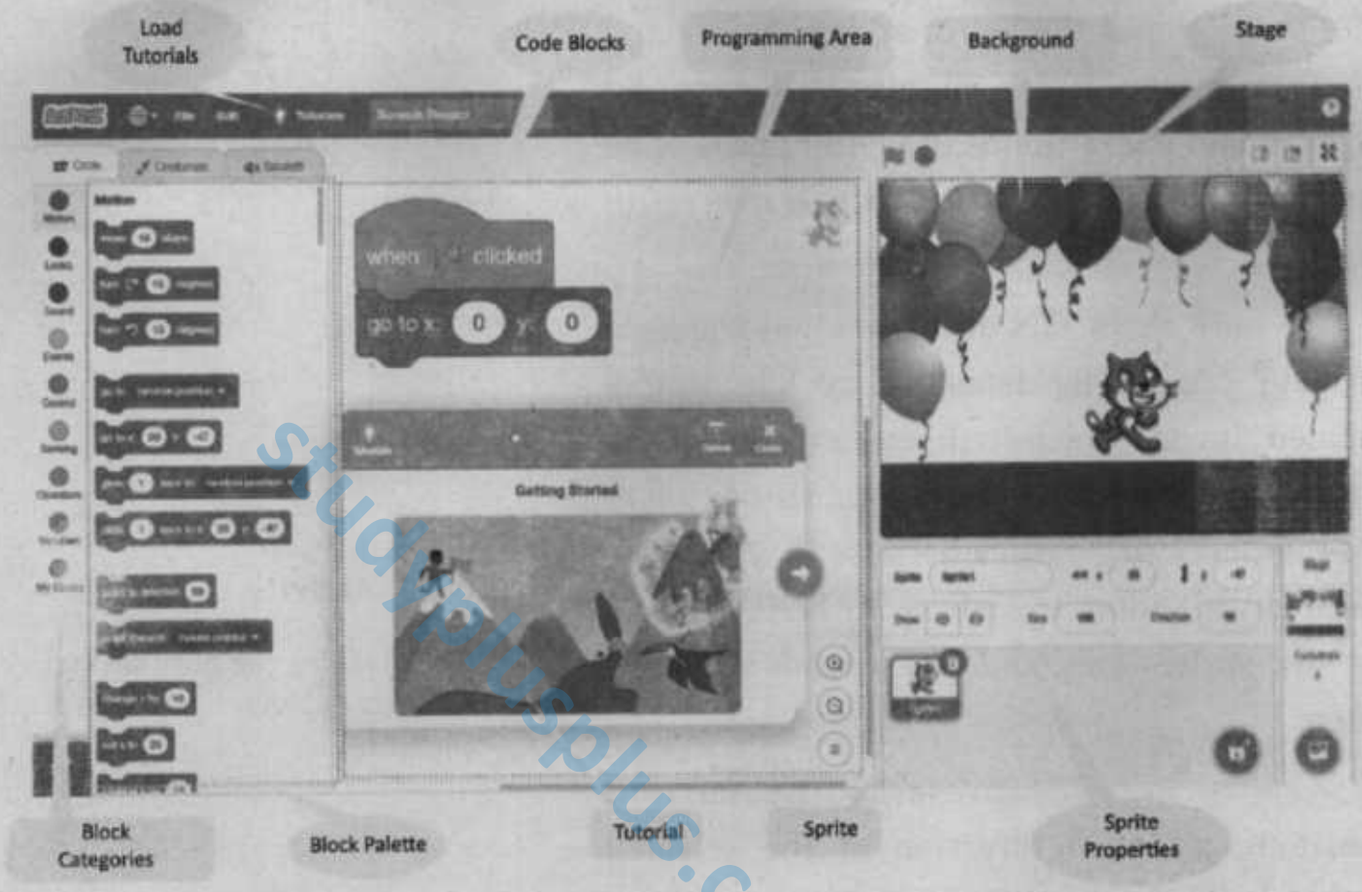


Example 4: $(57)_{10} = (111001)_2$



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4.3 Introduction To Scratch Interface



Main components of Scratch interface

Blocks Palette contains all building blocks for Scratch known as Code Blocks. There are a number of categories of Code Blocks presented in various colored dots. A user can drag the blocks to the programming or script area.

Blocks Category contains groups of commands related to specific purposes. A user can click on these categories to see the commands/Code Blocks in Blocks Palette.

Programming area (or script area) is where the user creates sequences of codes to be run. This is the actual working space.

Tip

Tutorials

Try using the built-in help feature; and apply the given instructions. Help is also available under "Tutorials" section, do explore them.

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The Stage (or display area) is a window where the code outcomes are seen. The lower part of the Stage shows the list of added Sprites and their properties. It also contains buttons to add Sprites and backgrounds. It is 480 pixels wide and 360 pixels tall; the center point is referred to as (0, 0).

Setting properties of sprite



Sprites are characters or images that you have in your project. By default, a cat like symbol named 'Sprite1' is selected. You can add as many sprites as you wish, but it is recommended not to add unnecessary sprites because it will create difficulty in coding. It is advised to start with one or two sprites only, and add more if you need them.

Sprite Properties presents the current position, size and direction of the selected sprite. In this image, the sprite is in the middle of the field (notice position x is 0, and y is also 0).

Backgrounds can be selected from bottom right corner.

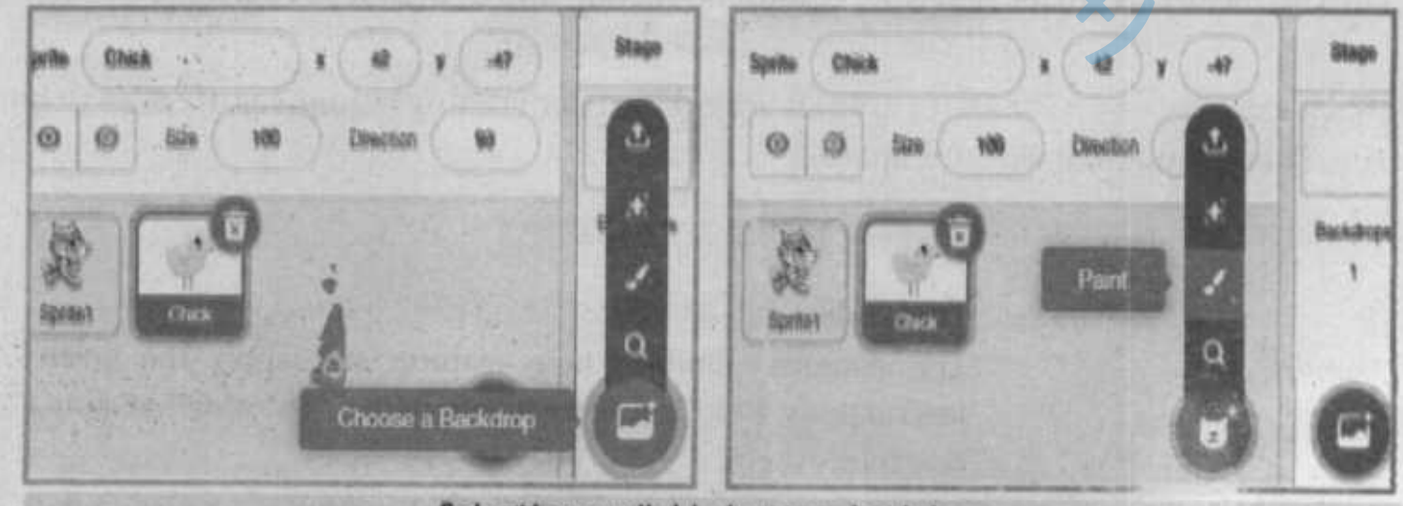
Choosing 'Paint' allows users to draw a customized backdrop.

Activity

Try changing the position and notice the change in position of the sprite.

Tip

A backdrop for Stage can be selected from the given library, and can be drawn by the users.



Selecting available/custom backdrop

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4.4 Scratch Code Blocks

4.4.1 Working with Scratch Code Blocks

Blocks are commands that are used to create programs in scratch. These are 'Drag n Drop' blocks which allow the user to write programs without typing commands. There are a number of block types like motion, looks, sounds, etc. These blocks can be found on the left most of the screen in Blocks Palette. Clicking on each block category reveals the command blocks related to that block. A user can drag and drop blocks in the middle to make a program. These blocks can be joined over or under other blocks to make a group; grouped blocks can be moved together by dragging.

Try to drag 'point towards' block in the middle, and then click it. Notice the sprite turns towards the mouse pointer regardless of its position. However, if you use 'glide' block instead, the sprite moves towards the mouse pointer or towards a random position; in the number of seconds mentioned.

The block 'change y by' and 'change x by' move the sprite in terms of the mentioned steps in y and x axis, respectively.



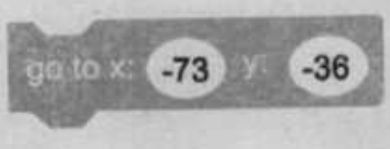


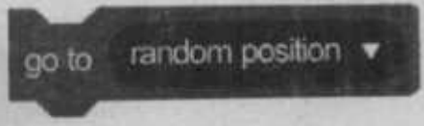


4.4.2 Changing position of Sprites via code

A user can change the position of the sprite by using 'go to' command. There are two variants of 'go to':

- **'go to random position'** which takes the sprite to a random position on screen; when clicked it takes the sprite to a random position on the output area.
- **'go to x: y:'** which moves the sprite to a given position on the stage; when clicked it takes the sprite to a fixed location as provided in the code block. A user can change coordinates to see the effect.



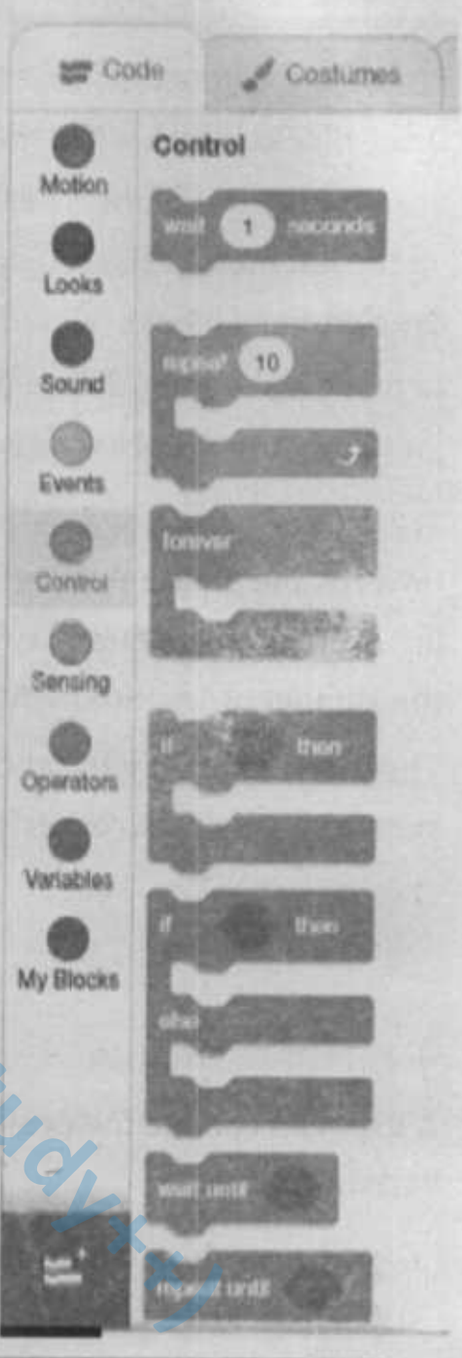


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4.5 Control Block in Scratch

Loops are used to repeat a certain block of code for a known or unknown number of times.
Common loop commands used in scratch are:

- Repeat,
- Repeat until,
- *Forever.*



4.5.1 Repeat Command

Repeat command is used when a block of code is required to run for a given number of times.

