Test Edition

Based on
New Sindh Curriculum
2023-24

The Textbook of

Computer Education

For Class VII

Sindh Textbook Board

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Prepared by **SINDH TEXTBOOK, BOARD, JAMSHORO.**
Reviewed by **Directorate of Curriculum Assessment and Research Sindh, Jamshoro**
Prescribed by the Board of Intermediate and Secondary Education Hyderabad, Sukkur, Shaheed Benazirabad,Larkana, Mirpurkhas and Karachi for Secondary School Examination.
Approved by the **Education and Literacy Department, Government of Sindh**
Letter **No.** for the province of sindh.

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PREFACE

The century we have stepped in, is the century of Science and technology. The modern disciplines of Technology are strongly influencing not only all the branches of science but each and every aspect of human life.

To keep the students abreast with the recent knowledge; it is must that the curricula at all the levels be updated. Moreover regularly by introducing the rapid and multidirectional development taking place in all the branches of Science.

The recent book of Computer Education for Class VII has been written in this preview and in accordance with the revised curriculum. Prepared by Ministry of Education, Govt of Sindh. Reviewed by independent team of Directorate of Curriculum Assessment and Research, Jamshoro Sindh. Keeping in view the importance of Computer Science, the topics have been revised and re-written according to the need of the time.

Among the new editions the introductory paragraphs, information boxes, summaries and a variety of extensive exercises have been included. Which I think will not only develop the interest but also add a lot to the utility of the book.

The Sind Textbook Board has taken great pains and incurred expenditure in publishing this book inspite to its limitations. A textbook is indeed not the last word and there is always room for improvement. While the authors have tried their level best to make the most suitable presentation, both in terms of concept and treatment. There may still have some deficiencies and omissions. Learned teachers and worthy students are therefore requested to be kind enough to point out the short comings of the text or pictures and to communicate their suggestions and objections for the improvement of the next edition of this book.

In the end, I am thankful to our Authors, Editors and Subject specialist of Board for their relentless service rendered for the cause of education.

Chairman
Sindh Textbook Board

CONTENTS

Chapter 1

ICT Fundamentals

Student Learning Outcomes:

After the completion of this unit students will be able to:

- Identify the various emerging technologies and their usage, such as Artificial Intelligence, Robotics, Biometrics, Computer-Assisted Translation, Virtual Reality,3D and holographic imaging, Cloud Computing.
- Understand the progression in Computing Technologies.
- Recognize different peripherals of the computer system and their applications.
- Identify different I/O ports and functions of I/O ports in computer system.

Introduction Of Unit:

This unit covers the basic concept of emerging technologies such as (Airtifical Intellegence, Robotics, biometrics and etc). This unit also gives a brief overview of the progression in computing technologies , different types of I/O ports and various peripheral devices.

1.1 Emerging Technologies:

Emerging technologies are new ideas still growing. They are like baby technologies. These new tools can:

- Solve big problems (like cleaning dirty water).
- Make new jobs (like robot helpers).
- Make life better (like smart watches that tell time and health).

Examples: Artificial Intelligence (AI), robots, Virtual Reality (VR) glasses, and cloud storage. A caller uses voice assistants (e.g., Siri, Google Assistant) on phones is an example of every day usage. Figure 1.1 shows some of emerging technologies.

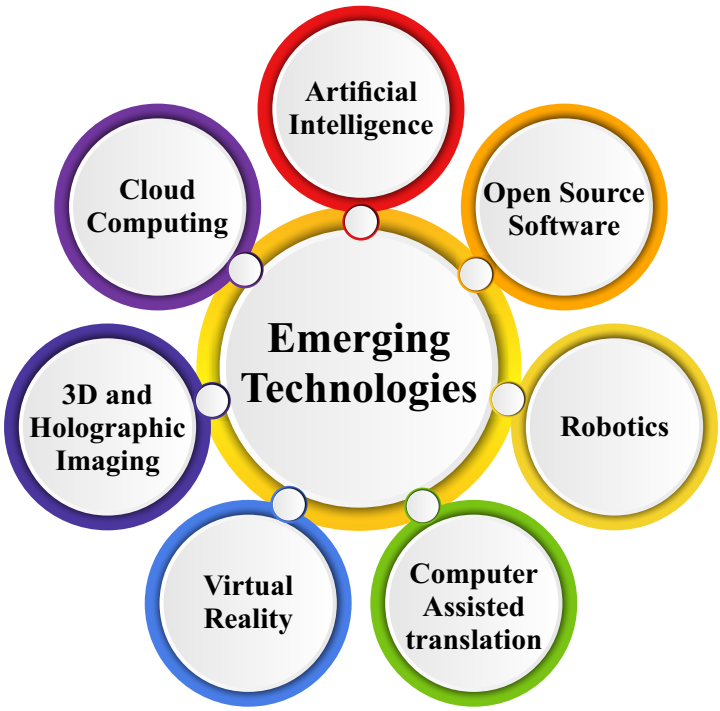


Figure 1.1 Emerging Technologies

The word "Technology" refers to the practical application of scientific knowledge, particularly in the creation of tools and systems that solve problems or improve human life.

1.1.1 Artificial Intelligence (AI):

Artificial Intelligence (AI) helps computers think and learn like people. AI lets machines:

- Understand what a person says.
- Learn from mistakes.
- Choose the best action.

Examples: 1) Self-driving cars that drive without a person (shown figure 1.2),
2) ChatGPT and Gemini that answer questions. Asking asking Siri or Google for help is AI use in every day life.

Figure 1.2 A Self-driving car

The ward Artificial Intelligence was first used by John McCarthy in 1956. He is also known as the "Father of AI"

1.1.2 Robotics:

Robotics is a new technology. It uses programming and sensors. These help machines see and feel what is around them. The machines can choose what to do. They follow instructions like a smart robot toy.

Robots are used in many places, for example:

1) In car factories to build cars fast (as shown in Figure 1.3)
2) In space to do simple jobs again and again
3) In dangerous areas so people stay safe

Example: A robot vacuum cleaner at home sweeps the floor by itself.

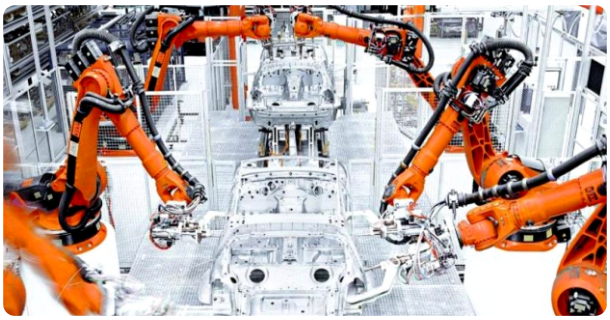


Figure 1.3 Use of robots in auto manufacturing

Activity Time

The Teacher divide the class into two groups A and B and assign group A to make a paper model of a Robot and group B to make a paper model of holographic image viewer .

1.1.3 Biometrics:

Biometrics comes from two words: "Bios" = life and "Metric" = measure. It means measuring parts of human body to know who is the person. It keeps things safe — only authentic person can open.

Examples of body parts used: 1) Fingerprint, 2) Face, 3) Eyes (iris), and 4) Voice.

Biometric is used in daily life for several purposes (see Figure 1.4). For instance: 1) Unlock mobile phone with face or finger, 2) Mark attendance in school with a finger scan.

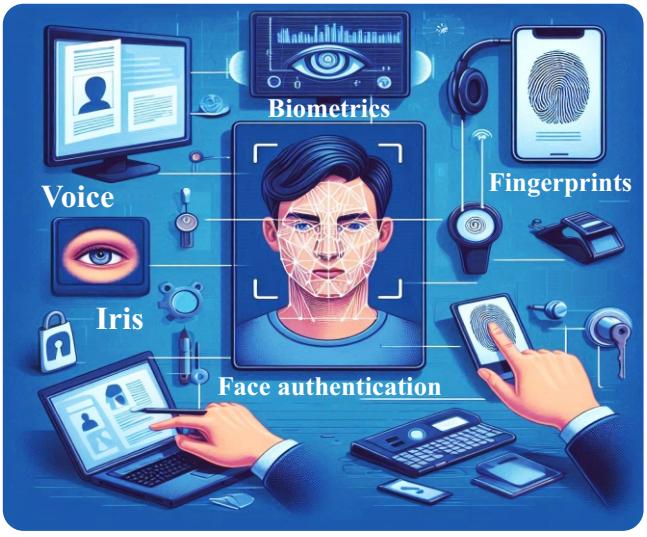


Figure 1.4
Shows various types of Biomatric

1.1.4 Computer-Assisted Translation:

CAT means Computer-Assisted Translation. It is a helper tool for people who change words from one language to another.

What CAT does:

- Helps write the new words.
- Saves old translations to use again.
- Makes work faster.

A real person still thinks and chooses the best words. The computer just helps speed things up.

Famous CAT tools:

Omega T, BasicCAT and Virtaal

Example: A teacher uses CAT to quickly translate an English story into Sindhi.

Figure 1.5 shows the use of computer-assisted translation

1.1.5 Virtual Reality:

Virtual Reality (VR) makes a virtual (artifical) world that feels real. Person wears special glasses or a headset (see Figure 1.6). It feels like person is inside the game or place.

Example: Ali can walk in old Mohenjo-daro! Sara can see the streets, houses, and shops from long ago. It makes person to feel as he/she is really there.

Where VR is used:

- Learning in school
- Training (like flying a plane)
- Games and fun
- Business meetings in a virtual room

Figure 1.6
Shows a student in a classroom learning history through Virtual Reality

1.1.6 3D and Holographic Imaging:

3D Design means making things on a computer. These things have height, width, and depth just like real objects.

Holograms are 3D pictures in the air. A person can walk around and see them from all sides. They use light or laser to shine and look real.

Example:

Draw a dress on paper or computer. Use a hologram app. Watch the dress float in the air like magic (see Figure 1.7).

Figure 1.7 shows a hologram of clothes designed on a computer

1.1.7 Cloud Computing:

Cloud Computing means using the internet to get:

- Storage space
- Power to run apps
- Ready-made software

A person does not need big machines at home. He/She just needs to connect to the internet and use it. A person may have to pay only for what he/she uses like website hosting. There are some free cloud services,

Examples:

- Save photos in Google Photos
- Save homework in Google Drive
- Save games in OneDrive

Open them from any phone, tablet, or computer! No need for USB or hard disk. It's easy, safe, and cheap!

Figure 1.8 shows a child using cloud computing Services

1.1.8 Open Source Software:

Open Source Software means anyone can see and change its code. A person does not need permission from the owner.

Examples:

- Firefox – a free web browser
- Java – helps games and apps run
- Linux – a free computer system

It is like a recipe book everyone can read and improve.

Figure 1.9 Open source software

Activity Time

The teacher divides the class into groups, and each group will look into their homes and school to find examples of common emerging technologies(smartphones, computers, CCTV cameras) and each group makes a list of these examples.

1.2 Progression In Technology:

Technological progress means making better and faster ways to build things. It helps work, talk, and learn in new ways.

Over time, people have improved tools. This has changed everything in daily life.

Two big areas, which are commonly used everyday:

1. Communication – like phones and video calls
2. Computing – like computers and apps.

Example: Old phones were used to male only calls. Now, smartphones do photos, games, and homework.

1.2.1 Progression in Communication Technology (Landline to Smartphones)

This section presents technological progress in communication technology (Landline to Smartphones).

i) Landline phones (1800 to 1990):

Alexander Graham Bell invented the telephone in 1876.

At first:

- It was only for voice calls.
- It used wires to connect.
- Person could not move it.
- person had to stay close to talk.

Example: A phone at home on the wall or Table Perosn has to sit near to phone, no walking around. Now phones are wireless and person can walk around while talking.

ii) Mobile Phones (1990 To 2007):

After landline phones, people made mobile phones.

Mobile phones:

- No wires needed.
- Person can carry these phones anywhere.
- Some phones had buttons to press.
- These phones allowed to play simple games.
- Person could send text messages.

Example: Old mobile phones were big. Person could play Snake game on them.

iii) Smart Phones (2007 Till present):

Smartphones are used to talk and share today. These smartphones are like tiny computers in human hand.

A person can:

- Browse the web
- Take photos and videos
- Use GPS to find places

- Watch videos
- Make video calls
- Use apps for shopping, learning, and fun

Example: Open YouTube, take a selfie, or play a learning game — all on smartphone.

Figure 1.10 shows the progression in communication technology

1.2.2 Progression In Computer Technology:

Computer progress is split into 5 generations. Each one got better and smaller.

- First Generation (1940–1956):
  - Used big vacuum tubes (Figure 1.10).
  - Computers were huge and heavy.
  - They used lots of electricity.

Example:
A computer filled a whole room — like a giant box.

Figure 1.11 Vacuum tubes

- Second Generation (1956–1963):
  - Used transistors instead of vacuum tubes.
  - Computers became smaller.
  - They worked faster.
  - They used less electricity.

Example:
A computer now fit in a big desk — not a whole room.

Figure 1.12 Transistors

- Third Generation (1964–1971):
  - Used Integrated Circuits (ICs).
  - These were tiny chips with many parts inside.
  - Computers got much faster.
  - They became smaller too.

Example:
A computer now fit on a table — like a big box.

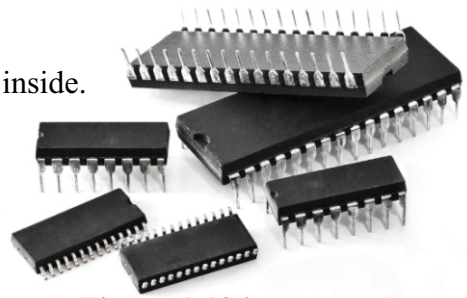


Figure 1.13 intergarted circuit(IC)

- Fourth Generation (1971–now):
  - Used microprocessors.
  - These are tiny chips with thousands of circuits.
  - Computers became super fast.
  - They got very cheap.

Example:
Nowadays a personal computer is mostly available at home or school. Even a tablet or phone uses this idea.

Figure 1.14 Microprocessor

Fifth Generation (Still in progress) wants real AI in computers. Machines will think and learn like people. Example: Future computers may talk, understand, and help just like a friend.

1.2.3 First Generation Computer Processor to 14th Generation Processor:

CPU means Central Processing Unit. It is the brain of the computer. It does all the thinking and work. New CPU generations are better than old ones. They are faster and smarter.

Companies like Intel and AMD make CPUs. Intel is very famous. Most laptops and desktops use Intel CPUs. Intel has made 14 generations of CPUs. Each one is stronger and quicker.

1st to 14th generations of Intel processors are discussed in Table 1.

Table 1: Timeline of processor generation

Generation	Name(year)	Major change
1st Generation	Nehalem, 2008-2010	Introduced the Core i series, with improvements in energy efficiency and multi-core processing.
2nd Generation	Sandy Bridge, 2011	Start of the Turbo Boost 2.0 technology

3rd generation	Ivy Bridge, 2012	Introduced the PCI Express 3.0 standard
4th Generation	Haswell, 2013	New instructions for enhanced performance and improved integrated graphics.
5th Generation	Broadwell, 2014-2015	Smaller chips, lower power consumption and also include security features.
6th Generation	Skylake, 2015	A new microarchitecture with improved performance, power efficiency and new instruction sets.
7th Generation	Kaby Lake, 2016-2017	Advanced video and display capabilities, along with increased clock speeds and additional optimizations for power efficiency
8th & 9th Generation	Coffee Lake, 2017-2019	The addition of more cores improved multitasking
10th Generation	Comet Lake, 2019-2020	Again, adding more cores with faster memory speeds
11th Generation	Rocket Lake, 2021	Improved integrated graphics, start of a new core architecture and support for PCIe 4.0.
12th Generation	Alder Lake, 2021	Hybrid architecture combining performance (P-cores) and efficiency (E-cores) for improved overall performance and power efficiency.
13th Generation	Raptor Lake, 2022-2023	The code name of the 13th-generation Core i-series processors is Raptor Lake. These processors deliver improved multitasking and content creation, higher clock speeds and enhanced gaming performance
14th Generation	Rapoter Lake Refresh 2023-2024	These processors use Intel's new Foveros advanced packaging technology

Usually, when someone buys a computer, the shop person asks: "Which generation do you want?"

It means: "Which Intel CPU generation?"

Example: Intel® Core™ i9-12900H

Let's break it down:

- Intel → The company
- Core → The family name
- i9 → Super powerful
- 12 → 12th generation
- H → High speed

Example: A 12th gen i9-H laptop is very fast.

Note:

This method applies only to Intel® Core™ Processors and does not apply to Intel® Pentium®, Intel® Celeron®, or Intel® Xeon®.

1.3 Peripheral devices and their functions:

Peripheral devices are extra helpers for the computer. They connect to the CPU — the brain.

They make computer do more things. Without them, the computer is very limited.

A person can connect them with wires or wirelessly (like Bluetooth).

There are 4 main types:

1. **Input Devices:** Put things IN
   - Keyboard, mouse, webcam
2. **Output Devices:** Show things OUT
   - Monitor, speaker, printer
3. **Storage Devices:** Save things
   - USB drive, external hard disk
4. **Networking Devices:** Help connect
   - Wi-Fi router, modem

Example: Plug in a mouse → ONE can click. Connect a printer → Print a paper.

1.3.1 Input Devices:

Input devices help to put information INTO the computer. They send data or instructions.

Common Input Devices:

- **Keyboard:** Type letters and numbers
- **Mouse:** Click and point
- **Webcam:** Take photos or video
- **Microphone:** Record voice
- **Scanner:** Copy paper into the computer

Example: Use the keyboard to type a poem. Use the mouse to open a game. Use the webcam for a video call with friend.

Figure 1.15 Input devices

i) Keyboard

Keyboard is an input device. A person uses it to type:

- Letters
- Numbers
- Symbols

It has special keys too:

- **Arrow keys:** Move up, down, left, right
- **Navigation keys:** Go through menus

What a person/user can do:

- Scroll in a story
- Move the cursor (blinking line)
- Open menus in games or apps

Example: Press arrow keys to move in a game.

ii) Mouse

Mouse is an input device. It helps to control the computer. It has buttons and scroller (see Figure 1.15).

5 things a mouse can do:

1. Select - Click on a picture
2. Navigate - Open menus
3. Move cursor - Point to words
4. Drag and drop - Move icons
5. Scroll - Go up and down pages

How it connects:

- With a wire (plugged in)
- Or wirelessly (Bluetooth)

Example: Use the mouse to drag a photo into a folder. Scroll to read a long story.

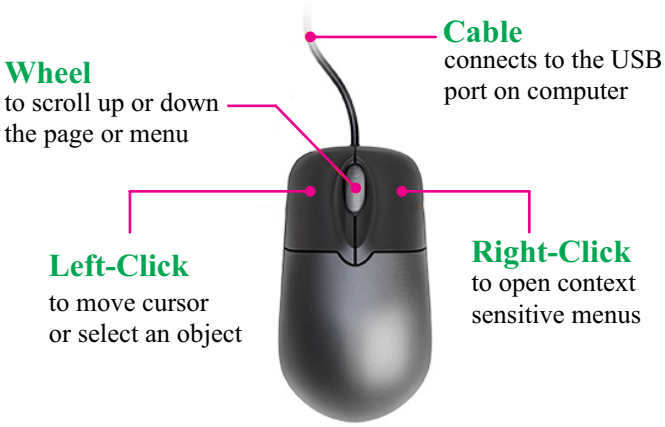


Figure 1.16 shows a computer mouse

iii) Webcam

Webcam is an input device. It takes pictures or videos. It turns them into digital files with software. Nowadays, it is integrated in laoptops (see Figure 1.16).

How it connects:

1. With a USB cable
2. Or built inside the computer/laptop

What a person uses it for:

- Chatting with friends
- Live streaming games
- Recording videos
- Video calls in class

Example: Turn on the webcam and wave to friend on a video call.

(a) (b)

Figure 1.17 shows an external webcam (a) shows screen-integrated webcame

iv) Scanner:

Scanner is an input device. It uses light to copy things.
It turns paper into digital files. This keeps them safe and easy to find.

Common Scanners:

1. **Barcode Scanner**
   - Used in shops
   - Scans price tags fast

2. **Optical Scanner**
   - Used in fax machines
   - Copies pictures and drawings

3. **Flatbed Scanner**
   - Has a lid that opens
   - Put paper inside
   - Used in offices for books or photos

Example:

Scan drawing paper at school; Save it on the computer. Share it with teacher.

1.3.2 Output Devices:

Output device is a helper. It takes information from the computer. It turns it into something a user can see or hear.