Example:

If 5 is used as an argument in repeat command, it will repeat the code blocks inside the 'repeat' loop 5 times.

The code in figure will make the sprite to move 10 steps forward and play sound.

Then, sprite will take another 10 steps and play the sound again. All together steps taken and playing of sound will iterate for 5 times.



Activity

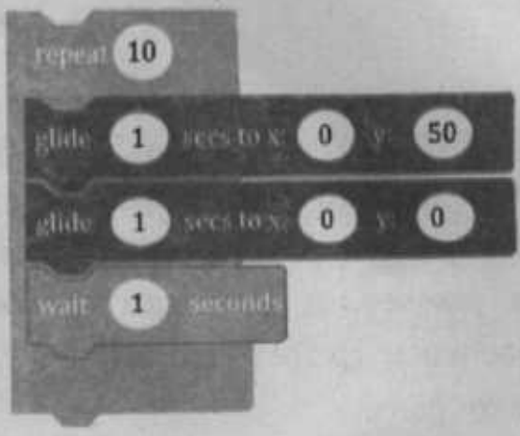
1. What will happen if we change the value in repeat to 10?
2. What will happen if we change the value in "move" to 5 or 20? Try it on your computer.



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Example:

This will animate the sprite to appear jumping between two (x, y) coordinates on the stage.



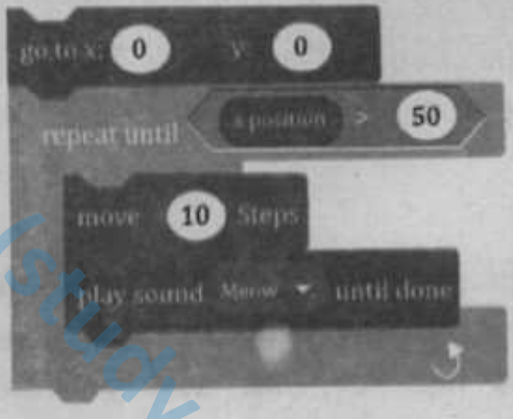
4.5.2 Repeat Until Command

Repeat until command is used to run the code inside the loop until the given condition/test remains false. It will exit the loop when the condition becomes true.

The code will do the following steps:

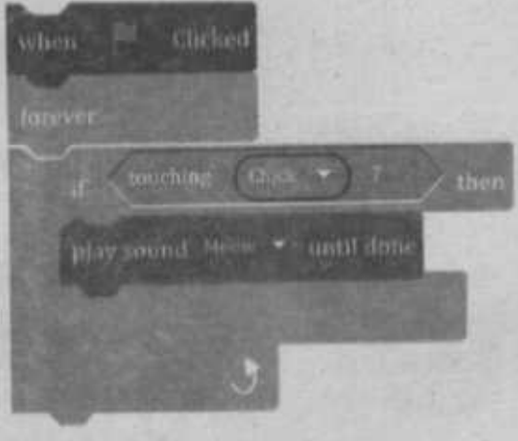
1. It will take the sprite to middle of the stage i.e., position (0, 0)
2. Will check if the position of x of sprite is greater than 50 or not. If the position is not greater than 50, then it will go inside the repeat until loop and perform
   a. Move 10 steps
   b. play sound
   c. go back to Repeat Until loop to check given condition again.

When sprite moves 10 steps forward the loop will run 6 times.



4.5.3 Forever Command

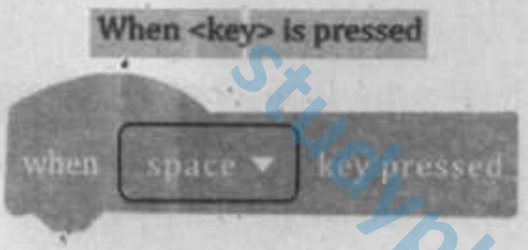
Forever is a command that allows the code inside it to run forever. A user can use Stop button on the top to end the loop. Forever block is used to run a block of code forever (until externally stopped). Any number of commands can be listed inside Forever command.



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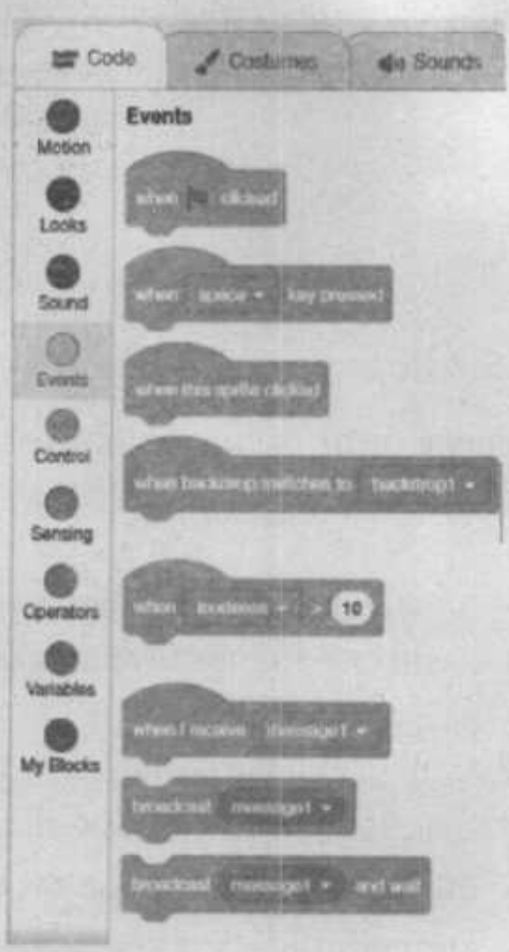
4.6 Handling Events

Scratch provides an effective way of interacting with the external events, for example, it can detect when mouse pointer is moved, or any key is pressed. A user can control code for a particular sprite to run when any of such event takes place.



It is used to detect if a mentioned key is pressed. Key can be selected from dropdown menu within the block. Review the code below

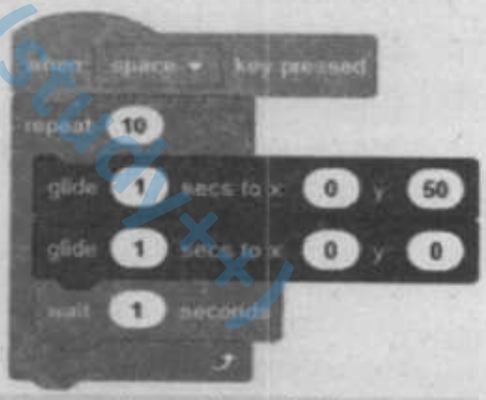
This code will run when "Space" key is pressed.



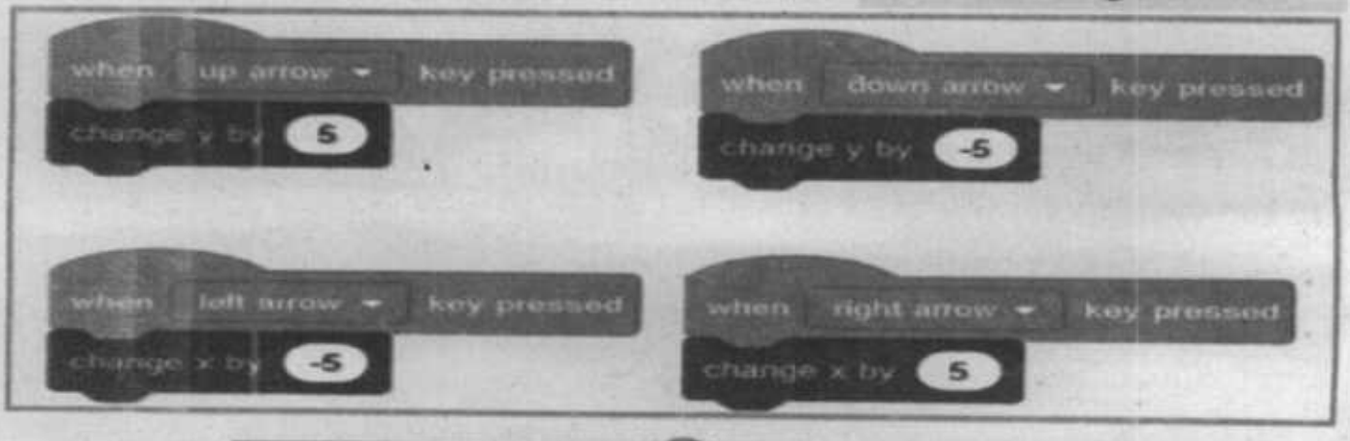
4.6.1 Controlling Sprite Movement:

Add a new sprite, like a basketball; and write the code provided in figure.

You will see that now you can control the movement of the sprite 'ball' using the four directional/arrow keys. This is a good breakthrough towards creating interactive games.



Bouncing a ball

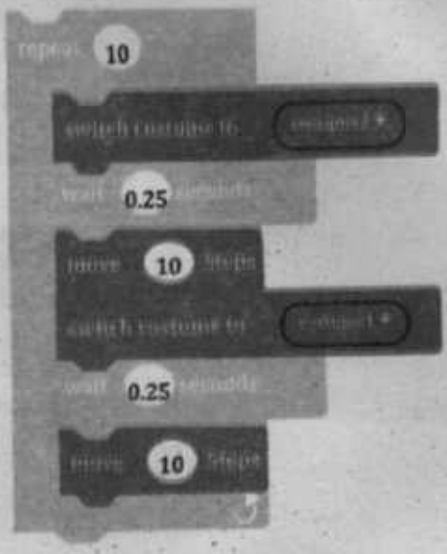


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4.6.2 Using Sprite Costumes

Looks block category contains blocks related to appearance of Sprites.

With Sprite-1 selected, write the given code in script area. Notice the purple blocks 'switch costumes to ...'. These are two different postures of Sprite-1 represented as 'costume1' and 'costume2', changing the costume with movement makes the sprite appear walking.

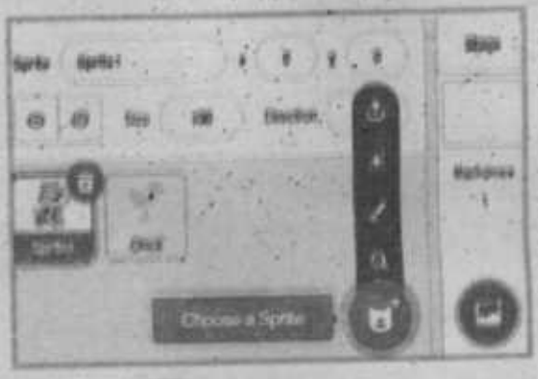


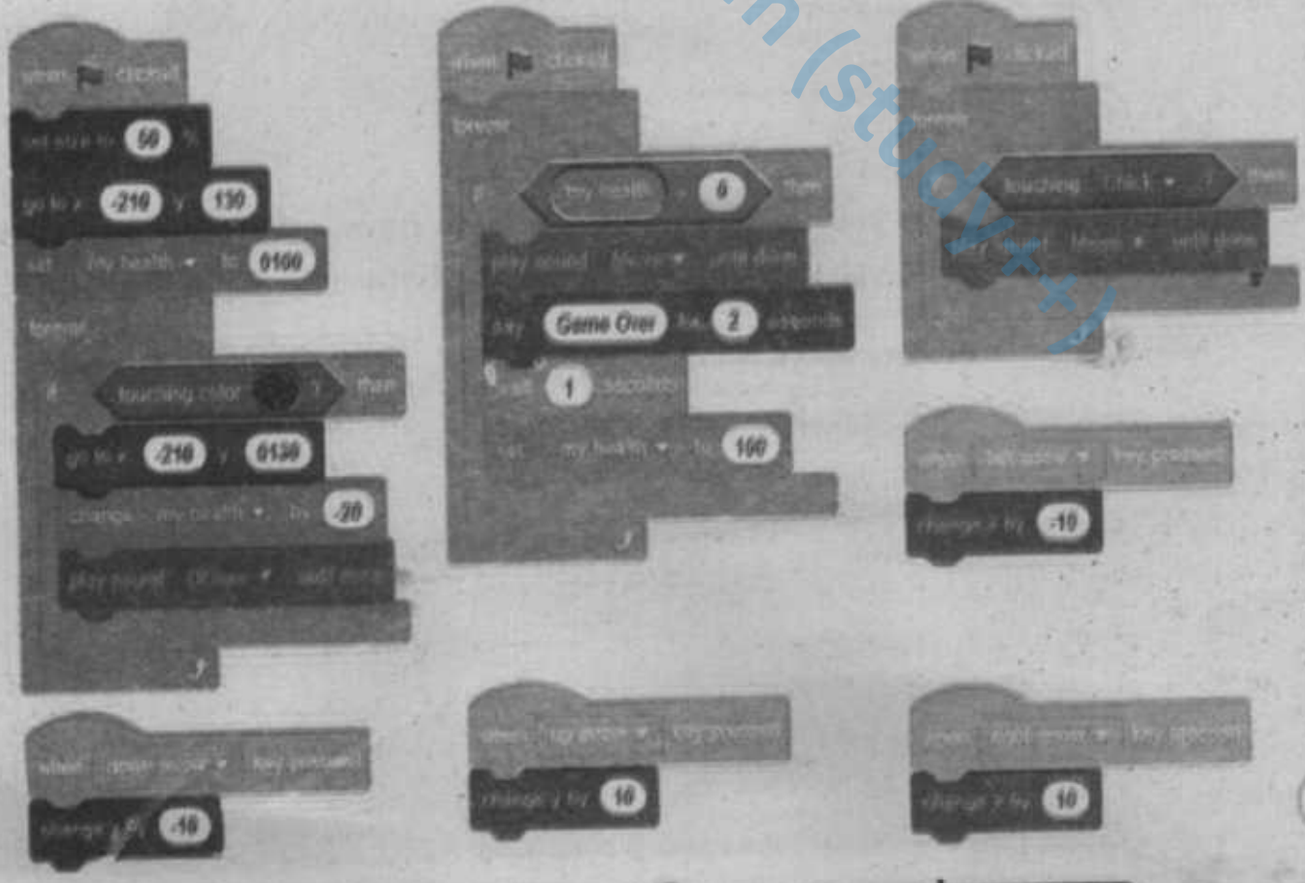
A walking sprite

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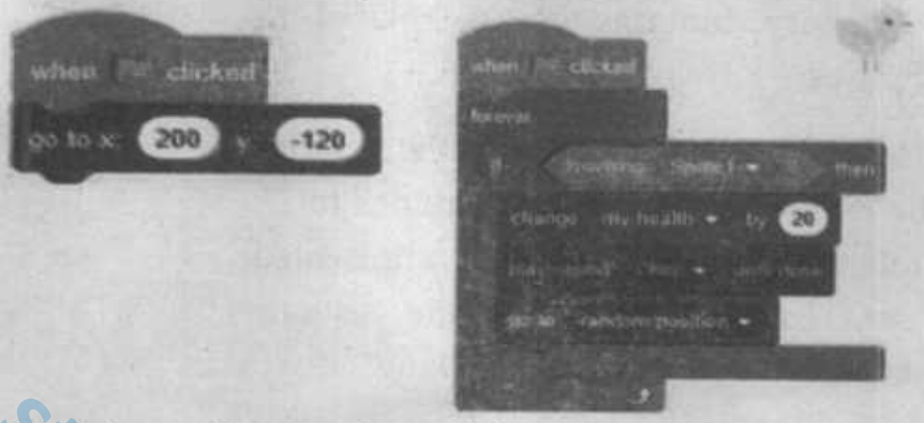
4.7 Developing a Basic Game

This example helps to get started with building interactive games with scratch. It works with two sprites: a Cat and a Chick. You can select these Sprites from Sprites list.
Select Sprite1 (the cat) and develop code as shown in the picture.





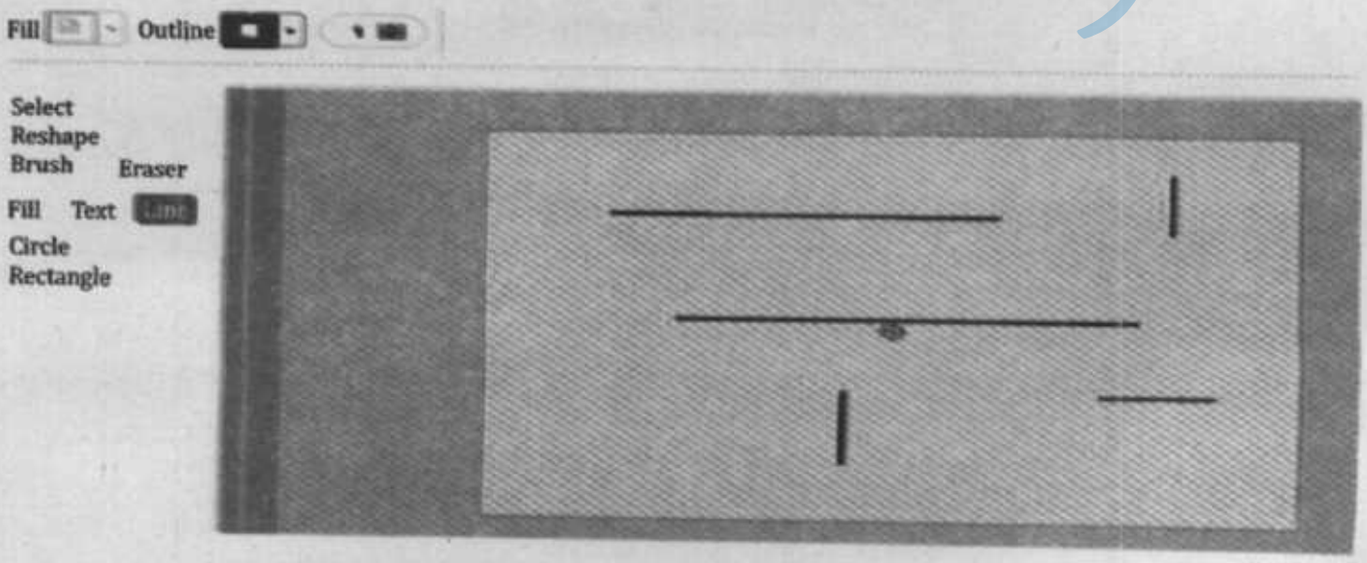
Then select sprite 'Chick' and develop the following code.



Then select the Backdrop painter as shown below:

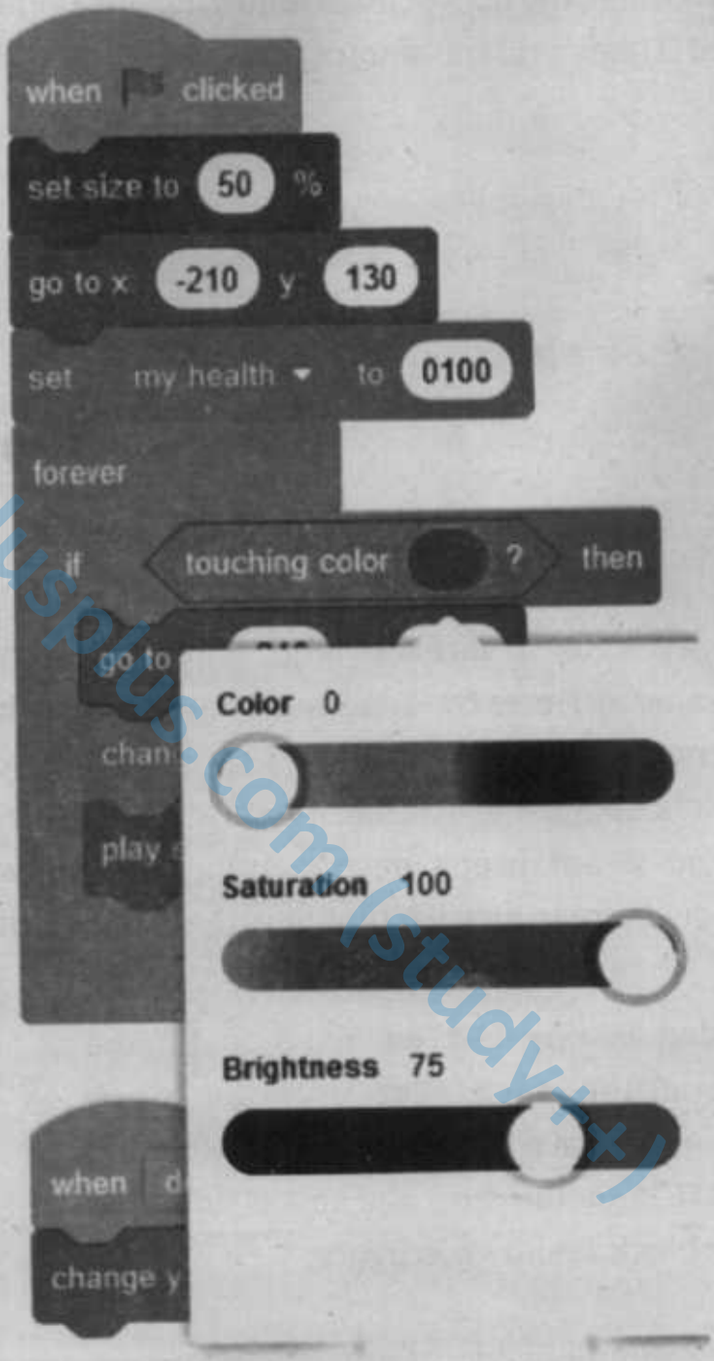


This will open the backdrop painter window. Draw a few lines in red color as shown below. Be careful to leave gaps so that the Cat can move in between.