Common Output Devices:

- **Monitor** - Shows pictures and words
- **Printer** - Makes paper copies
- **Speakers** - Plays sounds and music
- **Projector** - Shows big images on a wall

Example:

Watch a video on the monitor. Print homework with the printer. Listen to a song with speakers.

i) Monitor:

Monitor is the main output device. It shows pictures and words on a screen.

It gets signals from the computer. A graphics card helps it understand. Then it displays the image or video.

Example:

A laptop screen is a monitor. Watch cartoons on it.

CRT Monitor:

- Stands for Cathode Ray Tube
- It is the oldest type of computer screen
- Uses a big vacuum tube inside
- Makes pictures with electron beams

LCD Monitor:

- Stands for Liquid Crystal Display
- It is a flat screen
- Uses liquid crystals and electric signals
- Makes clear pictures

LED Monitor:

- Stands for Light Emitting Diode
- Uses tiny lights called LEDs
- It is very thin
- Uses less power
- Shows bright and real colors

OLED Monitor:

- Stands for Organic Light Emitting Diode
- Uses special glowing materials
- It is more expensive than LED
- Uses very little power
- Shows super clear and bright pictures

ii) Printer:

Printer is a popular helper device. It prints text and pictures on paper. It makes hard copies from the computer.

How it connects:

- **Wi-Fi** - No wires (wireless)
- **USB (Universal Serial Bus) cable** - Plugged in

What it can print:

- Homework
- Reports
- Letters
- Photos

Example: Click Print and get drawing/letter on a paper.

There are many types of printers as shown in Figure 1.14

➢ **Laser Printer**
They use laser beam for printing. These printers are fast and cost-efficient

➢ **Inkjet Printer**
produces prints by spraying tiny droplets of liquid ink onto paper. These printers produce high-quality images.

➢ **Receipt Printer**
They use heat for printing. They are fast, quiet, and low-maintenance.

Figure 1.14 shows different types of printers

iii) Speaker:

Speakers are output devices. They turn computer signals into sound.

Types:

- **Built-in speakers**
  Inside laptops and desktops (see Figure 1.18)
- **External speakers**
  Connect with USB or audio jack

What a person can use them for:

- Listen to music
- Watch movies
- Join online classes

Example:

Play a song or hear your teacher in a video call!

Figure 1.18
Laptop internal speakers

iv) Projector:

Projector is an output device. It shows big pictures from the computer. It puts the image on a wall or screen.

How it connects:

- **HDMI (High-Definition Multimedia Interface) cable**
  it is used for clear video (see Figure 1.19)
- **VGA (Video Graphics Array) cable** - Older type

Where a person can use it:

- **School** - Show lessons
- **Office** - Meetings
- **Home** - Watch movies

Example: A teacher uses a projector to show a story on the big wall.

Figure 1.19 shows the Projector and the HDMI cable

1.3.3 Storage devices:

Storage devices save and get back data. They help computers keep lots of files.

Common Storage Devices:

- **USB drive**
  Small stick you plug in
- **External hard drive**
  Big box with cable
- **SSD (solid-state drive) drive**
  Fast and inside modern computers

Example:

Save homework on a USB drive. Take it to school and open it there.

i) USB Flash/Pen Drive:

USB Drive (also called pen drive) is a small storage tool. It plugs into the USB port of a computer (see Figure 1.20).

What it does:

- Saves files
- Backs up data
- Moves files from one device to another

Example:

Save a project on a USB drive. Take it to school and plug it in computer/laptop.

Figure 1.20
Different types of USB drives

ii) External Hard Drive:

External Hard Drive is a portable storage box (See Figure 1.21). It connects to a laptop or PC (Personal Computer) with a USB cable.

Main Advantage:

- Gives extra space for files
- More room than the built-in drive

Example:

Save all photos, videos, and games. Carry it anywhere and plug it in computer/laptop.

Figure 1.21 shows an External drive connected to the Laptop through the USB port

iii) SSD Drive:

SSD means Solid State Drive. It is a fast storage device (see Figure 1.22).

Why it's better:

- More space
- Super speed
- Uses less power

It works using special silicon chips. SSDs are newer and smarter than old drives.

Example:

Games load in seconds on a computer with SSD.

Figure 1.22 SSD drive

1.3.4 Network Devices:

Network devices help computers talk to others. They share data over a network or the Internet.

Common Network Devices:

- **Modem** - Connects to the internet
- **Wireless Access Point** - Makes Wi-Fi
- **Network Adapter Card** - Lets devices join the network

Example: Use a modem to go online. Connect with Wi-Fi to share files.

i) Modem

Modem helps to get internet. It changes signals such that computers can be connected to the Internet (see Figure 1.24).

How it works:

- Turns computer data into phone line signals
- Turns phone signals back into computer data

It is a translator between computer/device and the ISP.

Example: Plug in the modem. Open YouTube. Watch videos fast.

Figure 1.24 A modem with an Ethernet cable connector

ii) Wireless access point:

WAP means Wireless Access Point. It helps wireless devices connect to a wired network (see Figure 1.25).

Why use it:

- No cables needed
- Easy to set up
- Connects all devices in one place

Example: At home Wi-Fi router is a WAP. Phones, laptops, and tablets join the internet without wires.

Figure 1.25 shows a wireless access point device

iii) Network interface card(NIC):

Network Adapter Card helps computer send and receive data. It connects to other devices on the network.

It is fixed on the motherboard inside the computer.

Example: Use it to connect to Wi-Fi or play online games.

Without it, computer cannot be connected to the Internet.

Figure 1.26 Shows a network interface card

Activity Time

The teacher will make a Venn diagram on the board with two overlapping circles labled as “modem” and “NIC Card” respectively then ask student to fill these circle with function of both devices so they can differentiate between their functions and find similarities .

1.4 I/O Ports and their functions:

Ports are small holes on a computer. They connect helper devices (pheripherals).

What do ports do:

- Send data from CPU to devices
- Get data from devices to CPU

Where these ports are present:

- Back of desktop computer (see figure 1.27 a)
- Side of laptop (see figure 1.27 b)

Common Ports:

- **USB** - For mouse, keyboard, pen drive
- **HDMI** - For TV or monitor
- **Audio jack** - For headphones
- **Power port** - To charge

Example: Plug mouse into a USB port. It works immediately.

(a) (b)

Figure 1.27
(a) Shows external ports on the back of the Desktop.
(b) Shows external ports on the side of the laptop

i) SATA Ports:

Serial Advanced Technology Attachment (SATA) Port connects hard disks and SSDs (Solid State Drives) to the motherboard. It is inside the computer (see figure 1.28).

What does SATA Port do:

- Sends data from CPU to disk
- Gets data from disk to CPU

Example: A game and photos load fast because of SATA.

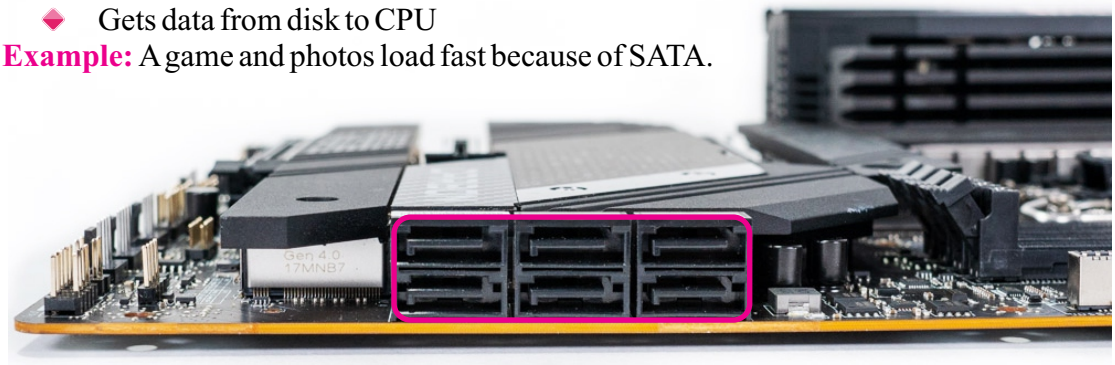


Figure 1.28 shows SATA ports

ii) PCI & PCI Express (PCIe) Port:

PCI (Peripheral Component Interconnect) Port is used in desktop PCs. It is a fast slot on the motherboard (see figure 1.29).

PCI Port connects extra cards like:

- Graphics card (for games)
- Sound card
- Network card

PCI-e is a newer and faster version. It replaces old PCI. It is also a slot inside the computer.

Example: A gaming PC has a graphics card in a PCI-e slot. It makes games look smooth and colorful.

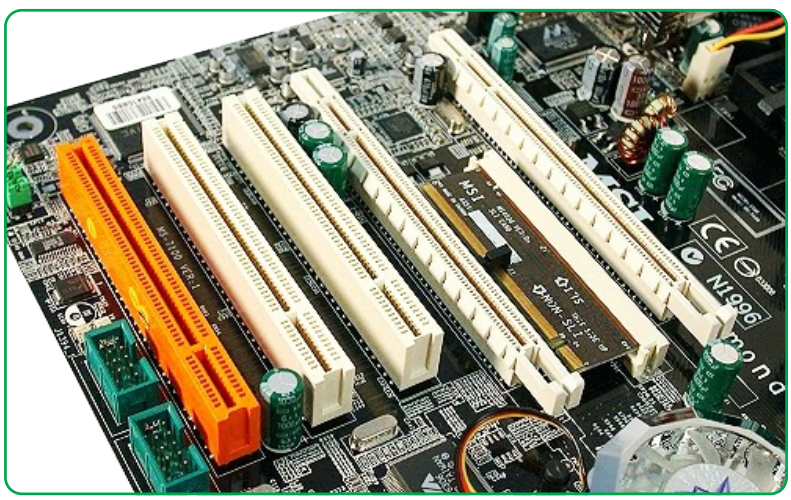


Figure 1.29 shows the PCI expansion port

iii) Serial Port:

A serial port sends data one bit at a time in order. It has 9-pin or 25-pin connectors (see figure 1.30). It is also called a COM port (for example, COM1 or COM2).

Its uses:

- Connecting modems
- Connecting microphones
- Connecting older printers

Figure 1.30 Serial port

Example: In old computers, a mouse or modem was connected using a serial port.

Note: Today, USB ports are used instead of serial ports.

iv) Parallel Ports:

A parallel port sends 8 bits (one byte) at a time. It is faster than a serial port. It is also called a printer port (see figure 1.31).

Its uses:

- Connecting printers
- Connecting scanners

Figure 1.31 shows a parallel port

Example: Old computers used parallel ports to attach printers.

Note: Today, USB ports have replaced parallel ports.

v) USB Port:

USB stands for Universal Serial Bus. The first non-commercial USB port came out in 1994.

Its uses:

- Connect mouse, keyboard, printer, scanner, external hard disk
- Transfer data quickly

Its connector:

- The oval-shaped plug a person puts into phones or computers.

Types of USB Ports (see figure 1.32):

- Type-A – Common rectangle shape
- Type-B – Square with curves
- Type-C – Small, reversible
- Micro USB – Tiny, used in old phones

Example: Plug a pen drive into a Type-A port to copy homework.

Figure 1.32 shows different USB ports with their connectors

vi) HDMI port:

HDMI means High-Definition Multimedia Interface (see figure 1.33). It connects computer to TV, monitor, or projector. It also sends clear video and sound using one cable.

Its uses:

- Extend laptop screen
- Mirror display
- Play movies or give presentations

Example: Plug HDMI cable from laptop to TV. Watch a game or video on a big screen.

Note: One thin cable does everything.

Figure 1.28 HDMI Port

vii) Ethernet port:

Ethernet port (also known as an RJ45 port) helps to plug in an Ethernet cable (also called a network cable). It connects computer to a network or Wi-Fi router (see figure 1.34). It is a small rectangular hole with eight metal contacts. It is, usually, labeled with a network icon or "LAN" on backside of desktop computer and side of laptop.

Its benefits:

- More stable than Wi-Fi
- Usually faster internet

Example: Plug cable into Ethernet port; Play online games using the Internet.

Figure 1.2 Ethernet Port and cable

Summary

- Emerging technologies are innovations that have the potential to create a new industry or transform an existing one.
- A peripheral is an external hardware device that gives a computer additional functionality.
- Input devices send information to computer system.
- Output devices are devices that convert computer data into a human-understandable form, such as text, images, or sound.
- Storage devices are devices that store data. It allows data to be saved, retrieved, and transferred as needed.
- Ports are physical connection points on a computer where user can plug in external devices.

Terms to Remember

AI	Using computers to do things that traditionally require human intelligence is called Artificial Intelligence(AI)
VR	Virtual Reality is defined as the use of computer simulation that allows a human to be immersed in an artificial 3D environment.
HDMI	High Definition Multimedia Interface is a port used to connect a monitor and projector to computer.
USB	Universal Serial Bus ports are uses to connect devices, transfer data and charge electronic devices.
CRT	Cathod ray tube is a display that use a vacuum tube and electronic gun to produce images on its screen.
LED	An LED monitor, or Light-Emitting Diode monitor, is a type of display device that uses LED technology to produce images.
OLED	An OLED monitor is a type of display device that uses Organic Light-Emitting Diode technology to produce images

EXERCISE

1. Encircle the correct answer:

i. Through 3D image processing we can:
- (a) Show Hologram
- (b) Move items automatically in a factory.
- (c) Print a realistic image
- (d) Recognize patterns and make decisions

ii. Biometric authentication can be done through:
- (a) Our account number.
- (b) Typing password.
- (c) Using Face, Fingerprint and voice.
- (d) By phone number.

iii. Which of the following is not classified as an emerging technology?
- (a) Self-driving car
- (b) Robotics.
- (c) Banking.
- (d) Artificial Intelligence.

iv. Which input/output port is most commonly used for connecting devices like USB drives, a mouse, a printer and a keyboard:
- (a) Serial port
- (b) USB port.
- (c) HDMI port.
- (d) Parallel port

v. The main purpose of peripheral devices is
- (a) To give additional functionality to the computer
- (b) To store files.
- (c) To send/receive data from external devices.
- (d) All of the above.

2. Fill in the blanks with appropriate given words:

Ports, Peripheral, HDMI, Input, 1994

i) Devices like mouse and keyboard are refer as _____ devices.

ii) _____ port is used to connect projector to computer.

iii) _____ devices are those devices that are used to give input and take output from the system unit.

iv) _____are the physical connections on the front or back of the computer case that allow us to plug in the I/O devices.

v) The first non-commercial USB port was released in ____.

3. Provide descriptive answers of the following questions.

i) Describe how emerging technologies are changing this world?
ii) Write how the application of VR helps in education?
iii) Briefly describe how progression in technology affects daily life?
iv) Write the difference between printer and scanner?
v) Describe why peripheral devices are necessary for a computer?

Class Activity

The teacher takes the students to the lab where she/he should demonstrate to them how to plug in different peripheral devices through I/O ports of computer and fill the worksheet given below.

Peripheral device name	I/O port Name

Instructions for Teachers

Teaching emerging technologies to children is very thought-provoking but if you give them real-life examples, it will become easy to understand

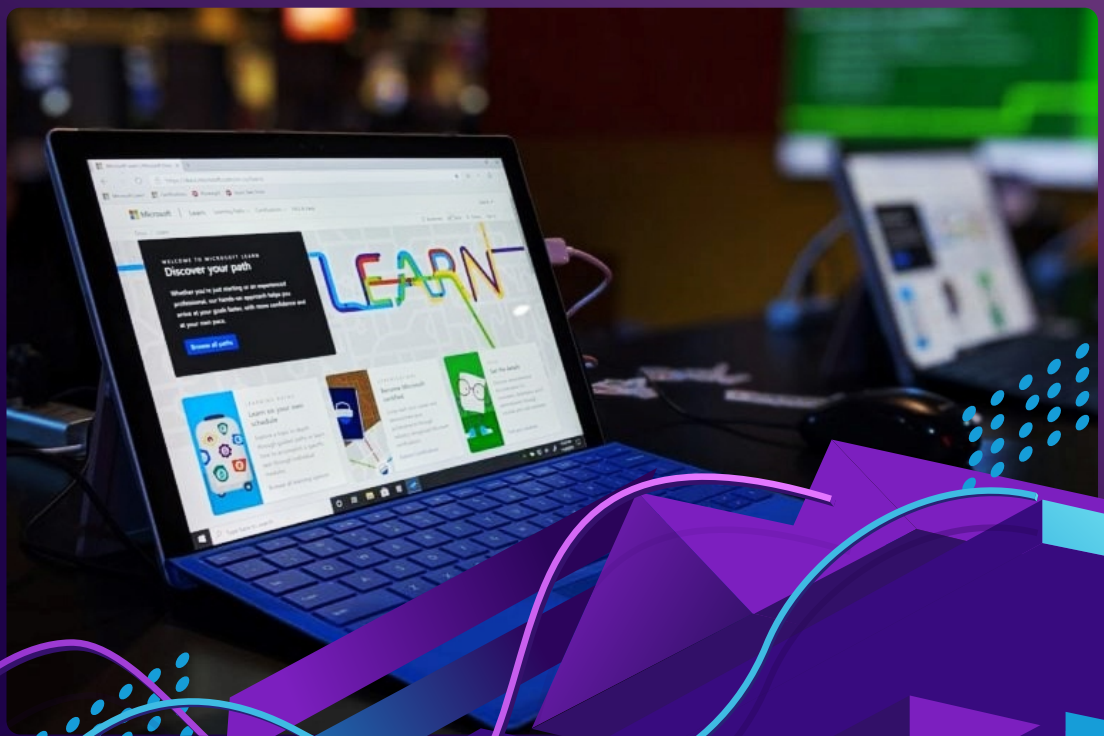
- Encourage children to create a wall in your classroom with the heading of "different input and output devices ". As the chapter progresses, add a new picture on the wall.
- Divide them into teams so that they learn to do web searches on emerging technologies.
- Help them install device driver in lab, hence they can have practical exposure to installing external hardware.

Chapter 2 DIGITAL SKILLS

Student Learning Outcomes:

After the completion of this unit students will be able to:

- Understand basics of Word processing using MS Word
- Explore functions of MS Word
- Explore functions of Presentation Software using MS Power Point
- Understand the basics of electronic mailing (Email)
- Demonstrate usage of Email



Introduction to Unit:

In this chapter, students will learn three important digital skills used in schools and daily life. Students will learn how to use MS Word to type assignments, format text and print documents. Students will use MS PowerPoint to create slideshows with text, pictures and animations. Students will also use Email to send and receive messages safely over the internet.

2.1 Introduction To Word Processing:

Word processing is a computerized method of writing and managing documents. In today's world, it is an ssential digital skill used in daily life. Students use word rocessors on computers, tablets and mobile phones to reate and edit documents quickly and easily. MS Word is he most common word processor. Following are the ommon uses of word processing:

e p c t c

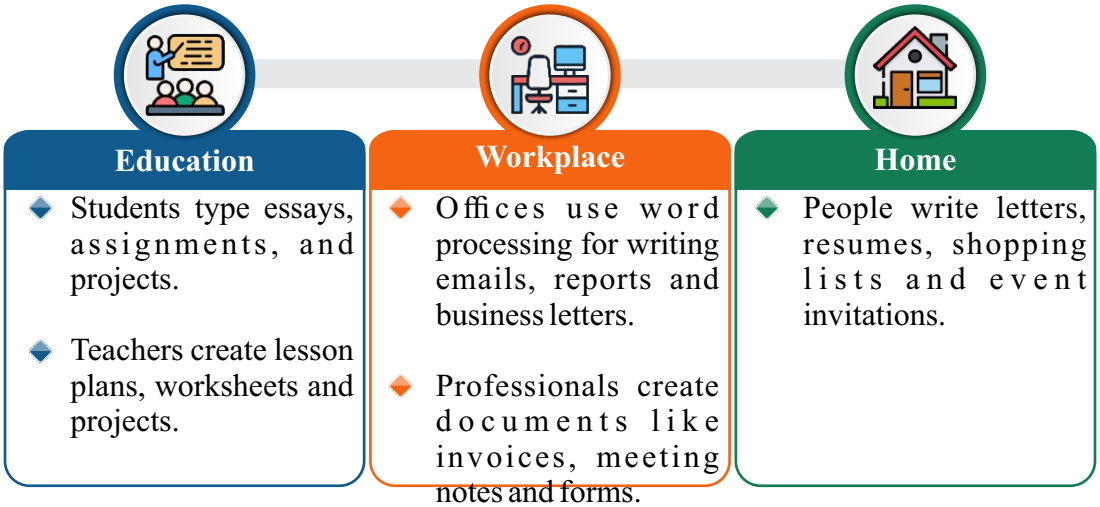


Figure 2.1 Usage of Word Processing

2.1.1 Key Features:

Key features of word processing software are given below

- Make writing faster and easier.
- Save time.
- Help correct spelling and grammar.
- Allow to add images, tables and designs in digital documents.
- Help to share documents with other instantly.
- Easy to edit and update documents.