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Note: Make sure to use the same color to draw lines which is used for sensing the touch. Choose color picker is sensing color and drag over a color to be sensed.

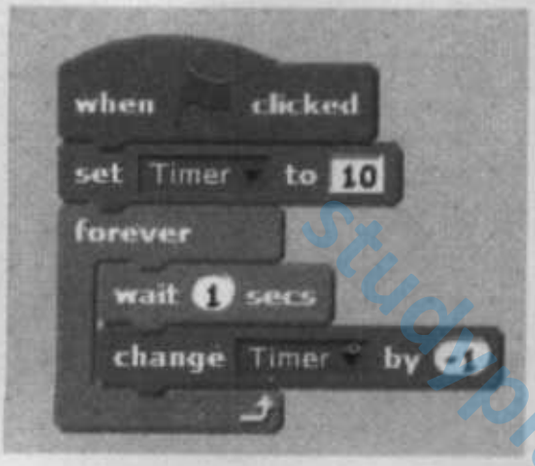


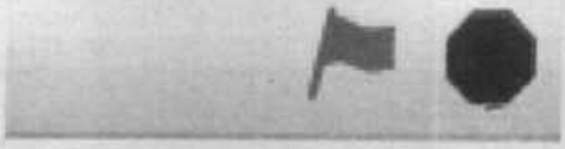
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Your first basic game is ready to be played. Click on the Green Flag to start the game, use arrow keys to move the cat and catch the Chick. The scores change when the Cat hits the red line(decreases), or it catches (collides in other words) the Chick (increases). Use your imagination and add more sprites to add fun to the game.

4.8 Create a Countdown Timer

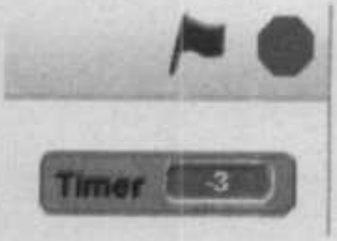
To create a timer, first select and place a 'when flag clicked' event. This way, whenever the green flag is clicked, the instructions following this event are executed. Next create a variable named 'Timer' and set value of timer to 10.



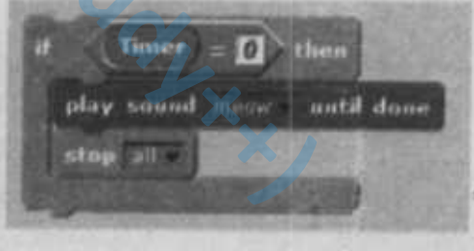




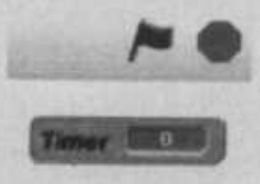
Thereafter, incorporate a forever loop where we will decrement the value of Timer by -1. Additionally, set delay by adding wait command and set its value to 1 second. Now, let us execute it by clicking the green flag. It works, but 'Timer' does not stop on 0 but keeps decrementing and shows negative values on decreasing such that negative values start to show.

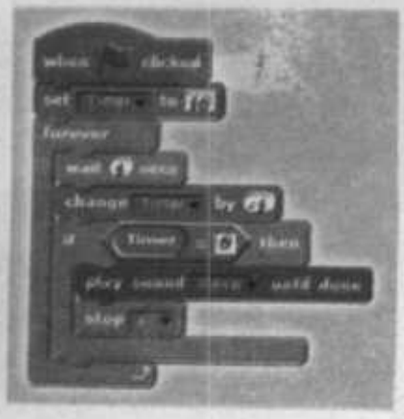


Thus, the starting is fine but we need to fix the terminating condition such that program stops smoothly. It means we have to check for condition that if timer reaches 0, it should stop and this is achieved through the code block as shown in figure.



Hence, the final code looks like the figure below and when executed it stops successfully when value of timer reaches 0.





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Summary

- **Data** is processed and stored in the form of information.
- **Digital devices** store information in binary arrangement, i.e. in the form of '0's & '1's.
- In **binary number** framework, only 2 digits are required, 0 and 1; rather than 10 distinct digits that form the decimal framework.
- **Number System conversion**
- To convert a binary number into decimal, put the respective power of 2 on the binary digits from right side while starting from 0.
- To convert a decimal number into its corresponding binary number, divide the number by 2 repeatedly till the quotient is no further divisible by 2, merge all the numbers to attain, corresponding binary number.
- The **events and coordinates** can be combined to allow a user to move a sprite via input devices or automatically without user intervention.
- The **conditional statements** use mathematical operators on a variable (e.g. if the score is greater than 10, or if the timer is less than 0), or set a condition for when two sprites collide (e.g. if touching another sprite).
- A **variable** is created, set and changed under certain conditions to either increase value (e.g. increase the score when the player touches a sprite) or decrease in value (e.g. countdown timer).

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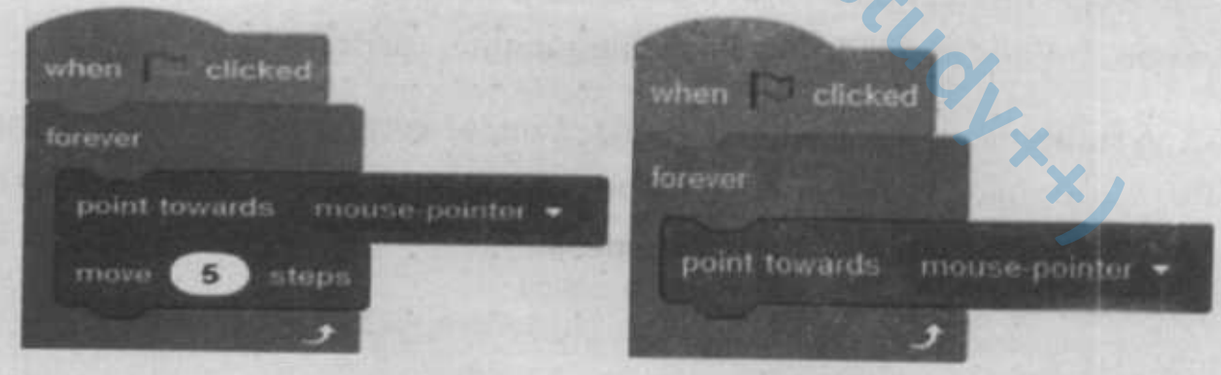
Exercise

Short response questions:

1. How is information stored on computer?
2. Convert the following decimal numbers to binary numbers:
   a)13 b) 17 c) 21 d) 31
3. Convert the following binary numbers to decimal numbers:
   a)1001 b) 1100 c) 1000 d) 1010
4. What is the difference in visual outcome of Move and Glide commands?
5. Differentiate Repeat and Forever control commands. Give one example of problem for each where they can be used.
6. Write down the functions of the following commands if used with any sprite:



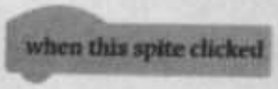
7. What will the following two sets of codes do when Flag is pressed? If possible, try running these sets of codes on a computer after your answer and compare.



8. Which of the following can be used to start a set of codes? Tick which are appropriate.

a. ☐  b. ☐ 

c. ☐ 

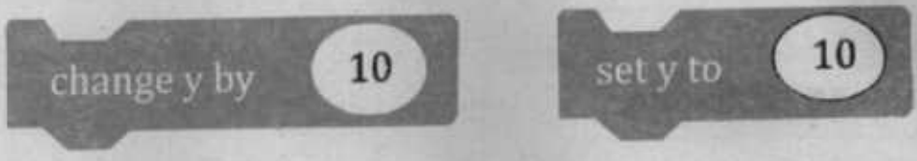
d. ☐ 

e. ☐ 

f. ☐ 

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9. What is the difference between the following two commands from Motion Category.



10. Label the appropriate areas of the picture below using the given words: Stage, Sprite, Programming area, Blocks Palette, Flag, Sprite Properties



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Activities

1. Develop a project to bounce a moving ball against outside walls.
2. Develop a story /dialogue between two characters. Also attach proper background.
3. Design a piano with eight keys. Attach a different sound with each key.

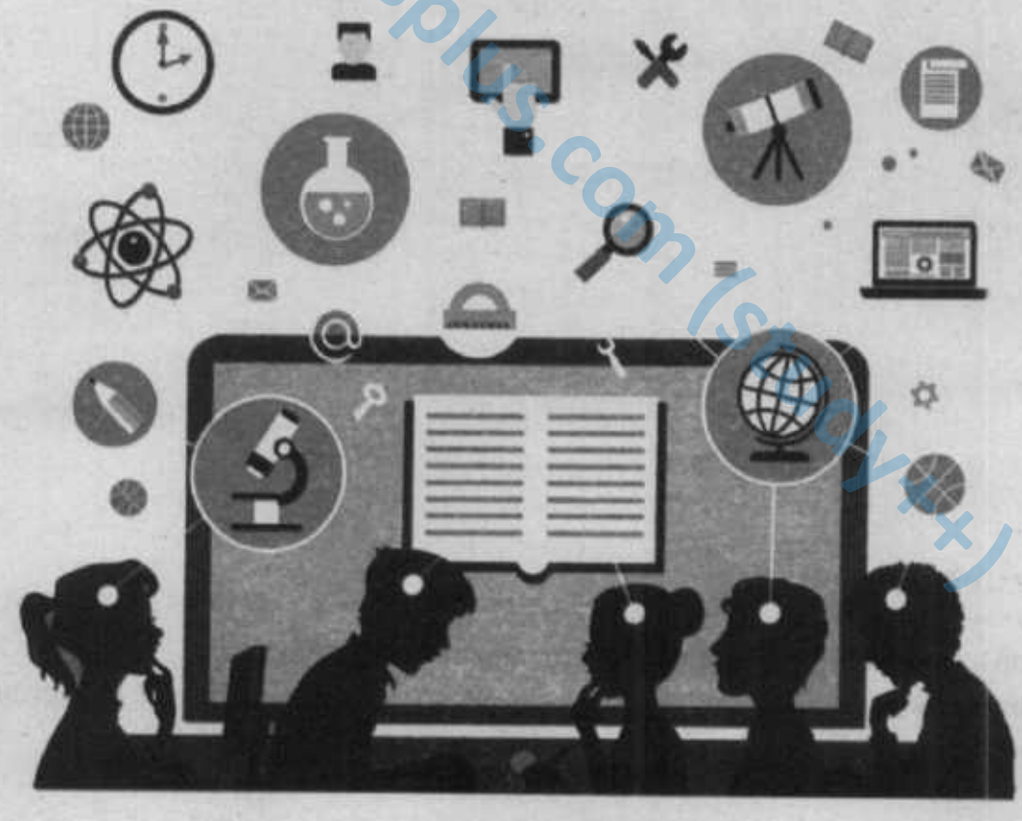
5 Digital Citizenship

Learning Outcomes

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

- identify ways to protect against malicious activities or behaviors in the digital environment

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5.1 Computer Ethics

Digital citizenship refers to the responsible use of Information and Communication Technology (ICT). A good digital citizen has the knowledge and skills to responsibly use computers, Internet and ICT devices.