The other common word processing programs are Microsoft Word, Google Doc and WPS Office.

2.2 Microsoft Word:

Microsoft Word is a word processor developed by Microsoft Corporation. It provides advanced tools to format and edit documents such as letters, stories, homework and reports. Users can change font, insert pictures, check spelling and print documents. It is one of the most widely used word processing programs in schools and offices.

2.3 Working with Microsoft Word:

- Make sure MS Word is already installed on the computer.Figure .2 Open MS Word
- **Start Microsoft Word:** Click on windows start button and type "Word" in search box. Word app icon will appear, click on it or click open option showing as in below figure.

Start Microsoft Word

❶ Click on windows icon start button.

❷ Type "**Word**" in search text box.

❸ Click on Word icon to start it or click to Open.

Figure 2.2 Open MS Word

To work with MS Word, you must install the Microsoft Office suite. Teacher should guide students how to install MS Word into computer.

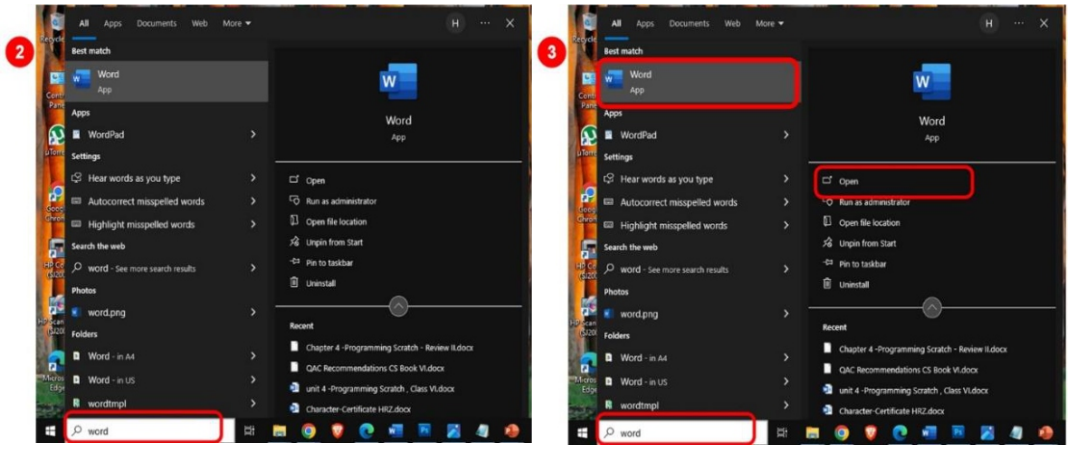


Figure 2.3 Opening MS Word

Create a New Document: When Word application is open, user will be given the option to start with a blank document or choose a template. A blank document is the best place to start with.

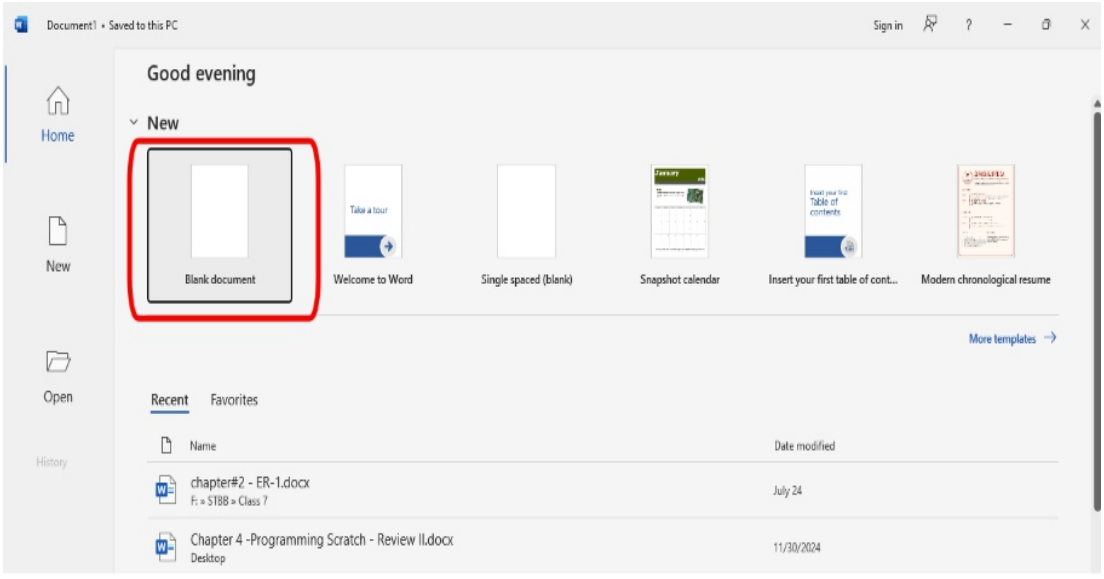
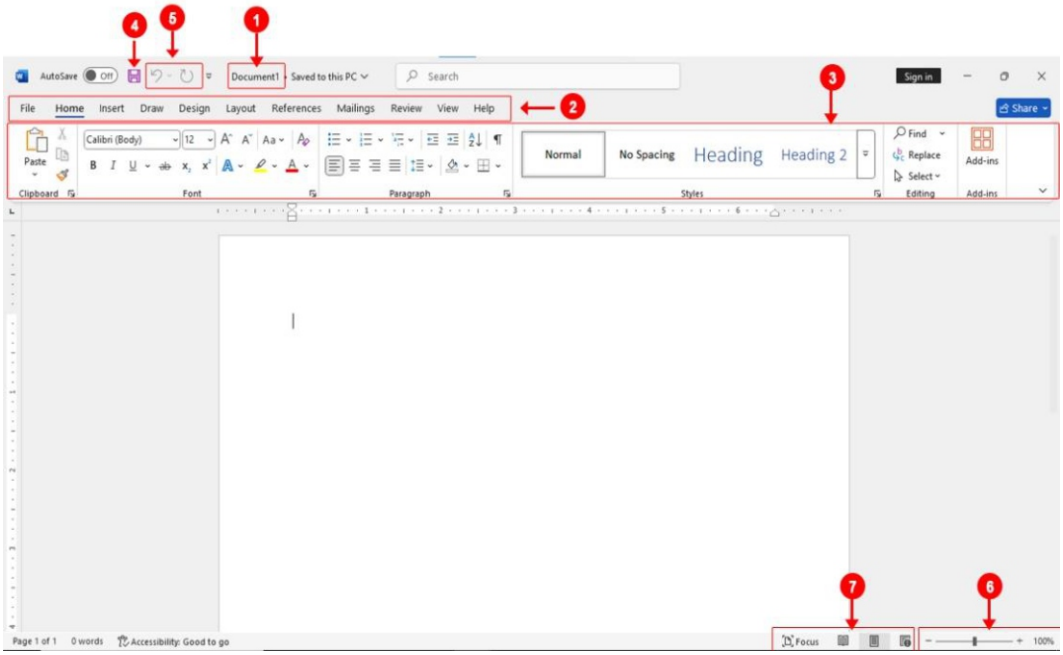


Figure 2.4 Opening blank document in MS Word

2.3.1 Components Of Microsoft Word:



Microsoft Word

❶ Document Title. ❷ Action Tabs ❸ Ribbon
❹ Save Icon ❺ Undo and Redo command
❻ Document Zoom in/out ❼ Document View

Figure 2.5 Word Interface

1. **Document Title**
   This shows the name of the current document. It appears at the top of the MS Word window.
2. **Action Tabs**
   These tabs appear on the Ribbon only when a specific object is selected. They are also called Contextual Tabs because they show tools related to the selected object.

Common Action Tabs:

- **Table Tools**
  - Appears when students insert or select a table
  - Provides two tabs: Design and Layout
- **Picture Tools**
  - Appears when students select a picture
  - Provides the Format tab to crop, add borders, change brightness, or apply styles

- **Drawing Tools**
  - Appears when students select a shape, WordArt, or a text box
  - Provides the Format tab to edit fill, outline, and effects.

3. **Ribbon:** The Ribbon is the large toolbar at the top of the window. It has tabs such as Home, Insert, Draw, Design, and Layout. Each tab has tools that help students work with the document.
   There are two parts in Ribbon: Groups and Command buttons.

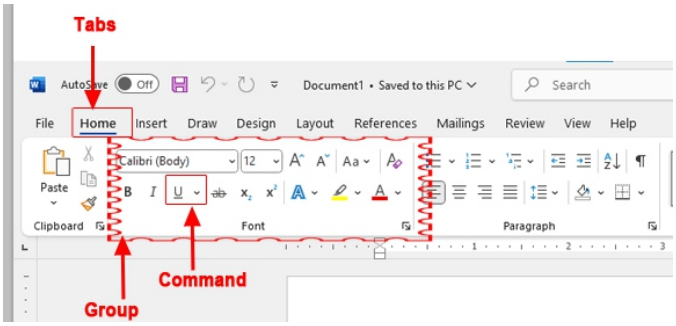


Figure 2.6 Ribbon Groups

4. **Save Icon**: To save the document with a file name and extension
5. **Undo and Redo Command:** The Undo command is used to cancel your last action. The Redo command is used to repeat an action that you just undid.
6. **Document Zoom In/Out:** Zoom In means to make the text and page look bigger on your screen. It helps you see words more clearly. Click the plus (+) button at the bottom-right corner to Zoom In.
   Zoom Out means to make the text and page look smaller on your screen. It helps you see more of the page at once. Click the minus (-) button at the bottom-right corner to Zoom Out.
7. **Document View:** means how your document looks on the screen while we are working on it. MS Word gives us different views to help you read, write, or edit more easily.

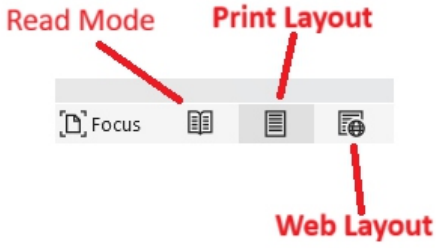


Figure 2.7 Document View

- **Read Mode**: Makes the document easy to read like a book. Good for reading.
- **Print Layout:** Shows how the page will look when printed. This is the default view.
- **Web Layout:** Shows how the document would look as a webpage.
- **Outline View:** Shows your document as a list of headings. Good for planning or organizing long documents.
- **Draft View:** Shows only the text, without pictures.

2.3.2 File Tab:

The File Menu is found when user clicks File Tab in Microsoft Word. It will help to manage whole document like saving, printing, or sharing it. Several options of this menu are listed below

Option	Description
Home	It will bring user back to the starting screen of Microsoft Word where user can see recent documents, choose template, access pinned files etc.
New	Create a new blank document or choose a template
Open	Open an existing document saved earlier
Save	Save work permanently so you don't lose it
Save As	Save document with a new name in a different place or change the file type
History	It shows a list of changes made to document overtime. It is very helpful when user want to • See older versions of your document • Check who made changes (if shared with others) • Restore a previous version if something was deleted by mistake.
Print	Print document or see how it will look when printed
Share	Share document to the others by email or link
Export	Turn your document into PDF or other file type.
Close	Close the document but keep the Word application open.
Account	View or change Microsoft account user is signed into
Options	Change MS Word settings like language, theme or display

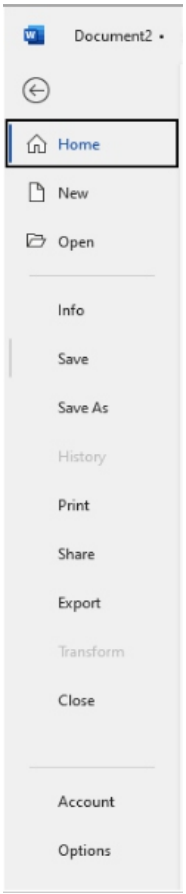


Figure 2.8 File Menu

2.3.2.1 Difference between Save and Save As:

The Save command keeps the changes in the current file. It is used when the file has already been saved before and students only want to update their work. It keeps the same name and the same folder and is a quick way to save while editing. The shortcut for Save is **Ctrl + S.**

The Save As command creates a new file with the same content. It is used when students want to make a copy with a different name or location. Save As allows choosing another folder or drive and can also save the file in another format such as PDF or DOC. The shortcut for Save As is **Alt + F + A.**

Tips

Default file extension of MS Word is .docx, we can change it to another format by Saving As the document from File menu.

2.3.3 Home Tab:

The Home tab provides basic options to perform tasks like changing text, organizing text, and managing how text is displayed.

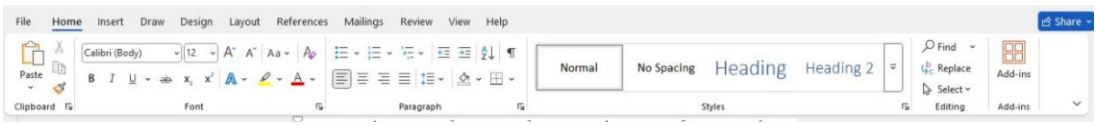


Fig 2.9 Home Tab options

Quick overview of Home Tab Group

Group	Key Commands
Clipboard	Cut, Copy, Paste, Format Painter
Font	Font Style, Size, Bold, Italic, Underline, Color, Borders
Paragraph	Left/Center/Right Align, Merge, Wrap Text, Orientation, Background color, Borders
Style	Conditional Formatting, Format as Table, Cell Styles
Editing	Find & Select, Clear, Sort & Filter, AutoSum

Home tab provides following features:

- **Clipboard Group:**

Cut: Removes the selected content and puts it on the clipboard, hence user can paste it somewhere else. Short key: **Ctrl + X**

Copy: Makes a copy of the selected content on the clipboard without removing it from its original location. Short Key: **Ctrl + C**

Paste: is used to paste the content user have copied or cut.
Short Key: **Ctrl + V**

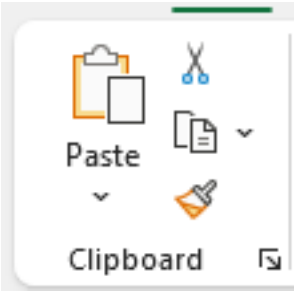


Fig 2.10
Clipboard Options

Format Painter: Copies the formatting (colors, fonts, borders) of a selected line of text and applies it to another selected line of text. Short Key: Use **Alt + Ctrl + C** to copy a format, and **Alt + Ctrl + V** to paste a format.

- **Font Group:**

Font Name: Change the font of text (e.g., Arial, Calibri). Short Key: **Ctrl + Shift + F**
Font Size: Change the size of text. Bold, Italic, Underline: Make the text bold, italic, or underline. Short Key: **Ctrl + Shift + P**
Font Color: Change the color of text.

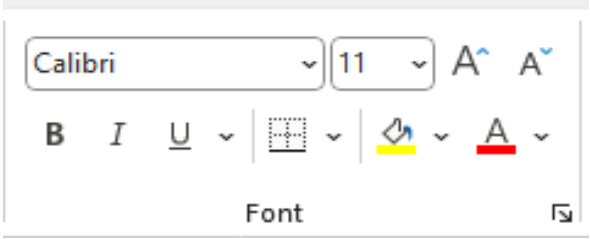


Fig 2.11 Font Group options

- **Paragraph Group:**

Align Text Left, Center, Right, Justify: Align the text to left, center, right or justify.

Indentation: Moving text in from the edge of the page either right or left side. It is used for paragraph or lists.

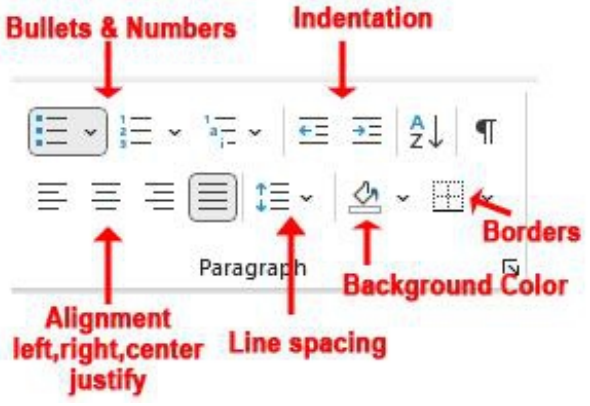


Fig 2.12
Paragraph Group options

Line Spacing: Allows text to adjust space between paragraphs or lines of text.

Shading/Background: use to change background color of text.

Borders: Add or remove border of your selected text.

- **Style Group:**

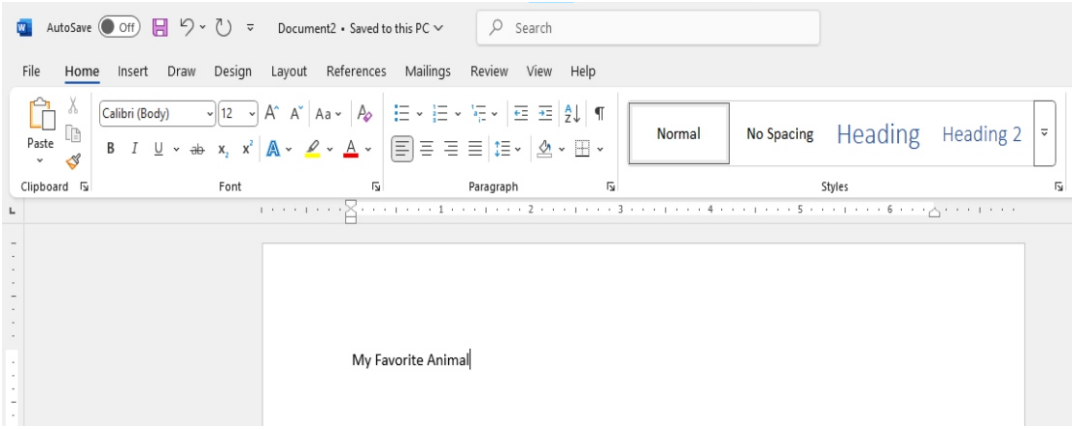
User can quickly change the look of text by using pre-defined text formats. Instead of changing the font-size and color one by one, user can just select text and click a style, it will automatically apply to as previewed.

Fig 2.13 Styles Group options

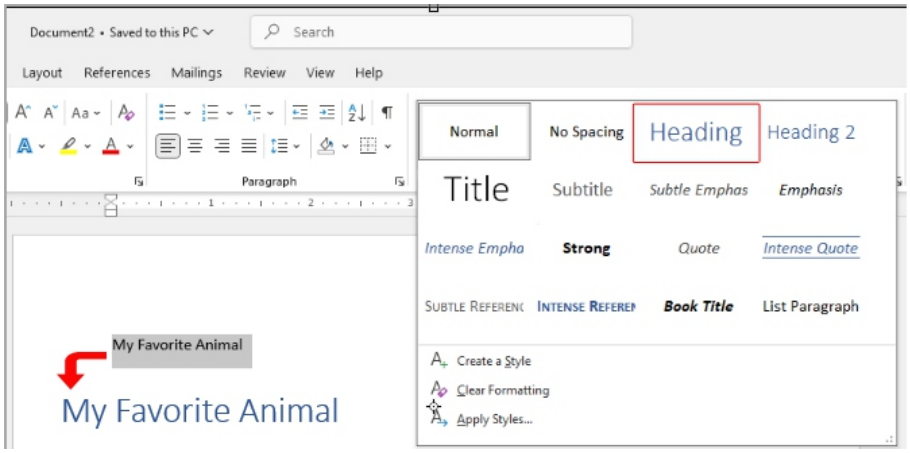
2.3.3.1 Creating a "My Favorite Animal" Document:

An activity to practice Home Tab, lets create first simple document by performing following steps.

1. Open MS Word software and choose blank document to create and type the text as given in the following figure.

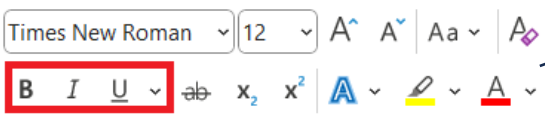


2. Apply basic formatting by using **Styles** group.
   - **a.** Select the text "My Favorite Animal" go to Style group and click on Heading.

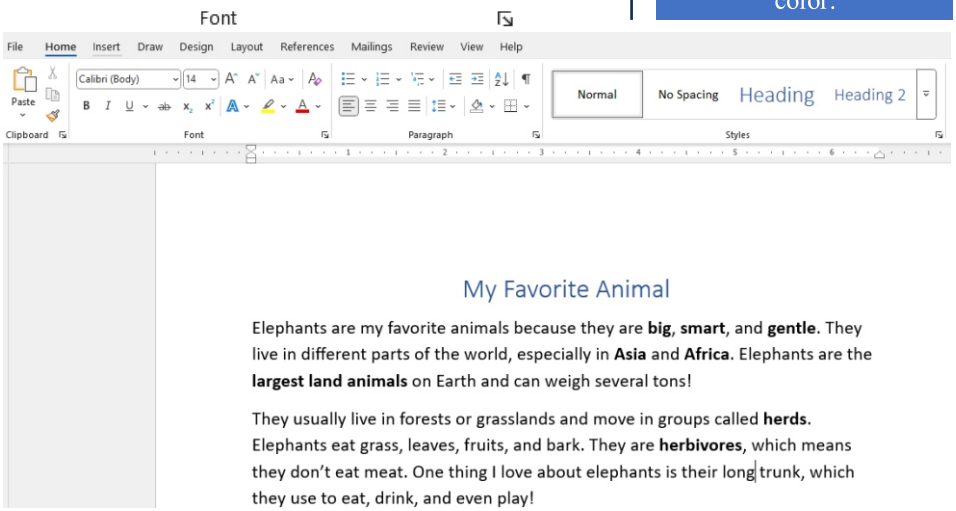


   - **b.** Select the heading and center align it using the Paragraph group or press Ctrl + E..

3. Write a short paragraph about animal, where it lives, eats and why you like it.
   - Change font style and size
   - Highlight key words using bold, italic or underline



Teacher demonstrates the students how to apply different fonts, background and text color.



4. Add 3-5 fun facts in bullet point
   - Use bullets and numbering from Paragraph group.
   - Add line spacing (1.5 or double)
   - Make the paragraph justify align

My Favorite Animal

Elephants are my favorite animals because they are **big**, **smart**, and **gentle**. They live in different parts of the world, especially in **Asia** and **Africa**. Elephants are the **largest land animals** on Earth and can weigh several tons!

They usually live in forests or grasslands and move in groups called **herds**. Elephants eat grass, leaves, fruits, and bark. They are **herbivores**, which means they don't eat meat. One thing I love about elephants is their long trunk, which they use to eat, drink, and even play!

Here are some fun facts about elephants:

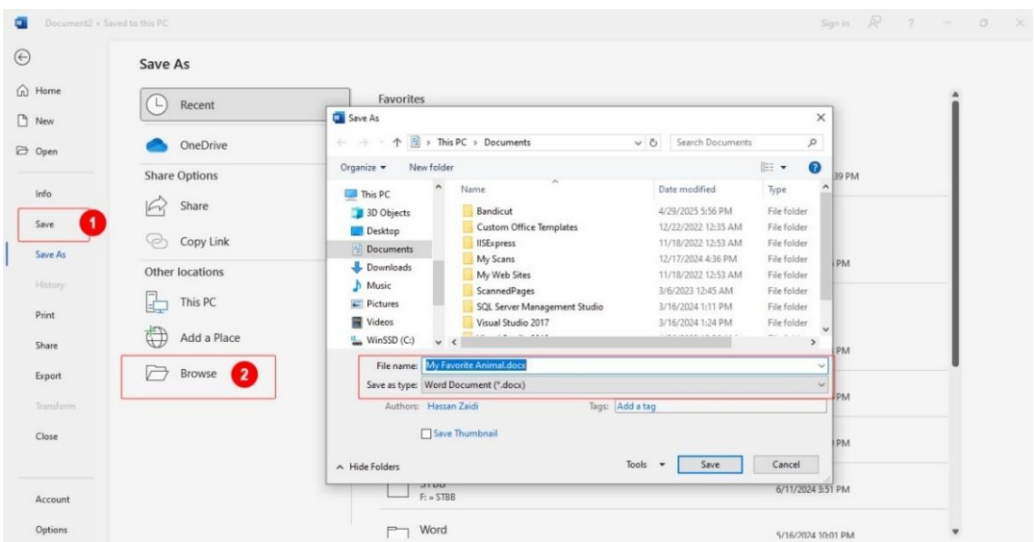
- Elephants can live up to 60–70 years.
- They have an amazing memory.
- Baby elephants are called calves.
- Elephants can recognize themselves in mirrors.
- Their ears help them stay cool.

Elephants are not just strong — they are also loving animals. They take care of their babies and help each other in the wild. I think elephants are truly **amazing** creatures!

Written by: ***Asghar Raza***

Teacher demonstrates the students how to apply alignment, bullets and line spacing.

5. Save work by clicking  save button from top left side or go to File menu and click on Save option.
   Save file with name MyFavoriteAnimal.docx



2.3.4 Insert Tab:

The Insert tab in Microsoft Word is a powerful tool which is used to add various objects, charts, and features to document. It contains all tools user need to insert elements like tables, pictures, charts, shapes, and more to make document more interactive and informative.

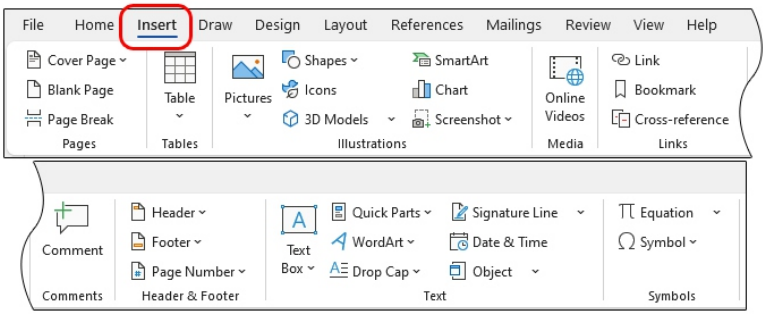


Figure 2.14 Insert Tab

Following are some common group and button in insert tab.

		Feature	What it does	Example Use
i)		Pages	Add a cover page, blank page, or page break	Start a new section or page
ii)		Tables	Insert a table to organize information	Show data in rows and columns
iii)	Illustrations	Pictures	Add a picture from your computer	Add photos to a report
		Shapes	Add arrows, boxes, circles, etc.	Create diagrams or decorate text
		Icons/3D Models	Insert symbols or 3D images	Visual appeal
		SmartArt	Insert diagrams like flowcharts	Show a process or idea
		Chart	Add bar, line, or pie charts	Show data or statistics
viii)	Header & Footer	Header & Footer	Add text at the top or bottom of the page	Add titles, page numbers, or names
ix)		Page Number	Add automatic page numbers	Number pages in a long document
x)	Text	Text Box	Insert a box with custom text	Highlight quotes or facts
		WordArt	Add fancy styled text	Make headings stand out
		Date & Time	Insert the current date or time	Add to letters or documents
		Symbol	Insert special characters (like ©, ®, ✓)	Use in professional or math work

i) **Pages:** This group is used to start a new section or page.

- **Cover Page** adds a ready-made title page at the beginning.
- **Blank Page** inserts a new empty page anywhere in document.
- **Page Break** Moves text to next page, starting a new section.

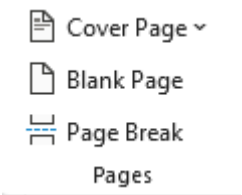


Figure 2.15 (a) Pages group

ii) **Tables:** A table is a grid of rows and columns. It helps to organize information neatly in a document. To insert a table, click Table in the Tables group and move the mouse over the boxes to choose the number of rows and columns.

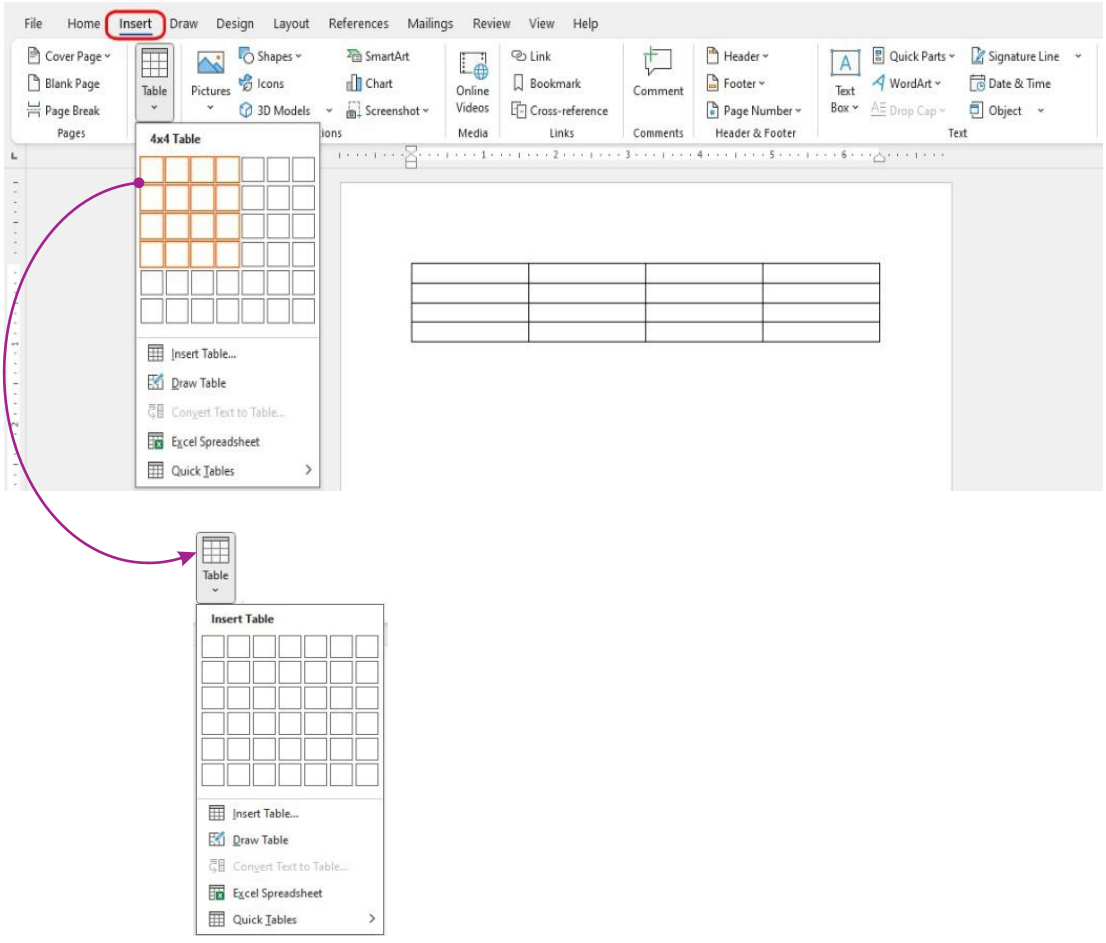


Figure 2.16 Insert Table

After inserting table click on top left corner of table and right click to open pop-up menu and select "**Table properties**" it will open a dialogue box that will provide options to adjust table and cells.

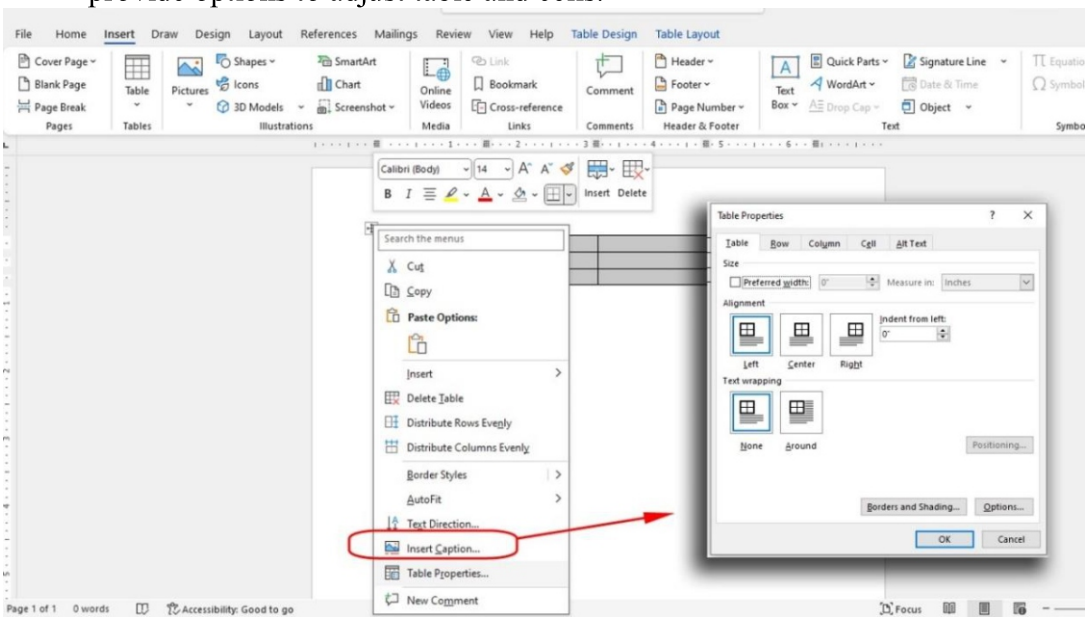


Figure 2.17 Table properties

When user click on table, **table design** and **table layout** tab will be visible in ribbon control as shown in following figure.

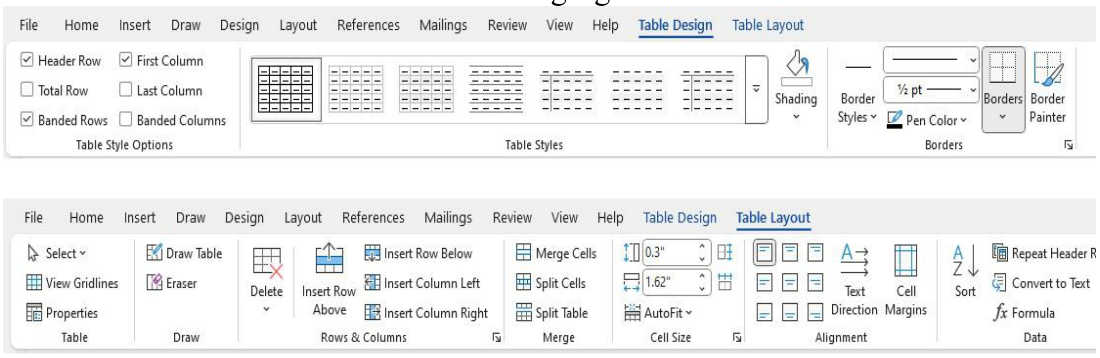


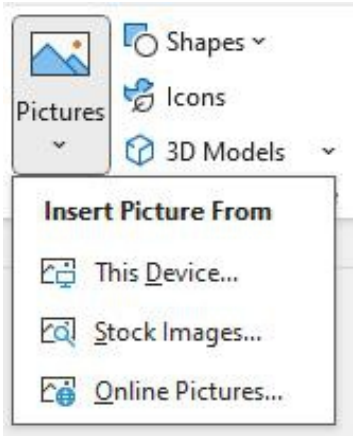
Figure 2.18 Table Design & Layout Ribbon

Table Design and Table Layout ribbon let us change design, border, Table background, border style, cell width etc. User can merge cells or rows of table by Table layout ribbon and align content of the cells.

iii) Illustrations:

This group is used to insert pictures, shapes, charts etc into document. Inserting or Formatting Image please follow below steps.

- Click on Pictures in insert tab
- A popup will appear choose either from computer or Online.
- Click on This Device to browse for the image to insert into the document and select insert.
- The image will appear on desired location of document.
- When user click on image an additional Format Tab will appear in Tab control as shown below figure.



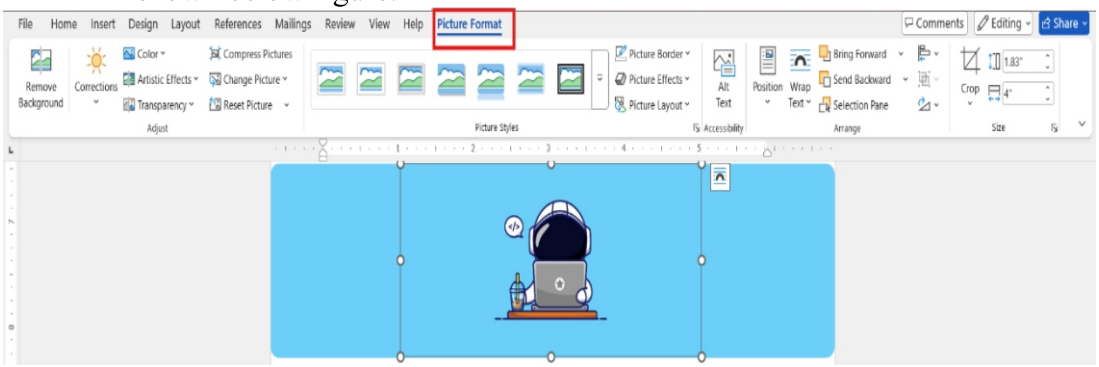


Figure 2.19 Picture Format Tab

Picture Format:

In Microsoft Word, Picture Format tab is a conditional bar that only shows up on the Ribbon when you select an image or picture within document. It provides a set of tools designed especially for modifying, improving, and personalizing photos that are added to documents. Following are some common groups and button in this tab.

Adjust Group: You can use these tools to fix and enhance the look of your photo:

- **Remove Background**: Automatically removes the background of the image
- **Correction:** Adjust brightness, contrast and sharpness
- **Color:** Change color tone (e.g., grayscale, washout, recolor).

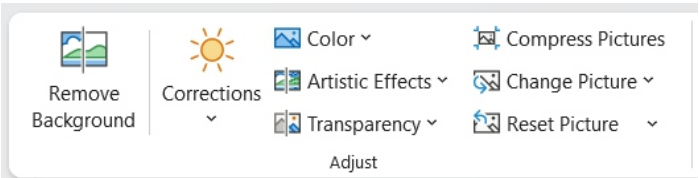


Figure 2.20 Adjust group.

- **Artistic Effect:** Apply effects like sketch, blur, paint strokes etc.
- **Compress Pictures:** Reduce file size by compressing image.
- **Change Picture:** Replace current image with a different one.
- **Reset Picture:** Revert to original picture (remove all formatting changes)

Picture Style Group:

User can use these tools to fix and enhance general look of photo:

- **Picture Border:** Add or change color, weight (thickness), and line style of border.
- **Picture Effects:** Apply effects like shadows, reflections, glow, soft edges, bevel, and 3D rotation.
- **Picture Layout (SmartArt):** Convert a picture into a SmartArt graphic for better visual organization.

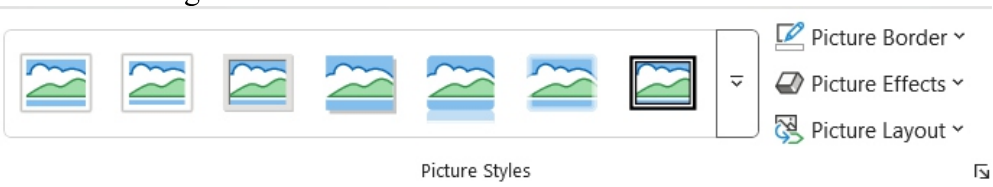
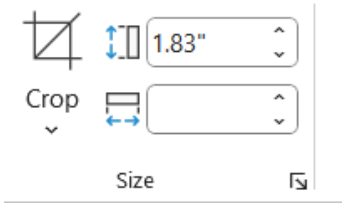


Figure 2.21 Picture Styles

Size Group: Tools to precisely resize and crop picture:

- **Crop:** Trim unwanted parts of image.
- **Height and Width boxes:** Enter exact dimensions manually.
- **Aspect Ratio Lock (Optional):** Keeps width and height ratio constant when resizing.



Arrange Group: Manage position of image within document

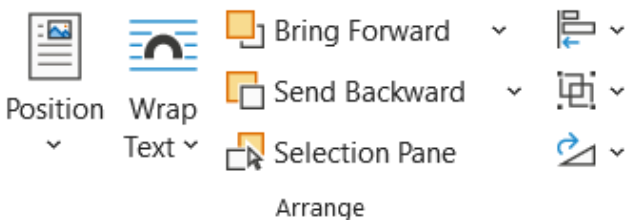


Figure 2.22 Picture Arrange Group

- Position : Place image at predefined positions on page.
- Wrap Text : Control how text flows around image (e.g., in line, square, tight, behind/in front of text).

- Bring Forward / Send Backward : Change layering order relative to other objects.
- Selection Pane : Helps manage overlapping objects by listing them.
- **Align:** Align picture relative to page, margins, or other objects.
- **Group/ Ungroup:** Combine multiple objects into a single unit or break them apart.
- **Rotate:** Flip or spin picture.

iv) Header & Footer:

A Header is space at top of each page in your document. A Footer is space at the bottom of each page. User can insert text, page numbers, dates or images in these areas and it will appear automatically on every page of your document.