Computer ethics refers to what is right and what is wrong while using digital technology. It is a set of moral principles for proper and responsible use of Internet, computers and ICT devices.

5.1.1 Ethical Use of Computers

The following principles and guidelines are to be followed to be safe, responsible and respectful while using digital technology.

- Use computer in a responsible way that shows respect to everyone online.
- Never use bad language while using social websites.
- Do not use computer to harm others.
- Do not use computer to steal, edit or destroy other's information.
- Do not interfere in other's computer work.
- Do not view others files without their permission.
- Do not make other's personal information public without their permission.
- Do not spread fake news via Internet.
- Do not use copyright software which you have not purchased.

5.1.2 Online Safety Rules

When we are online, it is very important to protect our computer, our data and ourselves. The following are safety rules when using Internet.

- Do not give your personal information to strangers.
- Do not download anything that looks suspicious or comes from a site you do not trust.
- Make online purchases from secure sites having a business office or has been registered with state registration organization/authorities.
- Choose strong password, mixing letters, numbers and special characters.
- Be careful who you meet online. People you meet online are not always who they claim to be.
- Keep Windows and your anti-virus software up to date.
- Keep your browser privacy settings on to protect your privacy.

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5.1.3 Ways to be responsible and respectful online

- Treat others how you want to be treated
- Respond to others in a fair, responsible and respectable way
- Acknowledge and accept others' culture and religion
- Respect others' privacy
- Avoid racism, bad language and insults

5.1.4 Improper use of computer resources

The following are improper uses of computer resources:

- Use of computer resources that cause harm to other users
- Sending harassing or offensive messages
- Disclosing to or sharing users' passwords with others
- Uses that violate confidentiality of information
- Pretending to be someone else when using computer technology

5.1.5 Intellectual property right

Intellectual property right means a copyright, a legal right of a producer of a product such as a software or poetry, etc. A producer has right to sue if someone violates the copyrights.

Do you know

Intellectual Property refers to innovative and creative ideas, information and knowledge as the result and outcome of research.

5.1.6 Plagiarism

Plagiarism refers to presenting someone's work or ideas as your own without consent of the original creator.

For example, copying full text or part of it and pasting it in your document and passing it on to others as your own is plagiarism. Plagiarism is an act of fraud and it is punishable by law. It can be avoided by citing the source from where certain material is taken.



Plagiarism

5.1.7 Digital Piracy

Digital piracy is a type of theft. Copying software or digital content without permission of the content creator is stealing. Normally purchasing content means that you are allowed to listen, play, read, or use that content for yourself.



Digital Piracy

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It does not give you the right to copy it, share it, trade it or download it. People who copy digital content for which they do not have permission to use are digital pirates.

Digital piracy includes:

- copying digital content a friend has bought - like music, pictures, videos, movies, games, books or software.
- copying digital content from Internet or any computer.
- buying content from a source that stole the content and made copies to sell – like counterfeit versions of games, movies, music, books, or software.

5.2 Digital Media Bias and Messaging

Digital media bias and messaging refers to widespread bias of journalist and news producers in reporting various events and stories in digital media. Digital media includes social media sites, news websites, Internet-based radio and television channels. Media bias is the tendency to support or be against someone or something. Media bias is influenced by factors such as your background, political affiliation, personal experience, etc.



5.3 Cybercrime

Any illegal activity committed via computer and Internet technology is known as cybercrime. Cybercrime may be committed by an individual or a group by having illegal access to computer systems.

Cybercrime includes:

- theft of information belonging to an individual, a business or an organization.
- Intentionally causing physical or mental harm or
- damaging the reputation of the victim.
- stealing money via online banking.



Cybercrime

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- harassing and stalking Internet users.
- spreading viruses or rumors.
- posting negative comments about people.
- sending threatening emails.
- violation of copyright.
- downloading illegal software.
- using someone else's computer resources without permission.

5.3.1 Information privacy and confidentiality

Computer users enter their personal information in websites to sign up or register for various services. This may create issues of privacy and confidentiality as others can access personal information illegally for harmful purpose. Organizations who hold personal data of people are responsible not to allow unauthorized access to it or disclose it to others. This is known as confidentiality and privacy means giving control to users what information they want to share with others.

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5.4 Cybercrime Categories

5.4.1 Hacking

Hacking is an unauthorized attempt to gain access to someone's computer or network. The person engaged in hacking activities is known as hacker. A hacker may alter system or security features such as passwords, to accomplish a goal that differs from the original purpose of the system. It also aims to have access to important data and information, breaching privacy.



Hacking

5.4.2 Identity Theft

Identity theft is a specific form of fraud in which cybercriminals steal personal information and data. These may include passwords, data about the bank account, credit cards, debit cards, social security, and other sensitive information. Through identity theft, criminals can steal money and obtain other benefits in other person's name.



Identity theft

5.4.3 Cyber bullying

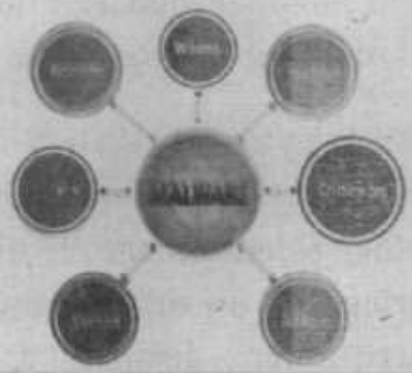
Cyber bullying or Cyber harassment is an online act of threatening people. The harmful bullying behavior can include posting rumors, threats, personal remarks, sharing victims' personal information or hate speech, etc. Cyber bullying can take place on social media sites such as Facebook, MSN or Twitter, etc.



Cyberbullying

5.4.4 Malicious Software

Malicious Software, commonly known as Malware, is a program which causes harms to a computer or network in the form of viruses, worms, trojans, spyware, adware, etc. Common symptoms of malware attacks include automatic rebooting of computer, computer running slow, deletion of files, etc.



Malware

5.4.5 Computer Viruses

A computer virus is a malicious program that are designed to spread from device to device and are attached with other files and documents. In other words, the computer virus spreads by itself into other executable code or documents. The purpose of creating a computer virus is to infect vulnerable systems, gain admin control and steal user sensitive data.



Computer Virus

One of the ideal methods by which viruses spread is through emails – opening the attachment in the email, visiting an infected website, clicking on an executable file, or viewing an infected advertisement can cause the virus to spread to your system. Besides that, infections also spread while connecting with already infected removable storage devices, such as USB drives.

5.4.6 Protection Against Malware

- Keep Windows and other software updated.
- Install antivirus software and keep it updated.
- Frequently scan your computer for malware to remove it with antivirus software.

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- Be careful when downloading email attachments as these may be infected with malware.
- Download material only from trusted website.

5.4.7 Financial Fraud

Financial frauds often occur when someone releases his bank account information to the offender or through some response to an email or on phone call soliciting account details. This may include the identity theft of a victim.

The offender then uses the victims personal information to create additional accounts through which money is laundered, or to open additional credit cards, etc.

5.4.8 Cyberstalking

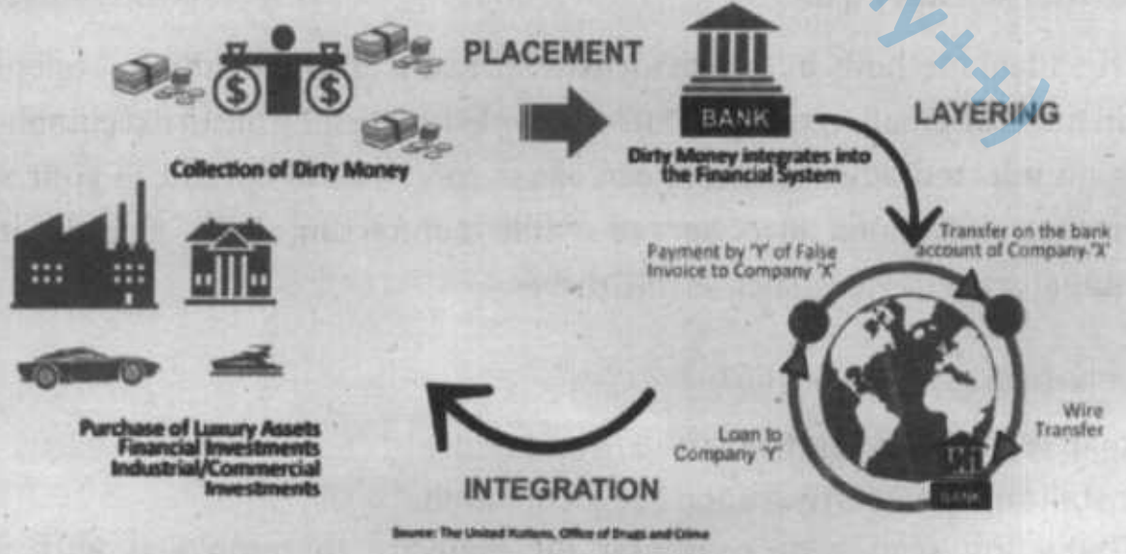
Cyber stalking refers to the use of the Internet or other electronic means to harass an individual, a group, or an organization. It may include false accusations, defamation and identity theft for harassment.



Cyberstalking

5.4.9 Money Laundering

Money laundering is the process of making transaction to hide actual source of money. The rise of online banking system, online payment services, and money transfers using mobile phones, have made detecting the illegal transfer of money more difficult. Money can also be laundered through online auctions and sales, gambling websites and even virtual gaming sites.



Money Laundring

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5.4.10 Electronic terrorism

Electronic or Cyber terrorism is the use of Internet to conduct violent acts that result in or threaten loss of life or significant bodily harm to the victim. The activities may include acts of disrupting on large scale computer networks by transmitting computer viruses, computer worms and or installing unwanted software or programming scripts, etc.