Insert a Header and Footer:

- Go to Insert tab and click Header or Footer command button.
- Choose desired layout of Header/Footer.
- The Design tab will appear as soon as user begins to type text into header.

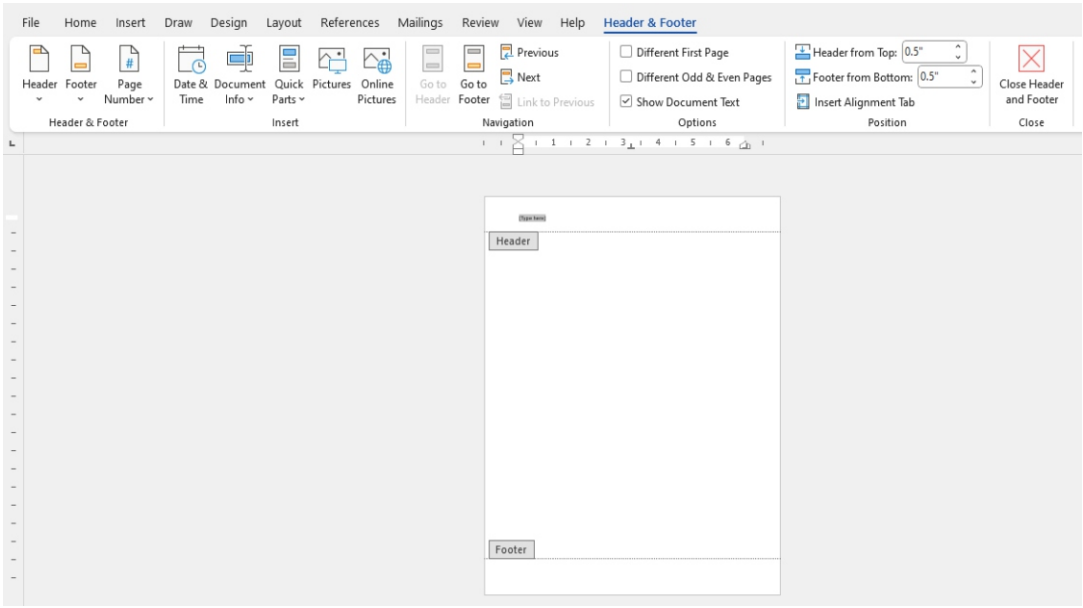
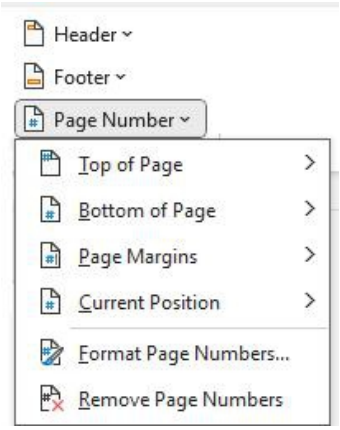


Figure 2.23 Table Design & Layout Ribbon

- After completion click on Close Header and Footer button.

Example: If user writes a school assignment, he/she might put this in Header
Name: Malika Fatima | **Subject:** ICT | **Grade:** 7
And if Footer
Page 1, Page 2, Page 3…. (Automatically).



v) Page Number:

It will automatically add numbers to each page of document. It helps keep track of order of pages, especially in long documents like reports or assignments. User can choose a style (plain, bold, fancy), can start number from different pages (like page X) or can format numbers (1,2,3 or i, ii, iii).

Activity: Insert and Edit Header & Footer in MS Word

Below is a simple step-by-step activity one can practice inserting and editing headers and footers in MS Word.

1. Open MS Word and Opening an Existing Document.
2. To Open previously saved "My Favorite Animal" document as showing in below figure.
3. Click Open and see Recent files that are saved previously. Click on My Favorite Animal document to open.

Teacher demonstrates the students how to Open documents from other path of the drive.

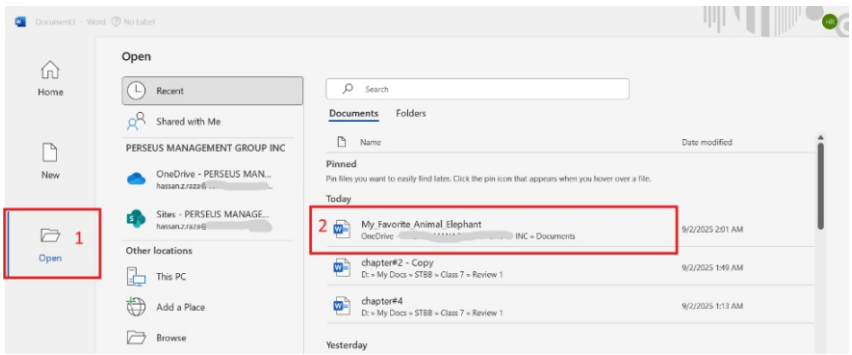


Figure 2.24 Open word document

4. Once file is opened. Go to Insert tab on Ribbon.
5. In Header & Footer group, click Header.

6. Choose a built-in style (like “Blank”, “Banded” or “Austin”) as shown in below figure.

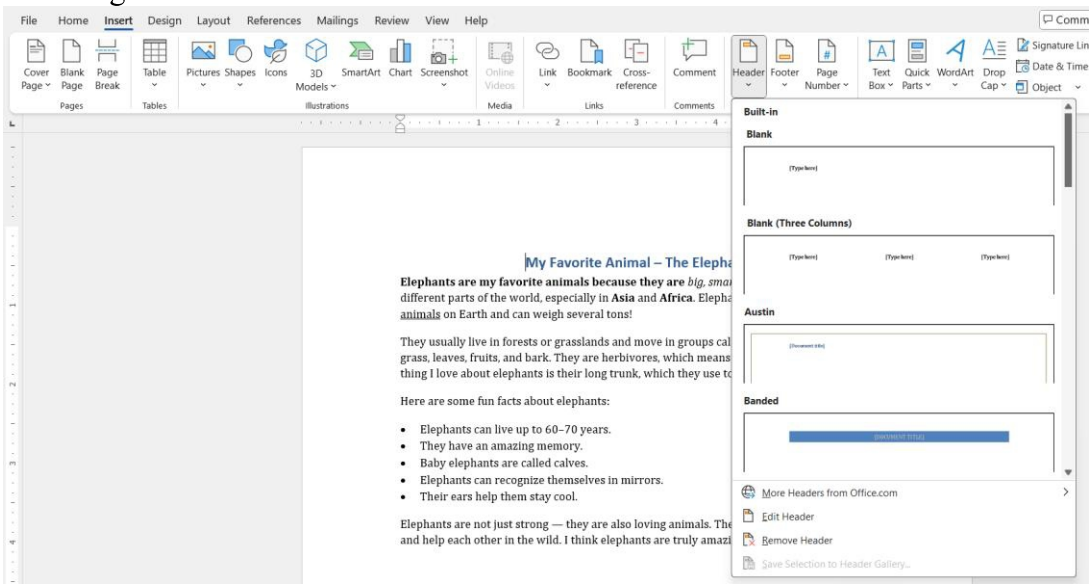


Figure 2.25 Adding Header in document.

7. Choose Austin as shown in below figure.

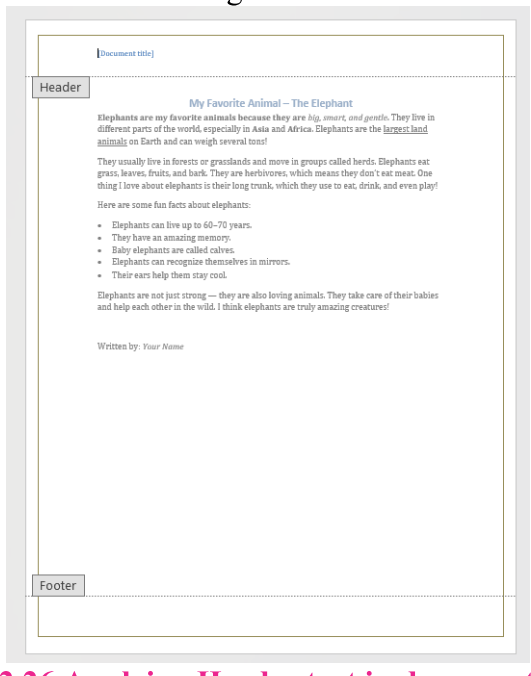


Figure 2.26 Applying Header text in document.

8. Type **Name** in header area.
9. Now, click **Footer** from same group.
10. To add **page numbers**, click **Page Number** (also in Header & Footer group).
11. Choose **Bottom of Page → Plain Number 2** (centered at bottom).
12. Double-click anywhere in main document area to close Header & Footer.
13. Press **Ctrl + Enter** a few times to create multiple pages and check how header, footer, and page numbers appear on each page.

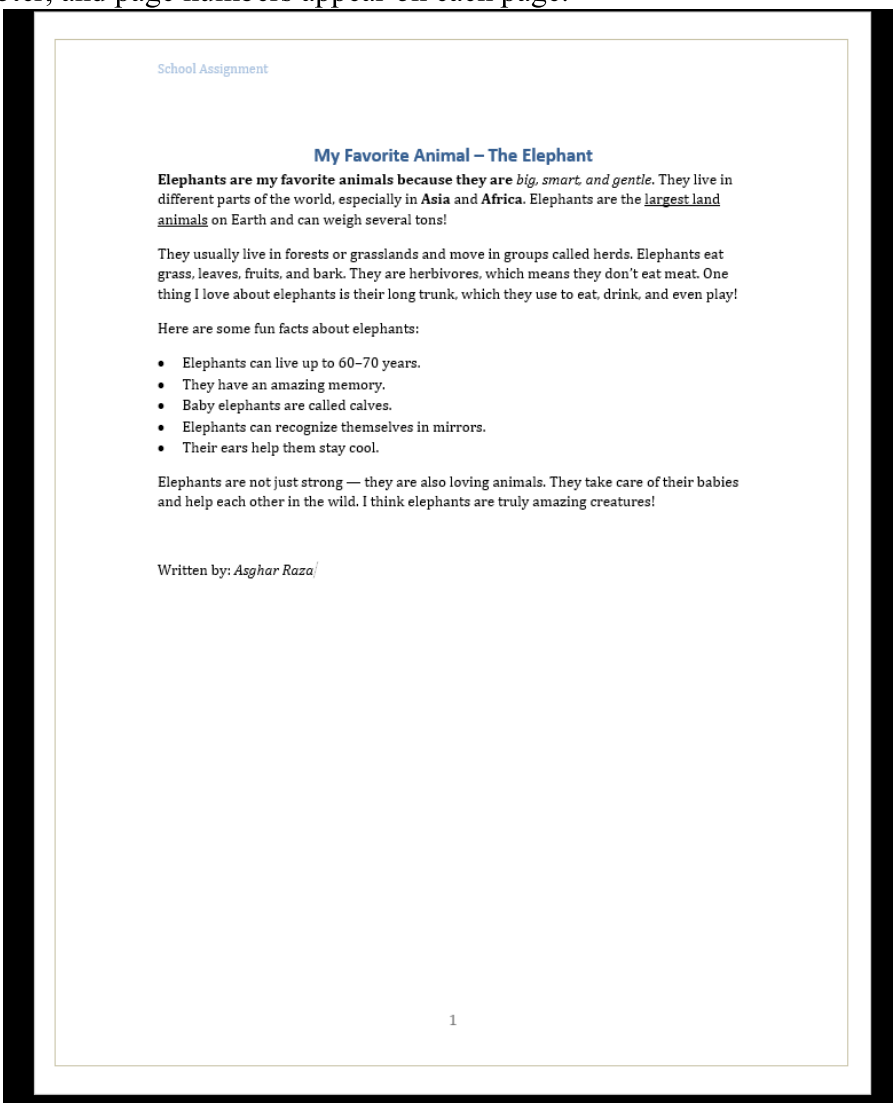


Figure 2.27 Header & footer text in document.

14. To save changes and make copy of file with another name.
15. Click on **File Tab**, Click on **Save a Copy**.

16. Select your desired location and write the new name of your document and click on save button.

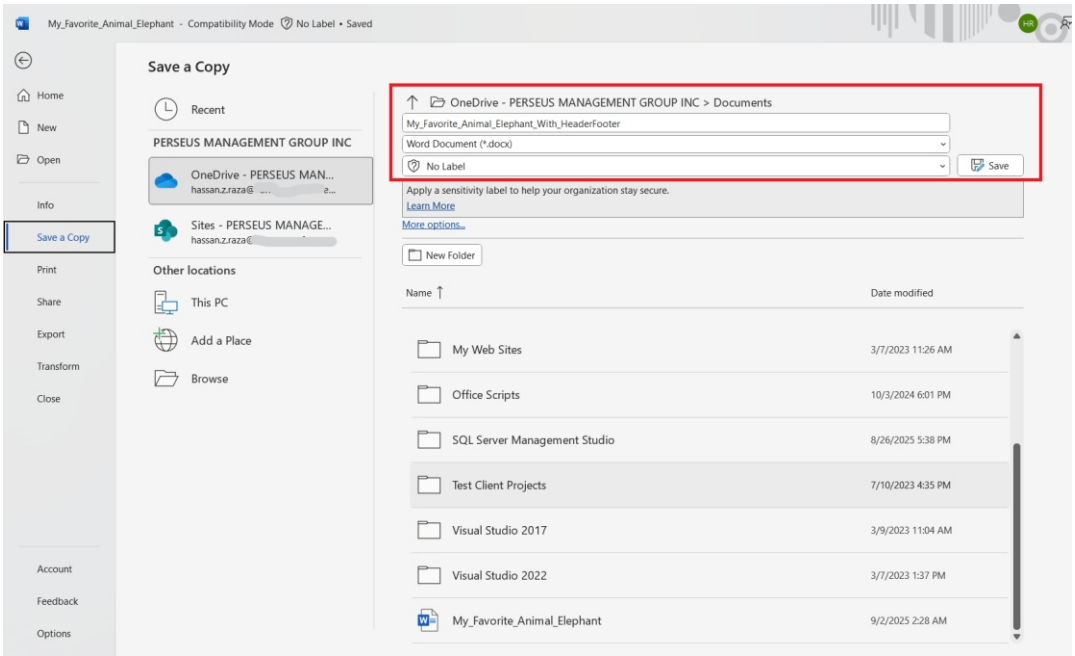


Figure 2.28 Header & footer text in document.

Note:

Teacher should demonstrate how to save a copy of document with different file format option.

2.3.5 Design Tab:

Design tab in Microsoft Word controls appearance and changes look and style of entire document. It allows to adjust page color, add themes, change fonts and border to make work look neat and professional.

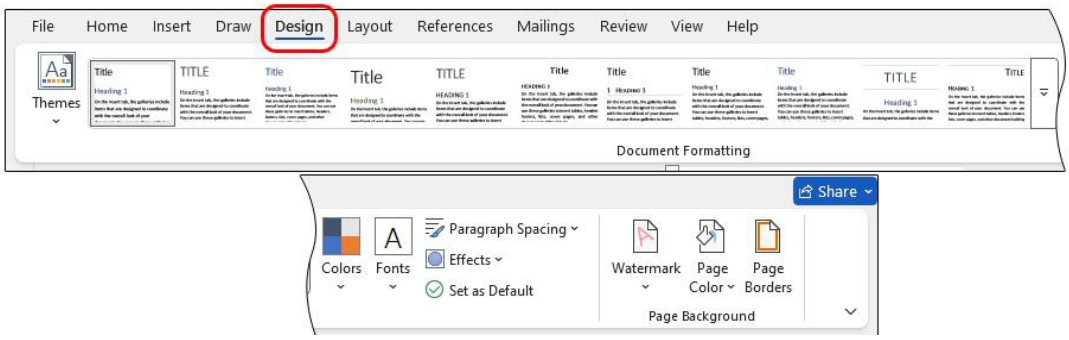


Fig 2.29 Design tab options

Following are some common group and button in design tab.

- **Page Background:**

The Page Background section allows to change color of page and add borders with different designs to make document look nicer. User can also add a Watermark, like words "Sample," "Private," or "Copyright," that appear lightly behind text to show document is special or protected.

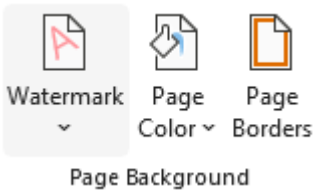


Fig 2.30
Page Background

- **Document Formatting:**

Document formatting helps make work look neat and stylish. It gives options like theme colors and text styles to change how document looks. To change theme, styles, and colors also changes to match it. User can also create new theme by choosing favorite colors, fonts, line spacing, and paragraph spacing to make document look just way user wants.

Fig 2.31 Document Formatting

2.3.6 Layout Tab:

The Layout tab in Microsoft Word provides tools and functions related to arranging and control space on page. It allow to set how much space is around text, how page looks and where things are placed.

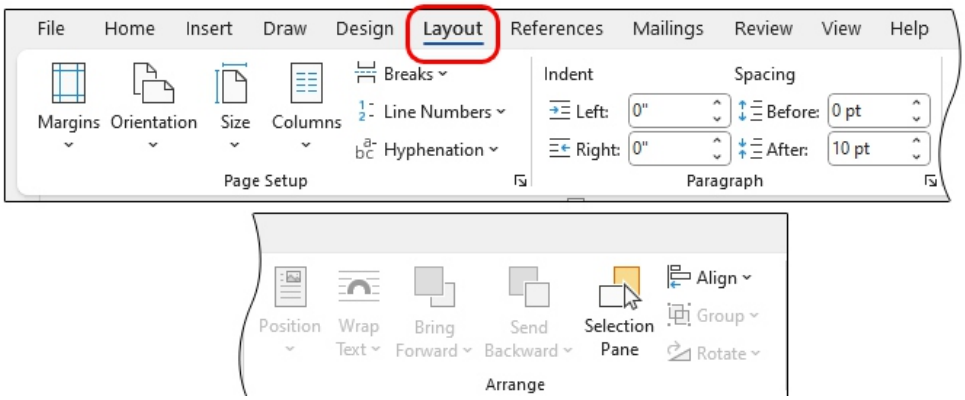
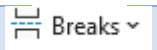
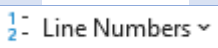
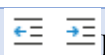


Fig 2.32 Layout Tab

Options	Description
	Sets space around edges of page.
	Changes page layout to Portrait (tall) or Landscape (wide).
	Let's choose different paper sizes (like A4, Letter, etc.).
	Splits text into two or more columns (like in a newspaper).
	Starts a new page or section in document.
	Adds numbers to each line of text.
 **Indent**	Moves text inward from left or right side.
 **Spacing**	Controls space before and after each paragraph.

Activity:

Create a document about best friend

Teacher demonstrates students to create a one-page document describing their best friend using tools from Insert, Design, and Layout tabs to make it colorful, creative, and well-organized.

Perform following steps to practice Insert, Design and Layout tabs.

- Write Title
  - Write title "My Best Friend"
  - Center it and use a Word Art Style (Insert Tab)
- Write Paragraph
  - Describe your best friend
  - What is name of your best friend?
  - What do you like most about him?
  - What do you do together?
- Add best friend picture
- Insert Shape like heart or start to decorate
- Add a text box and write a short quote like "A friend is someone who makes your world brighter."
- Choose nice theme to change font and color style.

- Change page color to something warm or happy.
- Add page border to make it look like a greeting card
- Use portrait orientation
- At bottom Footer of page type: Created by: [Your Name]

2.3.7 Reference Tab:

References tab in MS Word is used to manage citations, bibliographies, and other elements related to research and documentation. It provides tools that helps to create academic or professional documents that include sources, references, and structured content.

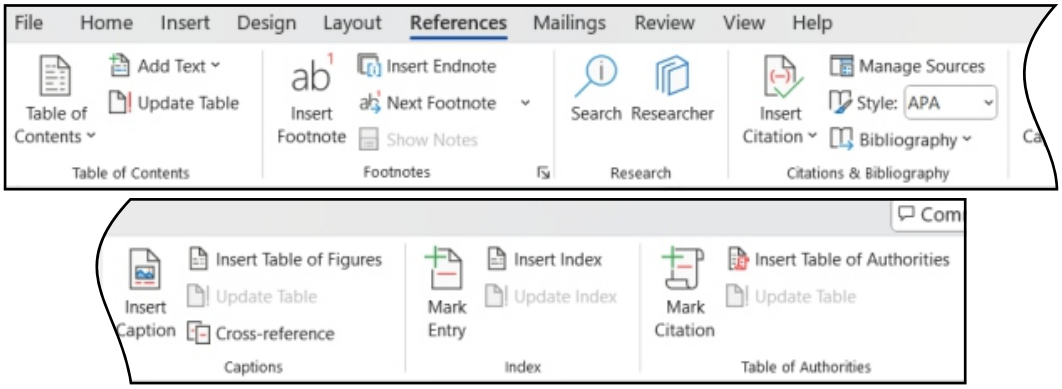


Fig 2.33 Reference Tab options

2.3.8 Review Tab:

Review tab in MS Word is essential for proofreading, collaborating, and protecting document. By using the review tab we can check the spelling mistakes, adding comments, tracking changes, or protect our work.

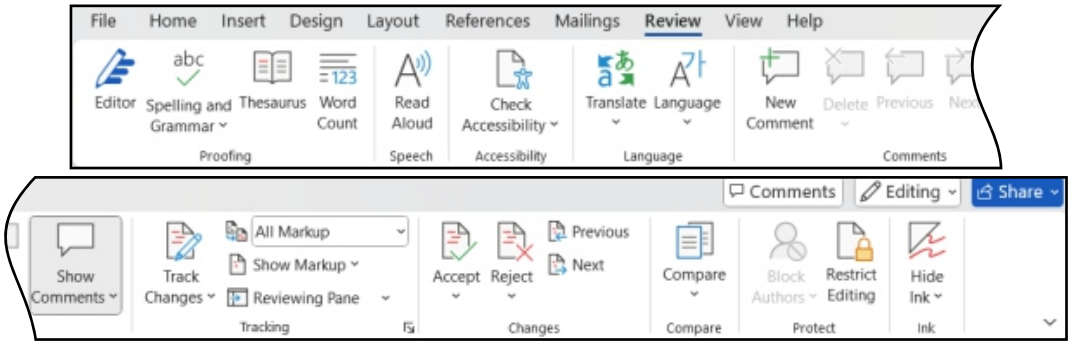
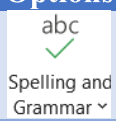


Fig 2.34 Review Tab options

Review tab is divided into several functional groups, each designed to assist with reviewing and refining a document:

Proofing Group: It contains tools to help check spelling, grammar, word usage, and overall readability. These tools are essential for ensuring document is professional, polished, and free from common language errors.

Options	Description
	Checks document for grammar and spelling errors.

Function:

- Scans document for spelling and grammatical errors.
- Opens a pane where user can:
  - See suggested corrections
  - Ignore errors
  - Add new words to dictionary
- It checks word-by-word, allowing to make decisions for each suggestion.

Example:

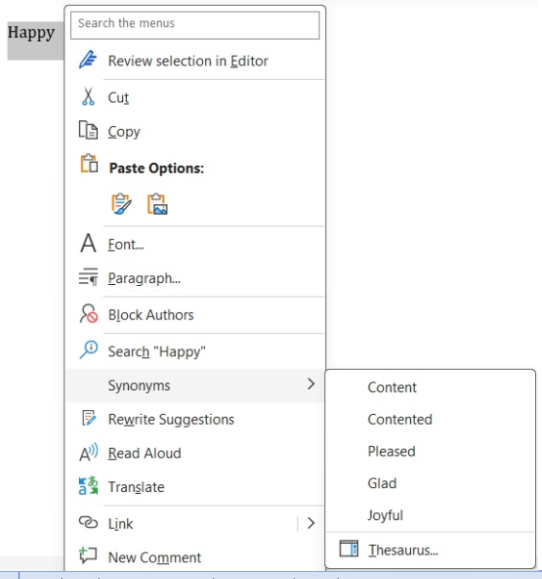
If user type "Recieve," MS Word will highlight and showing as red underline once user selects it, it will suggest changing it to "Receive." As shown below

	Suggests synonyms for selected words.

Function:

- Provides synonyms and antonyms for selected words.
- Useful for improving vocabulary, avoiding repetition, and making writing more expressive.

Example:
Right-click on word "happy" → Thesaurus might suggest "joyful," "content," or "cheerful."



123 Word Count	Displays total word, character, page, paragraph, and line count.

2.3.9 View Tab:

View tab in Microsoft Word allows users to control how document is displayed on screen. It offers various options to change layout, show or hide elements like rulers and gridlines, manage multiple windows, and control zoom levels—without affecting actual content of document.

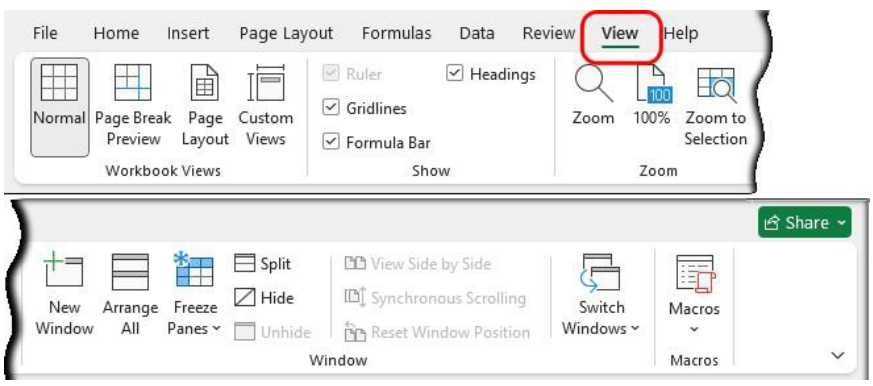


Fig 2.35 View Tab options

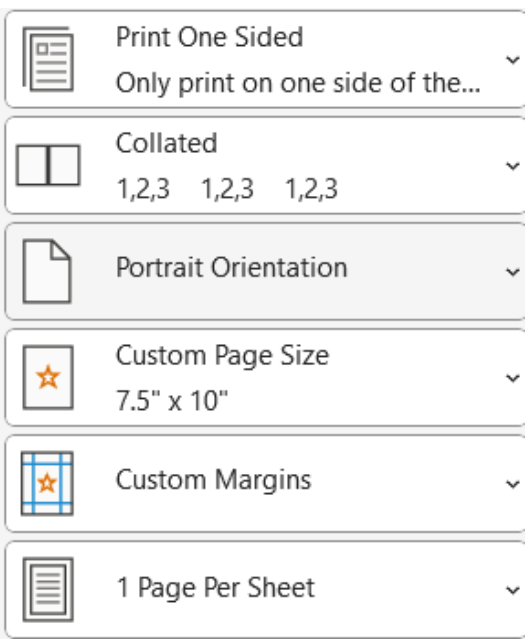
Following are some common groups in View Tab.

Group	What it does	Example Use
Views	Choose how document appears on screen	Print Layout, Web Layout, Draft, Outline
Show	Show/hide tools for layout and navigation	Ruler, Gridlines, Navigation Pane
Zoom	Adjust document zoom level	Zoom %, One Page, Multiple Pages
Window	Work with multiple document windows	Split, View Side by Side, Switch Windows

2.3.10 Printing a Document:

Printing a document in MS Word is simple. Below is step by step procedure to print a document.

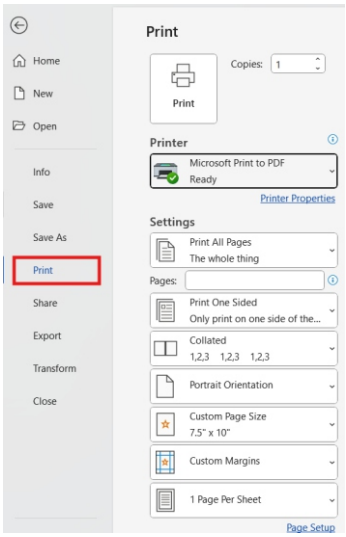
1. Open Microsoft Word
2. Open document to print.
3. Click on the **File** tab in top-left corner of screen
4. This will open Backstage View.
5. In Backstage View click on **Print** from left-hand menu
6. One will see Print Preview and Printer settings
7. Under Printer, select printer to use from drop-down list
8. Make sure printer is connected and turned on.
9. Click Print

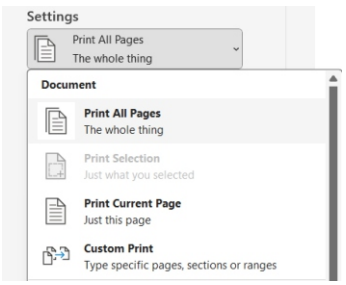


Set Print Settings:

User can customize several settings before printing.

- **Print Range**
  - Print All Pages (default)
  - Print Current Page
  - Custom Range (e.g. pages 2-5)
- **Print One Side:** Print on one side of paper or both side of paper
- **Number of Copies:** set how many copies are needed.
- **Collated**: keep multi-page document in order (1,2,3 – 1,2,3) or Uncollated (1,1,1 – 2,2,2 – 3,3,3)
- **Orientation:** Portrait or Landscape.
- **Paper Size:** Usually A4 or Letter
- **Margins:** Normal, Narrow, Wide etc.
- **Pages per Sheet:** Print Multiple pages on one sheet if needed.





Tips

1. Use **Ctrl + P** as a shortcut to open Print window directly.
2. Always check for **spelling and layout issues** before printing.
3. User can save paper by printing **double-sided** (if printer supports it).
4. To print the PDF instead of paper, select **"Microsoft Print to PDF"** as printer.

2.4 Knowledge Presentation:

A presentation enables students to share information in a clear and attractive way. When students give a report or explain a project, a good presentation helps the audience follow every idea without effort.

A presentation is a series of slides that appear one after another on the screen. Each slide carries one main idea. Text, pictures, sounds, and short video clips work together. These elements are called multimedia.

Multimedia helps the audience learn faster because:

- Text states the facts.
- Pictures show the meaning at a glance.
- Sounds keep attention alive.
- Videos bring real examples to the classroom.

Five programs are widely used to create presentations:

1. **Microsoft PowerPoint:** the standard tool in schools.
2. **Google Slides:** free and works on any device with internet.
3. **Apple Keynote:** produces smooth designs on Apple computers.
4. **Prezi:** displays content on one large zooming canvas.
5. **Canva:** offers ready-made templates and free images.

2.5 Microsoft PowerPoint:

Microsoft PowerPoint is the presentation program that comes with the Microsoft Office suite. Students, teachers, and office workers use it to create presentations for lessons, projects, and meetings. The program is simple to learn because its tabs and commands work in the same way as Microsoft Word.

Main Features:

- Slides – individual pages that build the show
- Layouts – ready designs for titles, pictures, or charts
- Themes – sets of colours and fonts that give a neat look
- Transitions – smooth changes from one slide to the next
- Animations – gentle movements that make objects appear

Most Common Ribbon Tabs:

1. **Home:** new slides, copy, paste, bold, bullets
2. **Insert:** pictures, shapes, charts, videos
3. **Design:** choose a theme or change colours
4. **Transitions:** pick Fade, Push, or Wipe
5. **Animations:** make text fly in or spin
6. **Slide Show:** start with F5, move with arrow keys
7. **View:** see thumbnail slides on the left

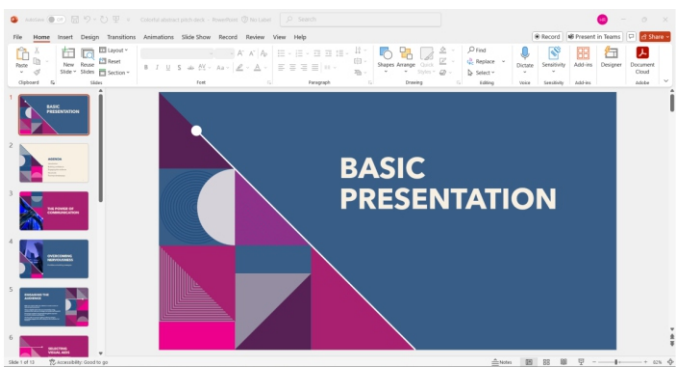


Fig 2.36 Interface of PowerPoint

The PowerPoint Window

When the program opens, three areas appear:

1. **Ribbon:** rows of tabs at the top
2. **Slide Pane:** the big white slide in the center
3. **Thumbnail Pane:** small pictures of every slide on the left

2.5.1 Create a Presentation in MS PowerPoint:

Every presentation in Microsoft PowerPoint is built from individual slides. A slide is a single page that holds titles, pictures, bullet points, or charts.

Seven Steps to Build a Presentation

1. Open PowerPoint Double-click the orange PowerPoint icon on the desktop. Choose Blank Presentation. A fresh title slide appears.
2. Add the First Slide (Title Slide) Click inside the top box → type "Saving the Snow Leopard". Click the bottom box → type your name, class 7-B, and today's date.
3. Insert New Slides
   - **Method 1:** Home tab ▶ New Slide ▶ pick a layout.
   - **Method 2:** Press Ctrl + M (fastest way).
   - **Method 3:** Right-click any thumbnail on the left pane → New Slide.
4. Choose the Right Layout Common layouts:
   - **Title and Content:** one picture + bullets
   - **Two Content:** picture on left, bullets on right
   - **Blank:** start from scratch

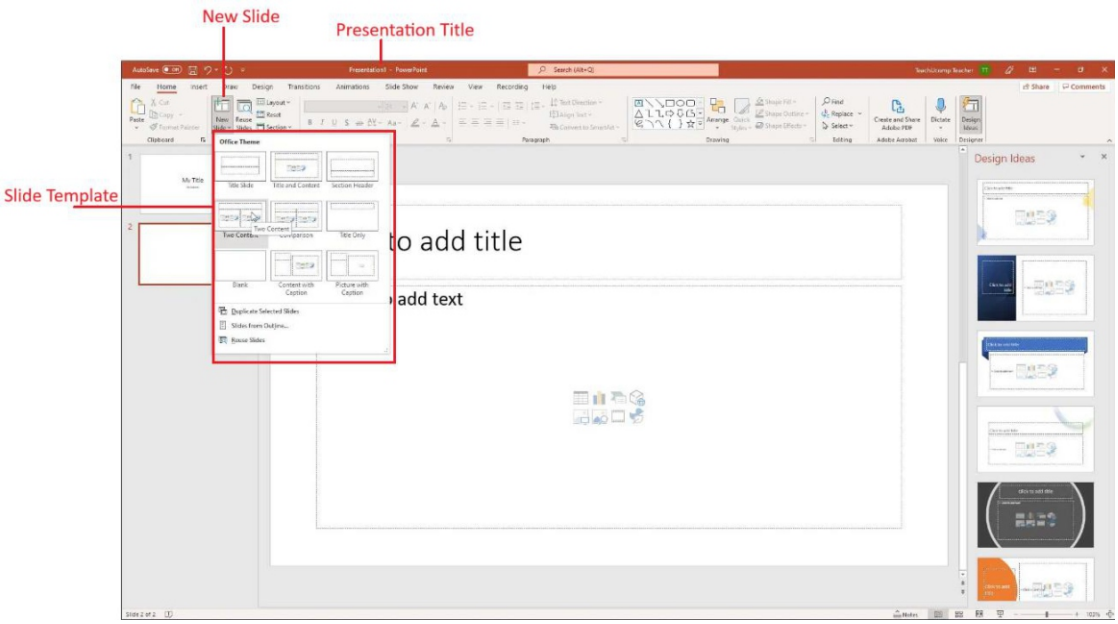


Figure 2.37 Adding slide

5. Duplicate or Delete Slides Right-click a thumbnail:
   - Duplicate Slide – makes an exact copy
   - Delete Slide – removes it forever
6. Rearrange Slides: In the left pane, drag any thumbnail up or down. Drop it in the new place. The show order changes instantly.
7. Save Early, Save Often:
   - File ▶ Save As ▶ Desktop ▶ "Snow_Leopard_YourName.pptx" ▶ Save.
   - Press Ctrl + S every five minutes.

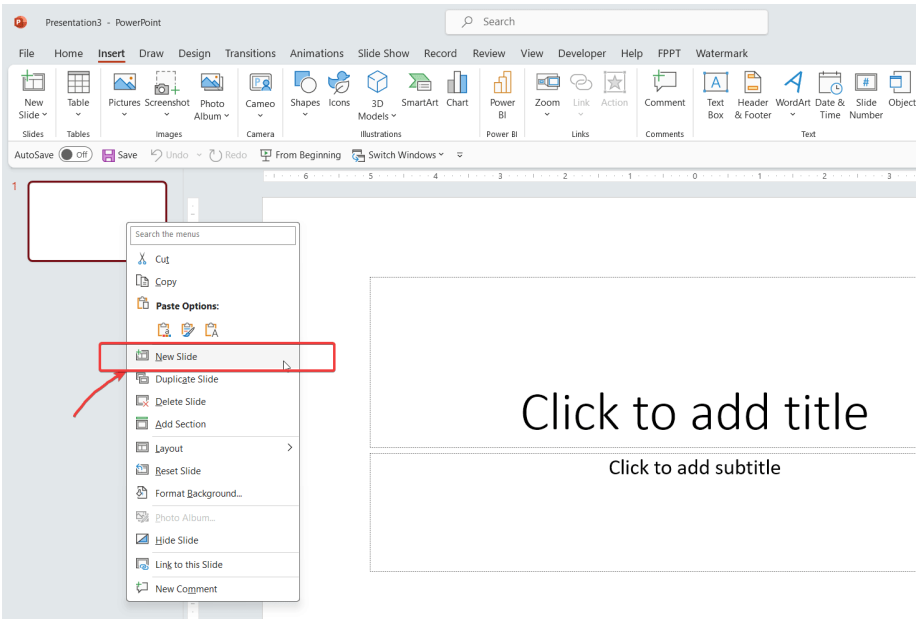
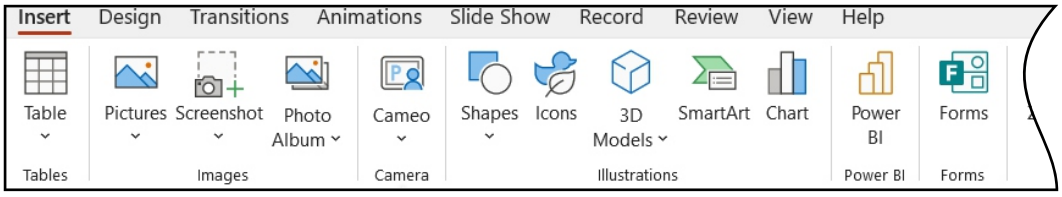
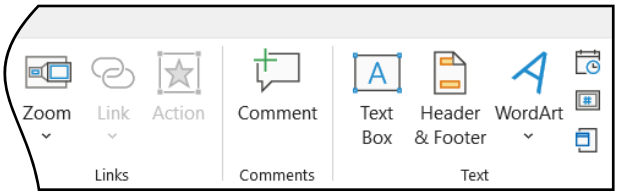


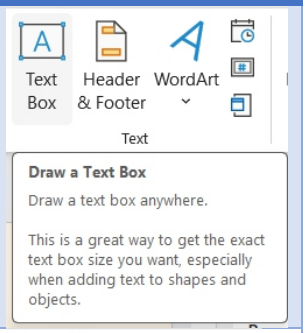
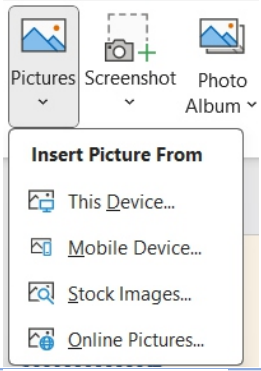
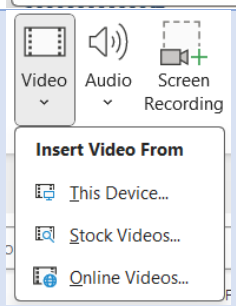
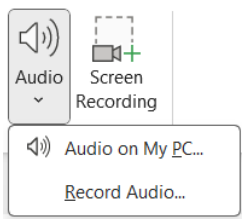
Figure 2.38 Adding New Slide

📌 *Use different slide layouts to match the type of content you want to add.*

2.5.2 Adding various objects on slides:





Objects	Description	
Add Text Box	Go to Insert Tab, click on Text Box, then type content.	
Add Images	Go to Insert > Pictures → choose "This Device" or "Online Pictures".	
Add Videos	Go to Insert > Video→ choose "This Device" or "Online Videos".	
Add Audio	Go to Insert > Audio→ choose "Audio on My PC" or "Record Audio".	

2.5.3 Creating Hyperlinks:

A hyperlink in PowerPoint is a clickable text, shape, image, or object that moves the screen to another location. When a student clicks the blue underlined word or picture, the computer jumps instantly to another slide, another file, or a website.