5.4.11 Vandalism and Extortion

Computer vandalism is a process that uses a program to perform malicious function like extracting user's password or other data and / or erasing the hard disk. Whereas, in cyber extortion, the hacker holds your data, website, computer system or other sensitive information, hostage until you meet their demands.

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5.5 Major Online Activities

5.5.1 Social Networking

Social networking refers to a group of people interacting and sharing views, ideas and information using social networking platforms. These platforms include Facebook, Twitter, Instagram, WhatsApp, etc.



Social Networking

Benefits of social networking are:

- Social networking allows people to communicate and share digital photos and videos with families and friends.
- It helps businesses to advertise and sell products.
- It helps to inform people about events being held all over the world.
- It allows computer users to participate in discussions.

5.5.2 Online Banking

Online Banking provides baking services to bank account holders to manage their accounts over the Internet.

Account holders can use the online services through bank's website or via bank's smartphone app. It allows account holders to pay bills, recharge phone balance, check account balance, download bank statement and transfer money from and to his account. Online banking is also known as Internet banking.



Online Banking

5.5.3 Internet Surfing:

Internet Surfing means browsing the Internet using an Internet browser. Internet browsers are software programs that allow computer users to open websites and navigate from one page to another on World Wide Web. Popular Internet browsers are Microsoft Internet Explorer and Google Chrome. Internet surfing allows us to do many things such as online shopping, online banking, social networking and easily finding information on any topic.



Internet Surfing

5.5.4 Audio and Video Conferencing

It is a method for interacting or chatting verbally or via video using Internet technology. Audio conferencing allows people to connect on a call for remote communication to hear and talk to each other. Video conferencing enables people to hold virtual meetings, no matter where in the world they are. Video conferencing allows participants to see, hear and talk to each other over the Internet. Different applications such as Skype, WhatsApp and Messenger provide these services.

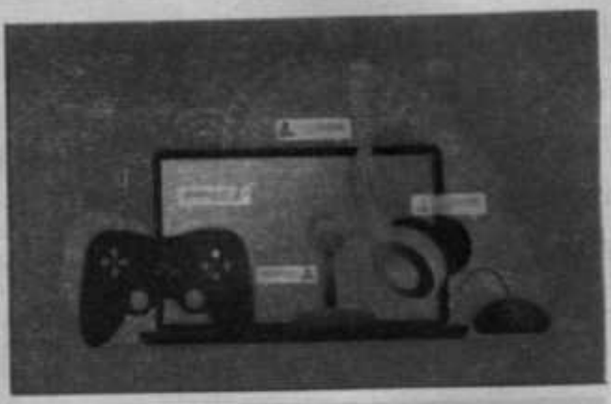


Audio and Video Conferencing

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5.5.5 Online Entertainment

Online Entertainment refers to live streaming or downloading and playing games, videos and music. Online entertainment makes our life full of fun and excitement which is good for our physical and mental well-being. It allows us to watch movies, TV shows, magic shows, concerts, sporting events, comedy shows and playing video games.



Online Entertainment

5.5.6 Map Direction/GPS

Map Direction or Navigation is one of the major online activity. There are numerous applications available online. These applications use Internet to connect to a Global Positioning System (GPS) navigation system to provide with a plotted path and voice-guided instructions on how to arrive at a given destination. This application also displays the user's progress along the route and issues instruction for each turn.



Map Direction/GPS

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Virtual University

Online Education

5.5.7 Online Education

Online education is electronically supported learning that relies on the Internet for teacher/student interaction and the distribution of class materials. With online education, students can turn anyplace with Internet access and electricity into a classroom. It can include audio, video, text, animations, virtual training environments and live chats with professors. It is a rich learning environment with much more flexibility than a traditional classroom.

5.5.8 Online Auction

Online auction or Virtual auction is a service provided to sell or purchase products or services to the person who bids the highest price. The starting bids are low but increases with the market demand and popularity. The online auctions are widely expanding due to its non-geographical and flexible time limitations. Online auctions also need access to the Internet and a valid method of payment, such as using credit card/debit card. The leading auction sites are ebay, Yahoo auction, WebStore, etc.



Online Auction

5.5.9 Online Shopping

Online shopping is a process of buying and selling products or services over the internet like Amazon, OLX, daraz.pk, etc. A typical online store enables the customer to browse the firm's range of products and services. Online shopping websites display photos or images of the products, along with information about the product specifications, features and prices. Online stores usually enable shoppers to use "search" features to find specific models, brands or items. Online customers must have access to the Internet and a valid method of payment in order to complete a transaction, such as a credit card/debit card, etc.



Online Shopping

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5.5.10 Online Information Sharing

Online Information Sharing is a process of exchanging data or information between people, organizations and businesses. A computer user may share a picture or video on Facebook, WhatsApp, YouTube, etc. An organization may share an online weather report for its viewers in general. But when it comes to sharing of personal information, there are laws in most countries prohibiting it without consent of the individual to whom the data belongs.



Online Information Sharing

5.5.11 Medical Assistance

Medical assistance is also known as health assistance. In today's modern age, it is possible to consult and get advice from the specialists around the world in a real time situation via digital technology. Medical assistants often take medical histories and record vital signs of patients and complete administrative and clinical tasks in the offices of physicians, hospitals, clinics, etc. These records if required are shared with specialist doctors for advice.



Medical Assistance

5.5.12 Online games

Online Gaming refers to playing video games through Internet or any other computer network. Online games are very popular among children and young people. PCs, consoles and mobile devices are used for online gaming. Most of the online video games are played by multiple players who are in different locations across the world. Very often, participants of online games can interact with other gamers in real time via text, audio or video chat.



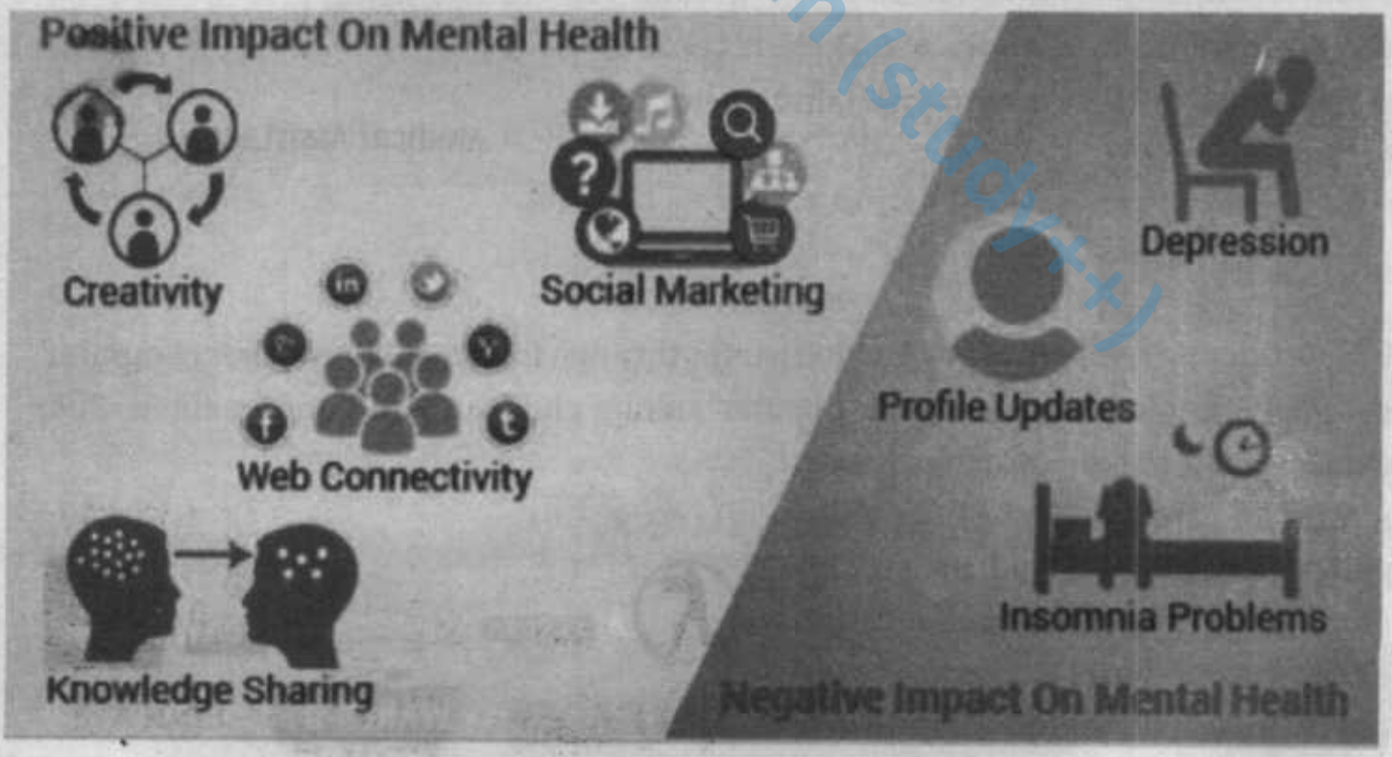
Online Games

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5.6 Positive and Negative Impact of Social Media

Positive Impacts	Negative Impacts
• People remain connected with family and friends all over the world. • People can share their views and ideas with a large audience. • It is a great marketing tool for advertising and selling products • Useful for social awareness and fundraising. • Useful for learning and education • Provides opportunities for remote employment • Provides quick access to information • You can drive huge traffic to your website using social media	• Online interaction is reducing face to face socializing. • It is increasing the use of cell phone. • Cell phones emit dangerous radiation which is harmful for our brains. • Personal information can become public through social media. • Can be used for cyber bullying. • Addiction to social media can waste time.

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Positive and Negative Impact of Social Media

5.7 Pakistan's Cybercrime Laws and Punishments

Crime	Punishment
Spreading false information about an individual	Up to 3 years in prison or up to Rs. 1 million in fine or both
Making / spreading explicit images or videos of an individual	Up to 5 years in prison or up to Rs. 5 million in fine or both
Cyber stalking	Up to 3 years in jail or up to Rs. 1 million in fine or both
Hacking email / phone for stalking	Up to 3 years in jail or up to Rs. 1 million in fine or both
Making videos/pictures and distributing without consent	Up to 3 years in jail or up to Rs. 1 million in fine or both
Cyber stalking with a minor	Up to 5 years in jail or up to Rs. 10 million in fine or both
Hate speech	Up to 7 years in prison or fine or both
Spamming	Three months in prison or fine up to Rs. 5 million or both
Spoofing	Up to 3 years in jail or fine up to Rs. 50,000 or both
Malicious code	Up to 2 years in jail or up to Rs. 1 million in fine or both
Unauthorized access to information system or data	Up to 3 months in prison or up to Rs. 50,000 fine or both
Unauthorized copying or transmission of data	Up to 6 months in prison or up to Rs.100,000 fine or both

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Interference with information system or data	Up to 2 years in prison or up to Rs. 500,000 fine or both
Unauthorized access to critical infrastructure information system or data	Up to 3 years in prison or up to Rs. 1million fine or both
Unauthorized copying or transmission of critical infrastructure data	Up to 5 years in prison or up to Rs. 5million fine or both
Glorification of an offence	Up to 7 years in prison or up to Rs. 10 million fine or both
Cyber terrorism	Up to 14 years in prison or up to Rs. 50 million fine or both
Online recruitment, funding of terrorism	Up to 7 years in prison or fine or both
Electronic fraud	Up to 2 years in prison or up to Rs. 10 million fine or both
Unauthorized use of identity information	Up to 3 years in prison or up to Rs. 5 million fine or both

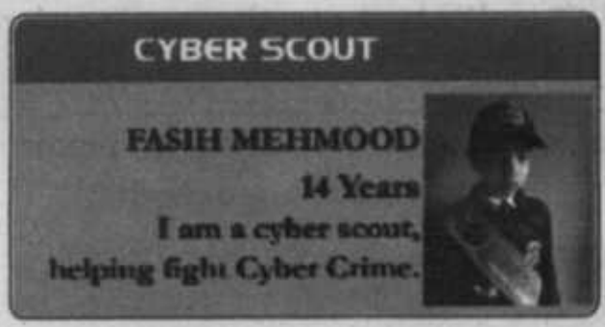
Cybercrime Act, 2016

Note: This act is included for awareness only and not be assessed in examination.

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WHO IS A CYBER SCOUT:

Cyber Scout is a student with a unique aim to promote awareness about cyber crime in the society.





Summary

- **Computer ethics** refers to what is right and what is wrong while using digital technology. It is a set of moral principles for proper and responsible use of Internet, computer and ICT devices.
- **Computer users have to follow all the principles and guidelines** to be safe, responsible and respectful while using digital technology. Computer should not be used to harm others in any way.
- **Intellectual property** means a copyright, a legal right of a producer of a product such as software or poetry.
- **Plagiarism** refers to presenting someone's work or ideas as your own without the consent of the owner.
- **Digital piracy** is a type of theft. Copying software or any type of digital content without the permission of creator is stealing and it is illegal.
- **Digital media bias and messaging** refers to widespread bias of journalists and news producers in reporting various events and stories in digital media.
- **Cybercrime** is any illegal activity committed via computer and Internet technology. Some common cybercrimes include hacking, identity theft, cyber bullying, financial fraud, cyber stalking and money laundering.
- **Online activities** refer to online products, services, or information provided on the Internet. Some examples of major online activities are social networking, online banking, audio and video conferencing, online entertainment, online education and online shopping.

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Exercise

Multiple choice questions:

1. The set of moral principles for responsible use of Internet, computer and ICT devices is known as:
   (a) Computer Education (b) Computer Ethics
   (c) Online Safety (d) Internet Surfing
2. If you regularly back up your data, this is a _____ against the threat of data loss.
   (a) firewall (b) class
   (c) security (d) countermeasure
3. A _____ is someone who uses a computer and a network or Internet connection to intrude into another computer system to perform an illegal act.
   (a) hacker (b) programmer
   (c) terrorist (d) spammer
4. _____ is a form of warfare which is used by the cyber terrorists to harm or gain control of important computer systems.
   (a) Cyberhacking (b) Cybertapping
   (c) Cybercrime (d) Cyberterrorism
5. Which of the following crime is related to stealing personal information?
   (a) Cyberbullying (b) Digital Piracy
   (c) Identity Theft (d) Plagiarism

Short response questions

1. What is intellectual property right?
2. What is privacy? How can you protect yourself from online theft of your personal information?
3. Define cybercrime and name different online cybercrimes.
4. What constitutes ethical issues in digital environment?
5. Discuss the advantages of Medical Assistance.

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Activities

1. Prepare a presentation based on any Cyber crime movie or story (relevant /age appropriate)
2. Discussion should be initiated in class by the teacher to make students understand that accountability is important for deviant behaviour. So develop values and skills that enable people to live together peacefully (respect, equality, caring, empathy, solidarity, tolerance, inclusion, communication, negotiation, managing and resolving conflict, accepting different perspectives, non-violence).
3. Create groups of students and assign them the task of making charts to display in the classroom on the following topics.
   (i) Ethical Use of Computer Technology
   (ii) Online Safety Rules
   (iii) Cybercrimes
   (iv) Social Networking
   (v) Protection Against Malware
4. Install any antivirus software on your system.

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6 Entrepreneurship in the Digital Age

Learning Outcomes

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

- analyze the uses and benefits of design thinking for entrepreneurs

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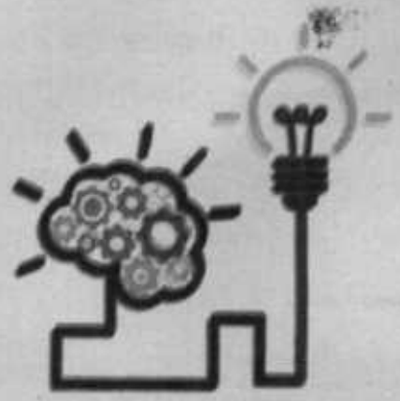


6.1 Entrepreneurship

Entrepreneurship is defined as the act of starting and running your own business. An entrepreneur is a person who is running his own business.

Technology is essential in optimizing a company's business operations. A customer does not have to wait for long to receive a simple reply through text or email.

6.1.1 Entrepreneurship and Innovation



Entrepreneurship refers to the process of developing new business ventures or growing existing ones while innovation is an important prerequisite for gaining a competitive advantage and building a strong and sustainable business.

The purpose of innovation is to come up with new ideas and technologies that increases productivity and generate greater output and value with the same input. Innovation can help you anticipate market changes more quickly. It can also help you differentiate yourself from the competition.

Entrepreneurship is applying the innovation to bring the dreams to reality. It is social invention, which lets people do what they could not previously do. Entrepreneurs take advantage of opportunities to make money on the innovation.



Entrepreneurship



Invention | Process | Market

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For example, the first electric vehicle introduced in the car's market was also an innovation, and new batteries with longer ranges that keep coming out are also an example of innovation.

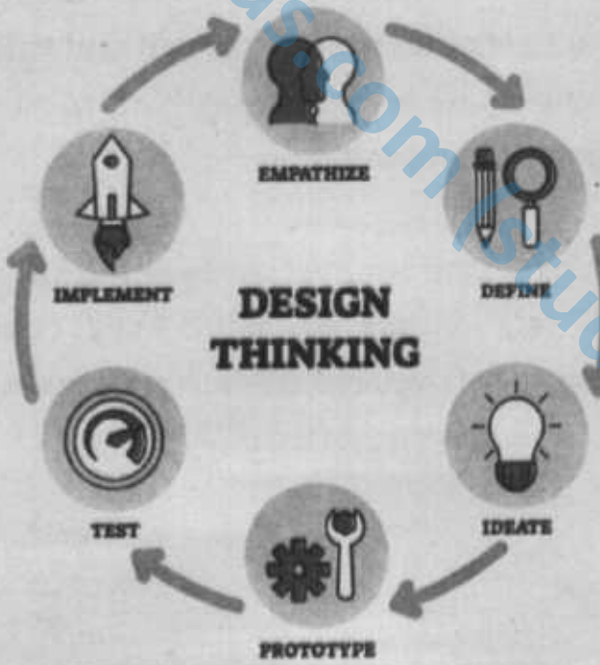
6.2 Design Thinking

Design thinking is a process for creative problem solving which leads to better products and internal processes.

Design thinking is an iterative process that teams use to understand user's requirement, redefine problems and create innovative solutions to prototype and test.

Design Thinking is extremely useful in tackling problems that are ill-defined or unknown, by reframing the problem in human-centric ways, creating many ideas in brainstorm sessions, and adopting a hands-on approach in prototyping and testing. Design Thinking also involves ongoing experimentation like sketching, prototyping, testing, and trying out concepts and ideas.

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Design Thinking

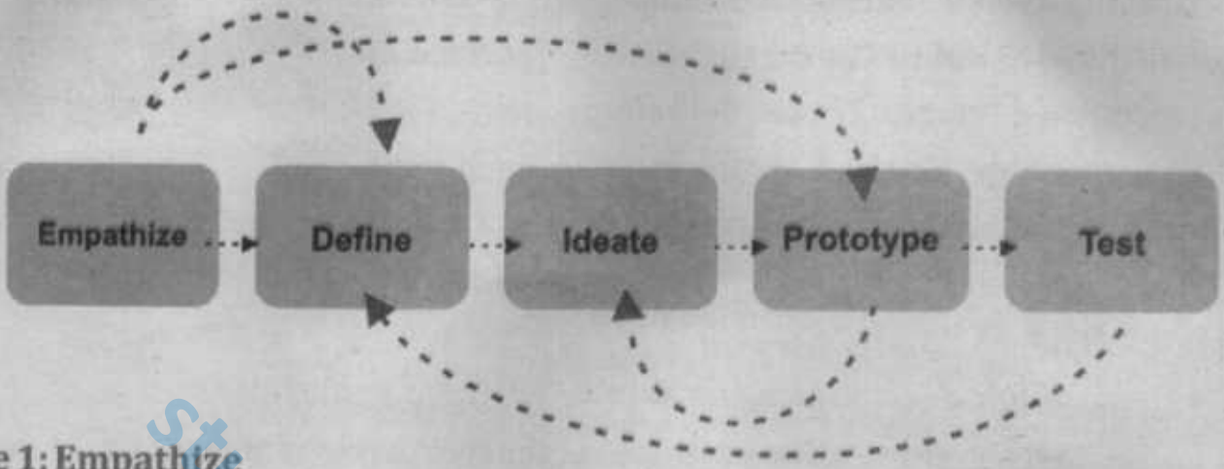
6.2.1 Stages of Design Thinking

The following are the stages of the Design thinking process:

Empathize → Define → Ideate → Prototype → Test

These stages are not always sequential and teams often run them in parallel, out of order and repeat them in an iterative fashion.

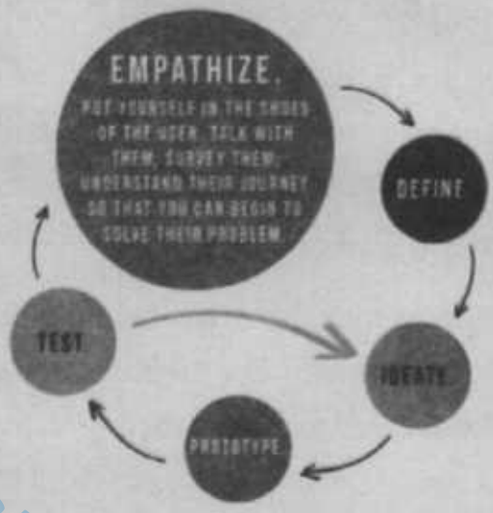
Design Thinking Process



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Stage 1: Empathize

Empathize is the first stage of the design thinking process. One of the main objective of Empathize stage is to identify user needs and behaviors. Design teams conduct research to know the exact requirement of the user.