Two Kinds of Hyperlinks

1. **Internal:** jumps inside the same presentation
2. **External:** opens a webpage on the internet

Internal Hyperlink – Jump to Any Slide

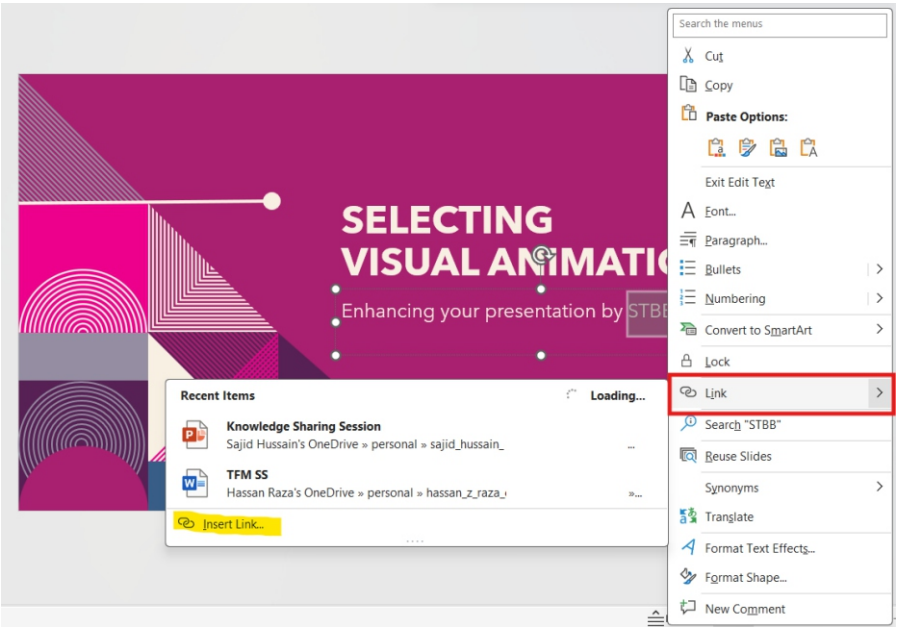
1. Type the word "Facts" on Slide 2.
2. Select the word Facts.
3. Right-click → Link (or press Ctrl + K).
4. In the box, click Place in This Document.
5. Choose Slide 5. Amazing Facts.
6. Click OK. The word turns blue and underlined.

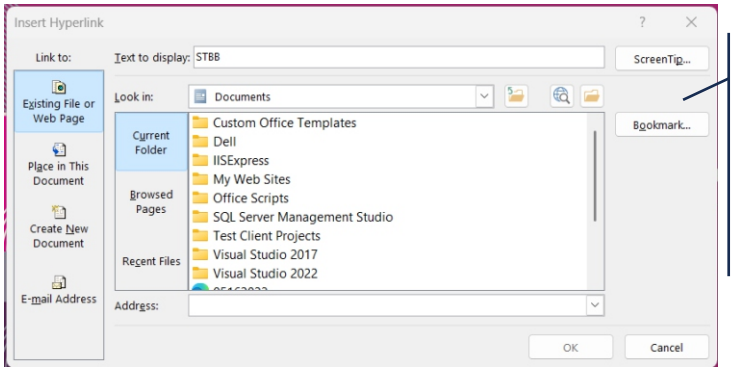
Test: Press F5 → click Facts → you land on Slide 5!

External Hyperlink – Open a Website

1. On Slide 3 type "Visit STBB".
2. Select the words Visit STBB.
3. Right-click → Link.
4. Click Existing File or Web Page.
5. In the Address box type: https://stbb.edu.pk/
6. Click OK.

Test: Run the show → click the link → the STBB website opens in the browser.





Teacher should demonstrates to students how to add internal, external links and other slides/ document link.

Figure 2.39 Adding Hyperlink

📌 Hyperlinks make presentation interactive, especially for navigation or quizzes.

2.5.4 Creating/Animating an object to appear on click:

In ICT, an animation is a short movement that brings an object onto the slide. When students set the Start option to On Click, the object stays hidden until the presenter presses the mouse or spacebar. This keeps the audience focused and makes every point feel like a surprise reveal.

Why "Appear on Click" is Powerful

- Slide looks clean at first
- Students control the exact second each fact arrives
- Used in every professional TED Talk and school science fair

Step-by-Step: Make a Picture Appear on Click

1. Insert the Object: Slide 3 → Insert tab → Pictures → choose a photo of the Karakoram Highway → Insert. Resize it to half the slide.
2. Open the Animation Tools: Click the picture once. Animations tab lights up at the top.
3. Choose an Entrance Effect: In the Animation group, click Fade (gentle) or Fly In (exciting). A small number "1" appears on the picture.
4. Make it Wait for Your Click: Look at the right side → Animation Pane → click the small arrow to open it. Click the words "Picture 1" in the list. In the Start box, change With Previous to On Click. A tiny mouse icon appears – success!
5. Add More Objects (up to 5): Repeat for a text box ("2,300 km long") and a star shape. Each gets its own number (2, 3, 4).
6. Test the Magic: Press F5. Slide 3 is blank except the title. Click once → picture fades in. Click again → length appears. Click again → star spins in.

Figure 2.40 Adding Animation

📌 User can add multiple animations and control their timing and sequence.

2.5.5 Adding Notes:

Speaker Notes are private reminders that only the presenter sees. They sit safely below each slide and never appear to the audience during the slide show. Users use them to remember exact numbers, jokes, or "slow down here" hints.

Why Top Users Always Add Notes

- Never forget the population of Gilgit (1.6 million)
- Read the exact quote from Allama Iqbal
- Stay calm when the class asks a surprise question

Three Ways to Open the Notes Area

Way 1: Notes Button (fastest) View tab → Notes button. A wide grey box opens under the slide.

Way 2: Notes Page (full-page view) View tab → Notes Page. Each page shows one slide + a big notes box. Perfect for printing.

Way 3: Normal View (everyday) Look at the bottom of the window. A thin bar says "Click to add notes". Click it → type.

Step-by-Step: Add Secret Notes

1. Open your "City_2.4.1.pptx".
2. Go to Slide 3.
3. Click View → Notes.
4. In the grey box type: "Speak slowly – 30 seconds silence after the picture" "Population = 2.2 million (2023 census)" "Ask class: Who has visited?"
5. Slide 5 → type: "Smile here! Tell the funny bus story."
6. Press Ctrl + S to save.

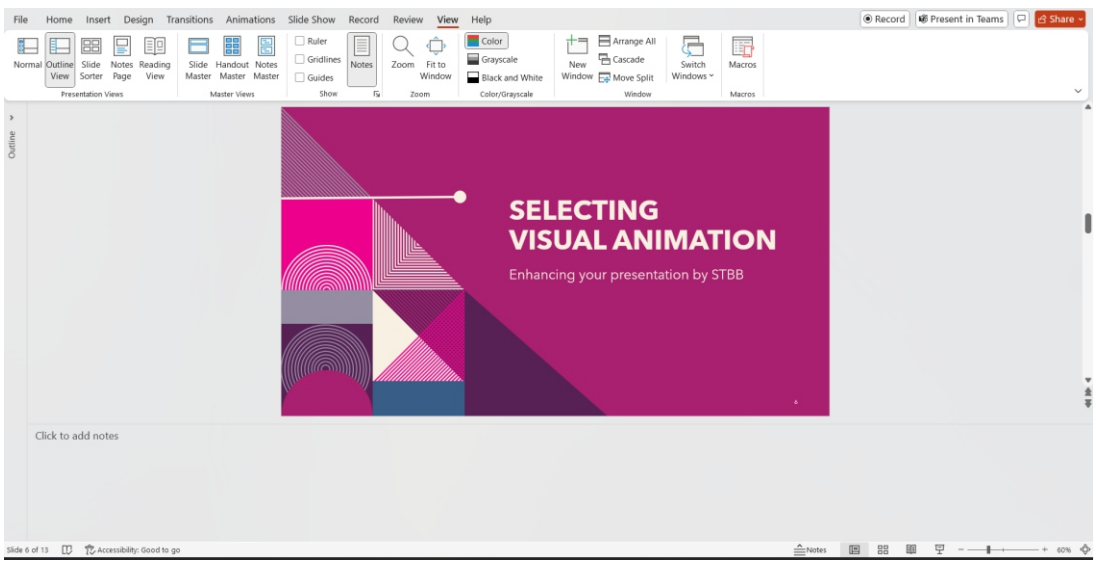


Figure 2.41 Adding Notes Outline View

See Notes While Presenting

1. Connect the laptop to the projector.
2. Press F5.
3. On the laptop screen choose Use Presenter View.
   - Big slide → shows on projector
   - Timer + notes → shows only on laptop

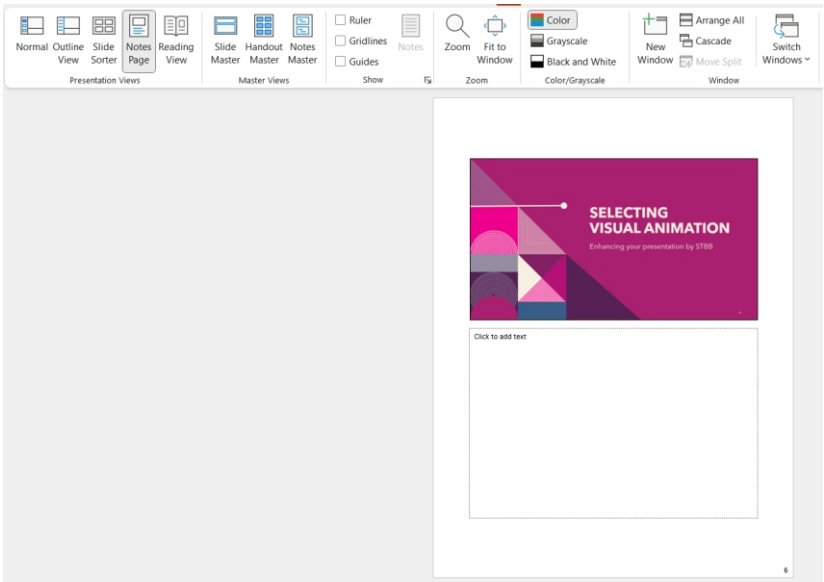


Figure 2.42 Notes Page View

📌 These notes don't appear on slide but help during presentation (especially in Presenter View).

2.5.6 Running the Show & Making It Executable:

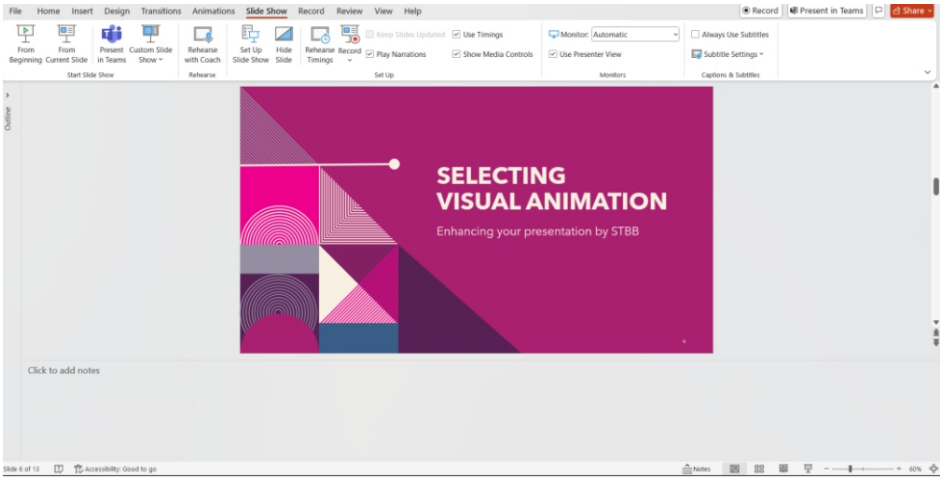
A slideshow is the live performance of your slides. An executable file (.ppsx) is a magic version that starts the show the moment anyone double-clicks it—no menus, no editing, just pure presentation.

Part A – Start the Slideshow (30 seconds)

1. Open your "Dolphin_YourName.pptx".
2. Slide Show tab → From Beginning (or press F5).
3. The first slide fills the screen.
4. Left-click or press Spacebar → next slide.
5. Press Esc → back to normal view.

Presenter View (laptop + projector) Connect the projector → Slide Show tab → tick Use Presenter View.

- Projector shows the big slide.
- Laptop shows the slide + your Speaker Notes + a timer.



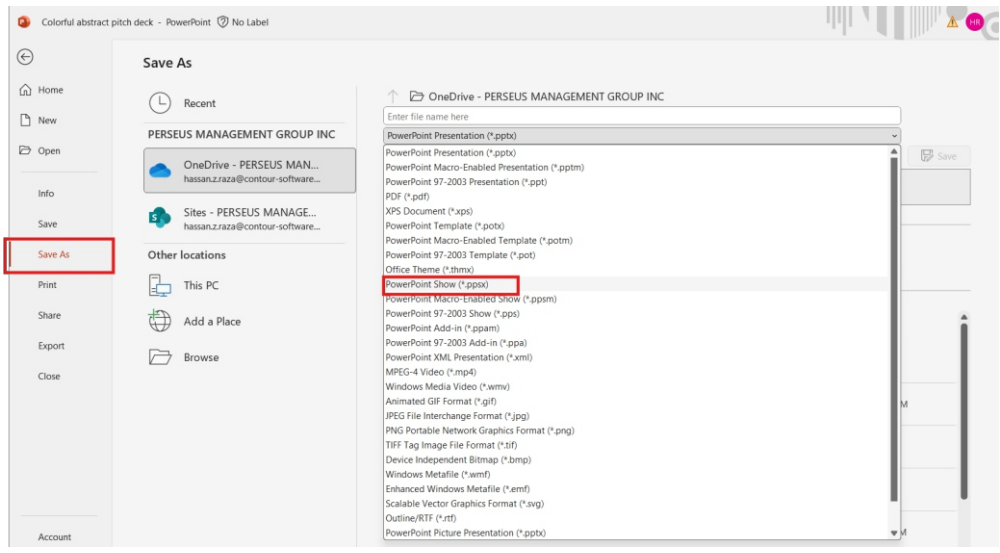
Part B: Turn It into an Executable Show

1. File → Save As.
2. Folder: Desktop
3. File name: "Dolphin_Show"
4. Save as type → choose PowerPoint Show (.ppsx)
5. Save.

One-Click Magic

Double-click "Dolphin_Show.ppsx"

- Slideshow starts instantly
- No Ribbon, no thumbnails
- Perfect for the science fair laptop!



📌 PowerPoint show is great for auto-running presentations at events or kiosks.

Activity: My Dream Vacation

A Complete 8-Step Project for Grade 7

This ready-to-teach activity turns every student into a PowerPoint expert in one 40-minute lab period. Follow the numbered steps exactly. Tick each box when finished.

Step 1 Open PowerPoint

- Double-click the orange PowerPoint icon.
- Click Blank Presentation.

Step 2 Build Exactly 4 Slides

Slide 1 – Title Slide

- Top box: "My Dream Vacation" (font size 44)
- Bottom box: Ali Khan – Class 7-B – 05 Nov 2025

Slide 2 – About the Place

- Title: "Maldives – Islands in the Sky"
- Type 3 short sentences (font size 28): 1 200 tiny islands Water so clear you see fish from the plane 30 °C every day

Slide 3 – Things to Do

- Title: "Top 5 Adventures"
- Insert 3 pictures (Insert → Pictures → This Device)
- Under each picture type one line:
  Snorkel with turtles
  Night fishing under stars
  Walk on a sandbank

Slide 4 – Summary

- Title: "Why I Must Go"
- One big sentence: "Blue water + kind people = perfect memories!"

Step 3 Add Design & Transitions

- Design tab → choose "Ocean" theme.
- Transitions tab → select all slides (Ctrl + A) → Fade → Duration 01.00.

Step 4 Add Animations

- Slide 2: select the 3 sentences → Animations → Wipe.
- Slide 3: select each picture → Animations → Zoom → Start: On Click.

Step 5 Insert Images

- Every slide must have at least one picture.
- Resize by dragging corners (hold Shift for perfect shape).

Step 6 Add Your Name in the Footer

- Insert → Header & Footer
- Tick Footer → type "Ali Khan – 7-B"
- Click Apply to All.

Step 7 Preview the Magic

- Press F5.
- Click slowly through every animation.

- Press Esc to stop.

Step 8 Save Two Files

- File → Save As → Desktop

Name: MyDreamVacation.pptx → Save
Change "Save as type" → PowerPoint Show (*.ppsx)
Name: MyDreamVacation.ppsx → Save

Bonus Test

- Close PowerPoint.
- Double-click the .ppsx file on Desktop.
- Your show starts instantly!

2.6 Electronic Mail (Email):

Email (electronic mail) is a fast and easy way to communicate over Internet. You can use a computer, tablet, or phone to write messages and attach files such as documents, pictures, audio, or videos.

Common uses of Email:

Domain	Use of Email
Communication	Sending and receiving messages instantly anywhere in the world
Business	Sharing documents, reports, and business proposals
Education	Submitting assignments, receiving study material, and teacher student interaction
Marketing	Email campaigns, newsletters, promotions and advertising
Job Application	Sending resumes, cover letters, and job inquiries
Scheduling	Sending calendar invites, meeting agendas and reminders

Common Platforms for Electronic Email:

An email platform is a program, or web-based service (website), or app that allows to send, receive, and manage your emails. These platforms often have extra features like such as saving contacts, blocking unwanted mail, using calendars, storing files online (cloud storage), and accessing email on a phone or tablet.

Common Platforms are listed below

	Gmail	Gmail is a free email service developed by Google. It is one of the most widely used email platforms in the world. **Website:** www.gmail.com
	Outlook	Outlook is an email platform developed by Microsoft. It is part of the Microsoft office suite and can be used both online and as a desktop application. **Website:** www.outlook.com
YAHOO!	Yahoo	Yahoo Mail is a free email service provided by Yahoo. It has been one of the earliest and most popular email platforms since its launch in 1997. **Website:** mail.yahoo.com

2.6.1 Key Terminologies/Key Terms:

Email Address

An Email Address is a unique ID that allows a person to send and receive emails. Just like regular email mail needs a sender and receiver address to send message properly.

Components/Parts of Email address:

Structure: username@domain.com

- Username: The name of user (e.g., abc123)
- @: This @ (at a rate of) symbol is used for connect the username to the domain. It's also known as separator.
- Domain: The service provider (e.g., gmail.com, yahoo.com, outlook.com)

Password

A Password is a secret combination of characters, numbers and alphabets used to secure an email account. It protects user data and ensures that only you can use your email. For strong password user can use a mix of letters, numbers and symbols such as @ # $.

Reminder: Never share password with anyone.

2.6.2 Create an Email Account:

There are many email services providers, for example, Gmail.com to create an email account by following the steps below.

- Open gmail.com in browser
- Click on Create account
- Choose Account type
  Choose "For myself" (personal use) or "For work or business", depending upon need.

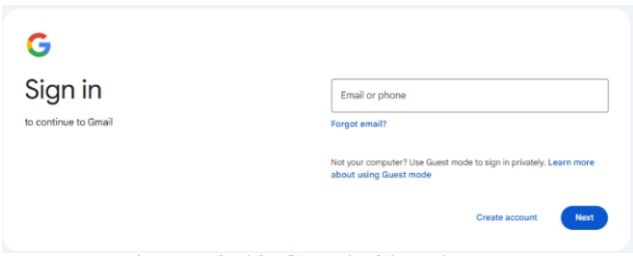


Figure 2.42 Gmail Sign in page

- Fill personal details

1. First and last name
   Username (this becomes email address, e.g., jane123@gmail.com)
2. Basic Information like Birth date and Gender
3. Create Strong Password
   Password (create a strong one with letters, numbers, and symbols)
   Confirm the password
4. Enter phone number for verification
5. Google may send a verification code via SMS to the provided phone number. Now enter the code.
6. Add recovery email which is a secondary email address that user add to Gmail (Google) account. It will help to recover email in case user forgot password, or someone hack account.
7. Click next to Agree terms and conditions.
8. After reading Privacy Policy and Terms of Service click, I agree.
9. Account Created, now user can access Gmail inbox.