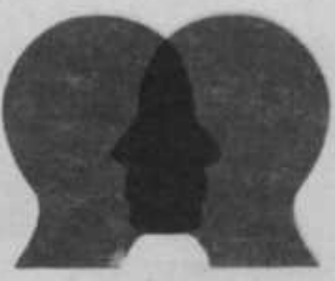


Empathize

They try to get insights of the user by observing and consulting with them. This way, they can understand users' experiences, motivations and problems. Organizations can motivate creativity and innovation by solving such problems using technology.

In a social context, empathy is often what drives us to take action. If we see people suffering or struggling, and we are able to empathize with their situation, we are compelled to help relieve them in some way.

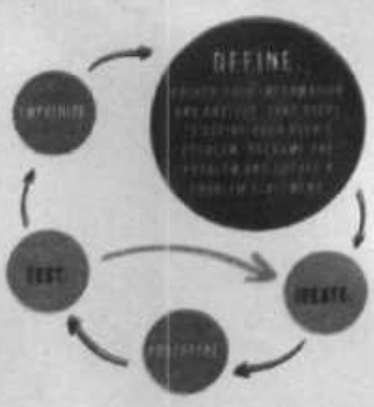
Designers need to build empathy for their users in order to take the right course of action. It is very important to understand the feeling of user while talking about the product or interface.



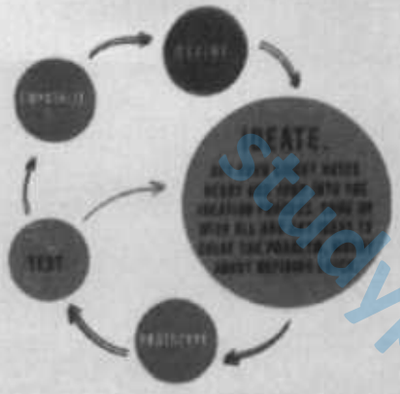
In building empathy, designers can create products which truly please the user and make their lives easier. Without this empathy, the design process lacks the actual need of the end user which often marks the distinction between product success and failure.

Stage 2: Define

Information gathered during the Empathize stage is further analyzed to define the core problems identified in above mentioned stage. These definitions are called problem statements. You can create roles to keep your efforts human-centered before proceeding to ideation.



Define



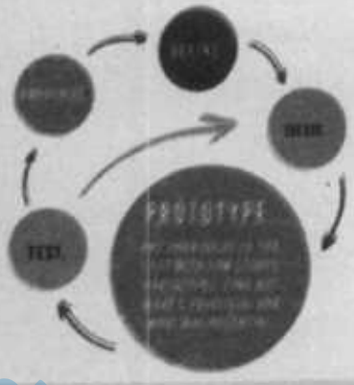
Ideate

Stage 3: Ideate

The outcomes of the two previous stages (e.g. Empathize and Define) enables a designer to generate ideas and think outside the box. In this stage, a designer comes up with new ideas and identifies innovative solutions to the problem.

Stage 4: Prototype

This is an experimental phase. The main object of this stage is to identify the best possible solution for each problem found. A designer must produce some inexpensive, scaled-down versions of the product to shape the ideas generated in the previous stage. This could involve simply paper prototyping.



Prototype



Test

Stage 5: Test

Finally, the prototypes are evaluated using different evaluators to test whether the prototype is producing the desired output or not. Design Thinking is an iterative process, teams may use the results to redefine one or more further problems. Hence, you can return to previous stages to make further iterations, alterations and refinements to find out alternative solutions.

Activity

Design a way to carry water from one point to another without using any kitchen tools. Let them choose the medium of a prototype (Play-dough, blocks, trash bag, etc.)

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Design thinking is a creative process that engages a person in opportunities to empathize and understand user needs, identify problems, brainstorm ideas and finally test these ideas using prototypes to learn and iterate towards the best solution.

Design Thinking is a powerful tool to develop a mindset. It will ensure that our children develop the:

- creative confidence to respond to new challenges
- ability to embrace failure, risk-taking and develop persistence
- ability to identify and define problems to solutions in an innovative way
- ability to learn, unlearn and relearn and 'nothing-is-too-big-to-solve' attitude
- understanding the value of collaboration and feedback

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6.3 Sustainable Development

Sustainable development is a way of organizing society so that it can exist for the long term. For example, using recycled materials or renewable resources to make a new product.

Following are the few sustainable development goals that need to be achieved to ease the world population.

- Quality Education
- Good Health and Well-Being
- No Poverty
- Zero Hunger
- Clean Water and Sanitation

6.3.1 Key challenges in sustainable development are:

- instability, such as conflict between nations
- implementation, such as ensuring programs fit the local context
- governance, such as political will to transform development programs into sustainable long-term practices

Summary

- **Entrepreneurship** is the act of starting and running your own business.
- The **purpose of innovation** is to come up with new ideas and technologies which increases the productivity with the same input.
- **Design thinking** is a process for creative problem solving which leads to better products and internal processes.
- There are five stages of **Design thinking** process: Empathize, Define, Ideate, Prototype and Test.
- The main objective of the **Empathize** is to identify user needs and behaviors.
- **Define** is a process in which information collected during Empathize stage are further analyzed to define the core problems.
- **Ideate stage** enables a designer to generate ideas and think outside the box.
- **Prototype** is a process in which best possible solutions are identified for each problem.
- **Testing** is done to ensure whether the suggested prototype is producing the desired output or not.
- **Sustainable development** is a way of organizing society so that it can exist in the long term.
- There are few **challenges in the sustainable development** such as conflict between nations, implementation of different programs and governance issues etc.

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Exercise

Multiple choice questions:

1. Design Thinking is a _____.
   (a) way of thinking about design
   (b) method and mindset to define, frame and solve problems
   (c) way to separate "thinking" from "making"
   (d) curriculum for teaching non-designers design
2. Design Thinking starts with_____.
   (a) sketching or prototyping with craft materials
   (b) sticky notes or note cards
   (c) empathy and an understanding of human needs
   (d) identifying solutions for your problem
3. Where does the information for defining the problem in the Define phase come from?
   (a) The Testing Stage (b) The Prototype Stage
   (c) The Ideate Stage (d) The Empathize Stage
4. What is the role of the Define stage of design thinking?
   (a) To define the parameters for a prototype
   (b) To define the audience, you're trying to reach
   (c) To define the problem that needs to be solved
   (d) To define all of the ideas for solving a problem
5. Design Thinking typically helps in _____
   (a) innovation (b) data analytics
   (c) financial planning (d) operational efficiency

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sponse questions

nat is the Design Thinking process?

Explain the stages of Design Thinking process.

3. How do you empathize design thinking?



Activity

A competition for designing a card on Mother's day held in the class. All the students have to design a card and a winner will be awarded a prize and a certificate.

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Glossary

Arithmetic Logic Unit	Arithmetic Logic Unit (ALU) is part of CPU that performs all the mathematical and logical comparison.
Augmented Reality	Augmented Reality enhances or augments our experience of the world around us.
Biometrics	Biomatrix refers to parts of a person's body used for identification purpose e.g. fingerprint, eye recognition, face recognition, voice recognition, etc.
Computational Thinking	Computational Thinking is a problem-solving approach that divides the problems into smaller components, extracts relevant ideas, recognizes patterns to enable proper solution planning.
Computer Ethics	Computer Ethics is a set of moral principles for proper and responsible use of Internet, computers and ICT devices.
Computer Virus	Computer Virus is a malicious program that self-replicates by copying itself to another program or file.
Control Unit	Control Unit (CU) is part of CPU that controls the electronic flow of information around the computer.
Cyber Stalking	Cyber Stalking is the use of Internet or other electronic means to harass someone or an organization.
Cybercrime	Cybercrime is a criminal activity carried out by an individual or group using Internet or computer.
Digital Citizenship	Digital Citizenship refers to the responsible use of Information and Communication Technology (ICT).
Digital Media Bias	Digital Media Bias and Messaging refers to widespread bias of journalists and news producers.
Email	Email (Electronic mail) is a method of exchanging messages between people using electronic devices.
Hacking	Hacking is an unauthorized attempt to gain access to someone's computer or network.
Identity Theft	Identity Theft is a specific form of fraud in which cybercriminals steal personal information and data such as passwords and bank account.
Internet Surfing	Internet Surfing is a method of browsing websites and navigating from one web page to another using hyperlinks.
Loop	Loop is an act or instance of doing something again and again.
Main Memory	Main Memory is a type of memory on the motherboard that is directly accessible by the CPU.

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Malware	Malware (Malicious software) is a software which causes harm to a computer or network in the form of viruses, worms, spyware, etc.
Motherboard	Motherboard is the main printed circuit board found in general purpose computers which serves as the central hub that connects all the peripherals and components such as CPU and memory.
Multimedia Presentation	Multimedia Presentation includes information presented with slides, videos, or digital representations and includes sound which might be narrative, music or sound effects.
Peripherals	Peripherals are all the input and output devices of a computer.
Problem Solving	Problem Solving defines the process of analyzing some particular situation and accordingly behaving in order to generate some response.
Random Access Memory	Random Access Memory (RAM) is used to read and write data but the data is volatile or temporary i.e. whenever the power is switched off the contents are of RAM are lost.
Read Only Memory	Read Only Memory (ROM) is non-volatile memory. Instructions in ROM are embedded permanently at the time of manufacturing. It contains Basic Input Output System and starts the computer when it is turned on.
Robotics	Robotics refers to the use to robots to perform a wide range of tasks that are performed by humans.
System Unit	System Unit is the case that contains all the electronic components of a computer system like motherboard, power supply, hard disk drive, etc.
Virtual Reality	Virtual Reality is computer-generated simulation of a three-dimensional image or environment that can be interacted with a seemingly real or physical way by a human using some special electronic way.
Word Processor	Word Processor is an application software used for composing, editing, formatting and printing documents.

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Abbreviations

AI	Artificial Intelligence
ALU	Arithmetic Logic Unit
ATM	Automatic Teller Machine
BCC	Blind Carbon Copy
BIOS	Basic Input/Output System
CC	Carbon Copy
CDM	Cash Deposit Machine
CPU	Central Processing Unit
DRAM	Dynamic Random Access Memory
EEPROM	Electronically Erasable Programmable Read Only Memory
EPROM	Erasable Programmable Read Only Memory
ESP	Email Service Provider
GB	Giga Byte
GPS	Global Positioning System
ICT	Information and Communication Technology
KB	Kilo Byte
MB	Mega Byte
MIDI	Musical Instrument Digital Interface
MMS	Multimedia Messaging Service
MP3	MPEG Audio Layer 3
PB	Peta Byte
PC	Personal Computer
PIN	Personal Identification Number
PROM	Programmable Read Only Memory
RAM	Random Access Memory
ROM	Read Only Memory
SATA	Serial Advanced Technology Attachment
SMS	Short Message Service

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About the Authors



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