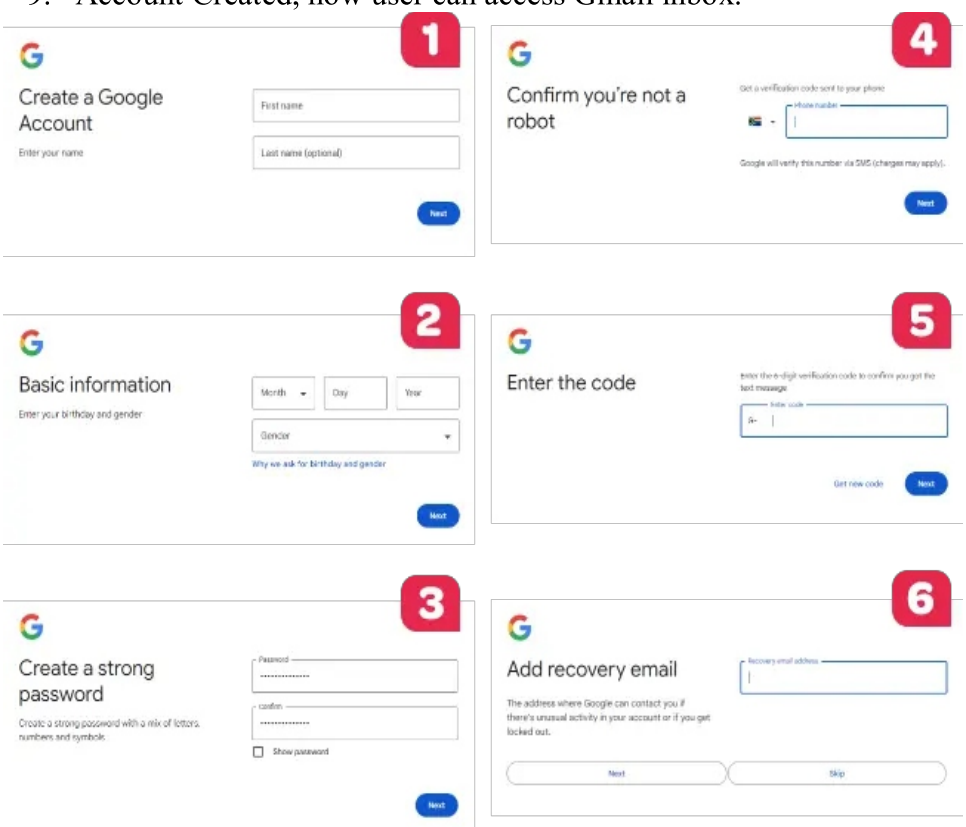


Figure 2.44 Create an Email account

2.6.3 Signing In and Signing Out from Email Account:

Sign In to Gmail

User can Sign In into Gmail account by steps as follows:

1. Open browser and go to www.gmail.com
2. Type email address (e.g. aliraza@gmail.com) and click next
3. Type password carefully and click next
4. You're Signed In! now user can see inbox. User can now read, write, and manage emails.

Sign out from Gmail:

User can Sign Out into Gmail account by steps as follows:

1. Open Gmail and make sure you're signed in.
2. In the top-right corner, cl ick your profile picture or initial.
3. Click Sign out or sign out of all accounts.
4. You're signed out. If you want, you can close the browser tab or window.

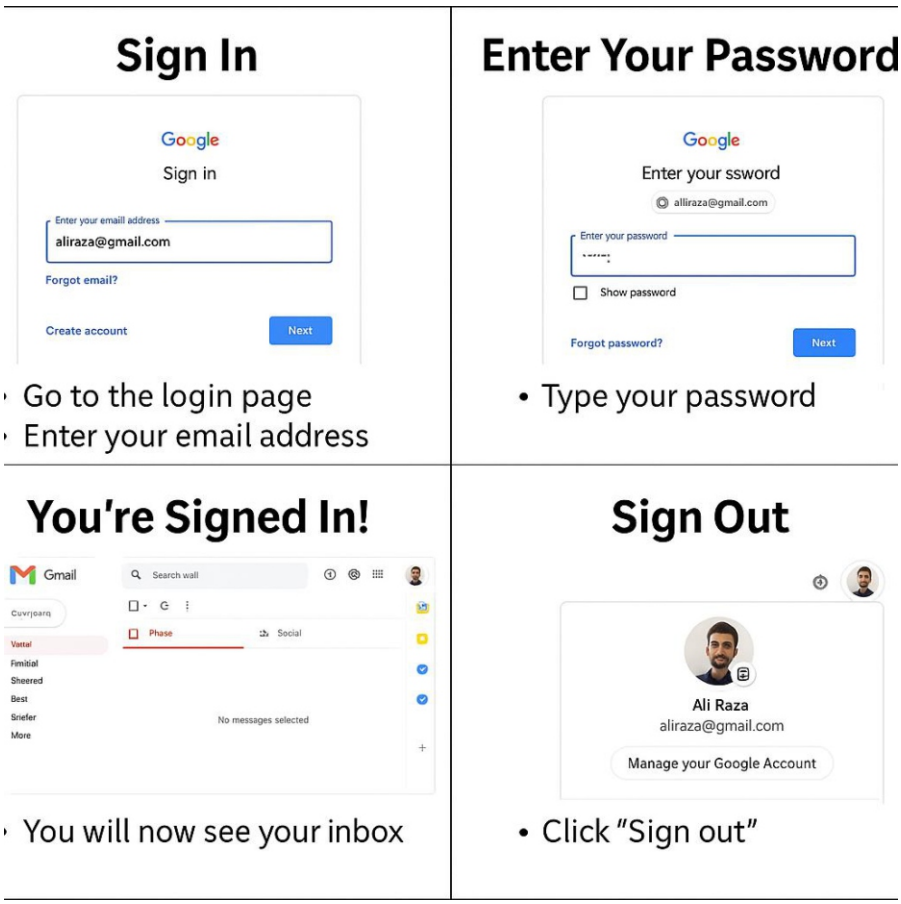
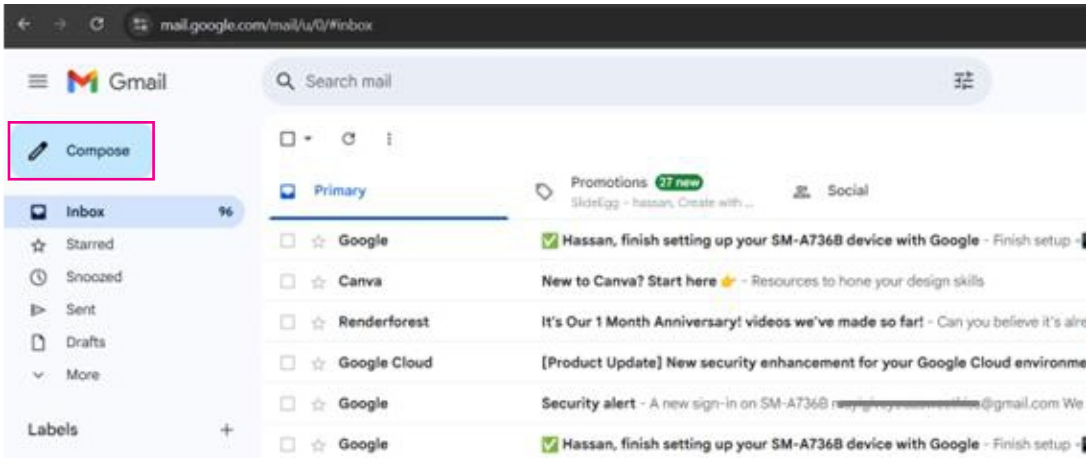


Figure 2.45 Sign In and Sign Out from Email account

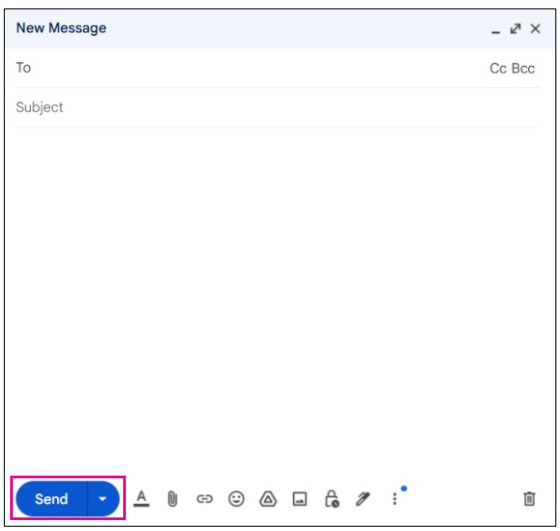
2.6.4 Compose an Email:

Compose an email means to write an email. First, login into Gmail with username and password. Please follow the steps:

1. Go to Gmail.com and enter username/phone number and password to own inbox.
2. Click on Compose button to start composing email as shown in following image.

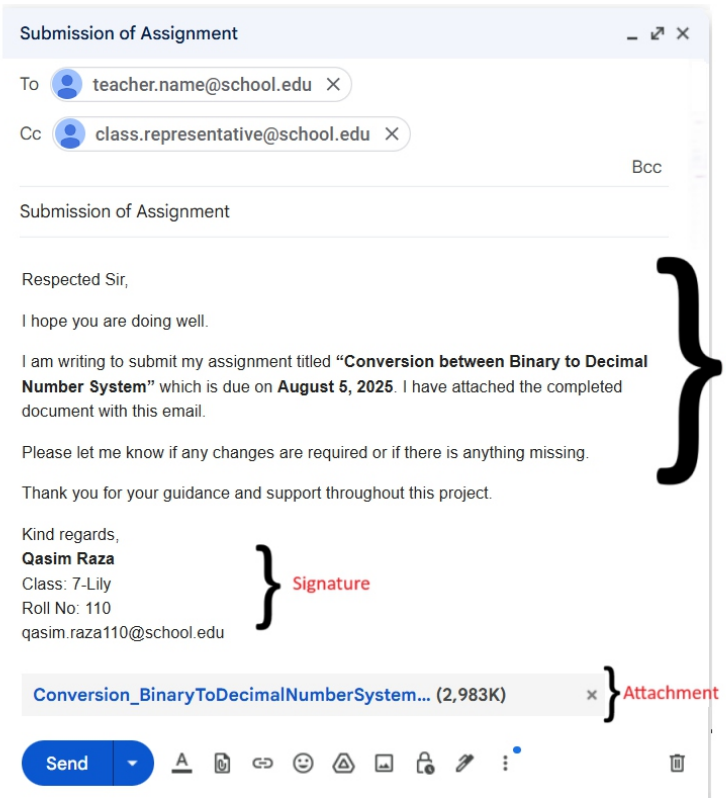


3. After clicking Compose button. A new message window will appear at the bottom-right (or as a panel).
4. To: field is for main recipient address.
5. Click "Cc" or "Bcc" (shown near To field) to expand those optional fields
6. Subject: line appears under recipient fields.
7. Message body: below subject, with formatting options and attachment icons at bottom. Type message content.



8. Toolbar includes icons for formatting fonts, color, underline etc., Attach files (Paper Clip icon 📎) images, documents, audio and video etc. insert links icon, and google Drive icon used for insert files from google drive, etc.
9. Click send to send email.

Inbox is the main folder in an email account where all incoming messages are received and stored.



- CC (Carbon Copy): For people who need to be informed.
- BCC (Blind Copy): For privacy, others will not see who is in BCC.

Tips for sending a Good Email:

- Use clear and relevant Subject line (keep it short and to the point)
  - ✓ Example: "Assignment Submission – Class 7"
  - ⊘ Don't use vague titles like "Hi" or "Please read"
- Begin with a proper greeting like Dear Sir, Respected Madam, Hello Mr. Khan
- Use a polite and professional tune
  - ✓ Example: "I hope you are doing well."
  - ⊘ Don't use "Hey! What's up?"
  - ✓ use correct punctuation and capitalization
  - ⊘ Don't use ALL CAPS (it feels like shouting)
- Finish email with words like Thank you, Kind Regards, Sincerely.
- Add a Proper signature which include full name, class/designation

2.6.5 Email Account Folders/ Labels:

Folders: Emails are arranged in different folders to keep them organized. Some important folders are:

- **Inbox:** This is where all the new or received emails appear by default.
- **Sent:** This folder stores all the emails that are sent.
- **Trash:** Deleted emails go to this folder. You could recover emails from here if deleted by mistake.
- **Junk/Spam:** Unwanted or suspicious emails are automatically moved to this folder.
- **Contact:** A saved email address with details about a person or organization stor in your email account. A contact can include a name, email address, phone number, and other information.

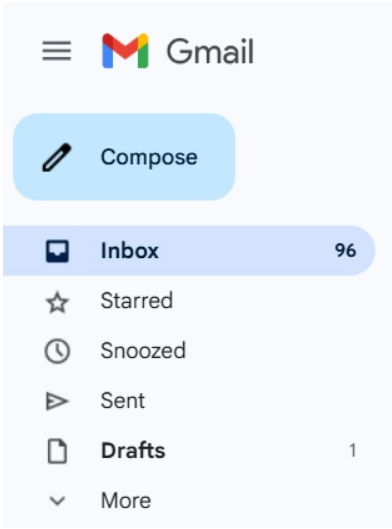
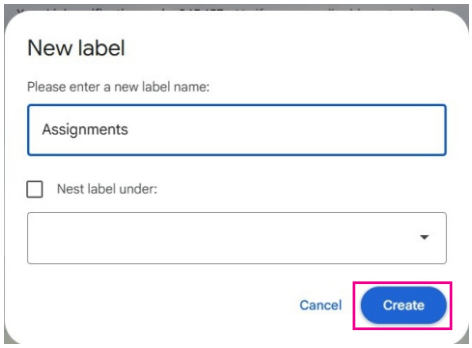


Figure 2.46
Email Account Folders

Labels: Labels help to organize, group, and filter emails without moving them to inbox. A single email can have multiple labels.

Create a New Label:

1. Open Gmail
2. Scroll down left sidebar
3. Click "+" on Labels option or "More" → "Create new label"
4. Type name (e.g., "Assignments", "Projects", "Family")
5. Click Create.



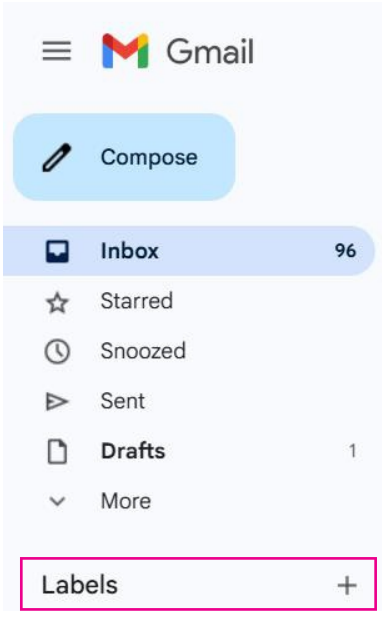


Figure 2.47
Email Labels

Apply Label to Email

1. From Inbox
2. Check box next to email(s)
3. Click Label icon at the top or click
4. Select label or create a new one

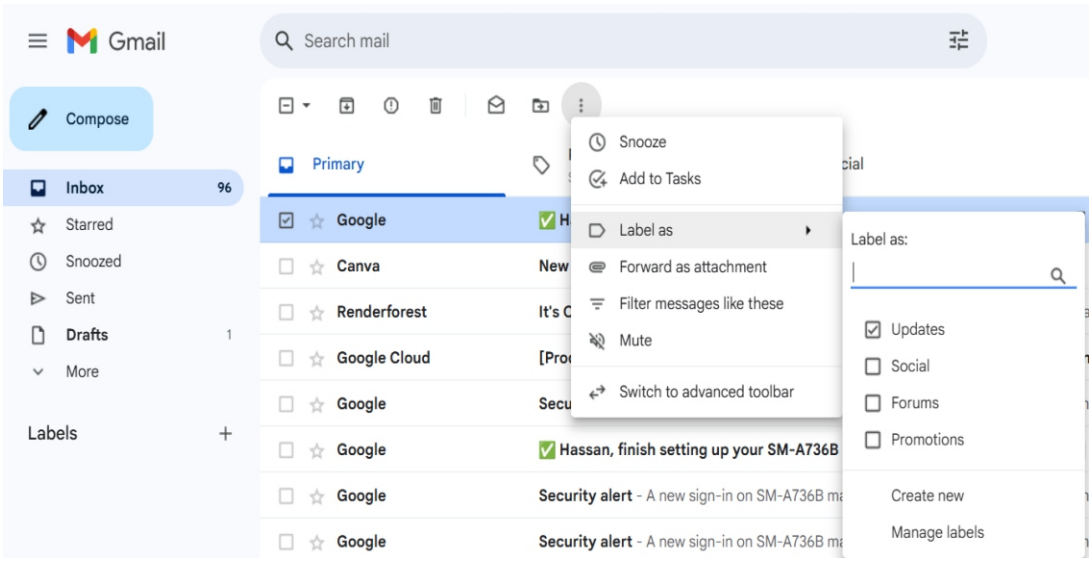


Figure 2.48 Apply Email Labels

2.7 Authentication:

Authentication is a process of proving one's identity to access a system, website, or service. It ensures that user is real person to access. This is an extra layer of security that confirms user is the rightful account owner by sending a verification code to phone or email.

1. Sign In to Account
   Go to website or app (e.g., Gmail)
2. Enter email address and password
   Example: aliraza@gmail.com
3. Verify Identity
   The system asks for confirmation through a second step
   You will be prompted to check email or phone
4. Enter Verification Code
   A code (usually 6 digits) is sent to: Phone (via SMS or call),
   or Recovery email. Type the code into website/app login screen
5. Access Granted
   If the code is correct, signed in successfully

✓ This confirms user identity and keeps account secure.

📌 *Authentication process using email or phone number, also known as **two-step verification** or **two-factor authentication (2FA)**. Two step verification is required whenever extra security is needed to make sure the person logging in is real one. It helps prevent unauthorized access even if password becomes compromised.*

Summary

- A **Word processor** is an application software for creating, editing, formatting and printing documents.
- **Ribbon** organizes Word's features in a visual, easy-to-use way so user can find commands faster without digging through long menus
- **Headers and Footers** help keep documents organized and professional by showing consistent information across pages.
- **Microsoft PowerPoint (PPT)** is a powerful, easy-to-use presentation graphics software program that allows to create professional-looking electronic slide shows.
- **PowerPoint Slide Show** is created when all of presentation's slides are arranged in a certain order and then shown to audience in which each slide is displayed sequentially.
- **Hyperlink** is a digital reference providing direct access to data by a user's clicking or tapping.
- Email is a facility to communicate messages and data through computer. It is an essential tool used widely in personal, professional, and academic life due to its speed, convenience, and ability to handle multiple formats.
- **Email** Address is a unique address used to send/receive emails (e.g. user@example.com)
- **Password** is a secure code to protect your email account.
- **Contact** is a saved person's information including their email for easy communication.
- **Authentication** means showing that someone really is the one, he/she claims trying to use a system, website, or service.

Shortcut keys:

	Shortcut	Description
Document Shortcuts	Ctrl + N	Create new document
	Ctrl + S	Save Document
	Ctrl + Z	Undo last action
	Ctrl + Y	Redo last action
	Ctrl + A	Select all
	Ctrl + B	Apply bold formatting to text
	Ctrl + I	Apply italic formatting to text
	Ctrl + U	Apply underline formatting to text
	F7	Start spellchecker
	Ctrl + F4	Close current document
	Ctrl + P	Open print dialogue box
	Ctrl + Plus sign (+)	Zoom In
	Ctrl + Minus sign (-)	Zoom Out
	Ctrl + 0	Return back to 100% zoom
Navigation Shortcuts	Home	Go to start of line
	End	Go to end of line
	Ctrl + Home	Go to start of the document
	Ctrl + End	Go to end of the document
	Page Down	Go to next page
	Page Up	Go to previous page
	Ctrl + F	Find (Navigation pane)
	Ctrl + G	Go to specific page number
Clipboard shortcut	Ctrl + X	Cut
	Ctrl + C	Copy
	Ctrl + V	Paste
	Alt + Ctrl + V	Paste special
	Ctrl + Shift + C	Format painter
	Ctrl + Shift + V	
Paragraph & Pagination	Enter	New paragraph
	Ctrl + Enter	Insert page break
	Shift + Enter	New line
	Ctrl + Shift + Enter	Insert section break
	Ctrl + M	Increase Indent
	Ctrl + Shift + M	Decrease Indent
	Ctrl + E	Align the text to center
	Ctrl + L	Align the text to the left
	Ctrl + R	Align the text to the right

EXERCISE

1. Encircle the correct answer:

i. Microsoft Word is?

(a) Spreadsheet (b) Database Management
(c) Presentation (d) Word Processor

ii. The default extension of an MS Word file is ____

(a) .txt (b) .docx
(c) .csv (d) .ppt

iii. The extension of an MS Power Point file is___

(a) .doc (b) .mp3 (c) .ppt (d) .mpt

iv. Which of the following is not a view format for a PowerPoint presentation?

(a) Slide View (b) Outline View
(c) Slide Show View (d) Presentation View

v. Which keyboard shortcut key is used to save a document directly?

(a) Ctrl + S (b) Ctrl +D
(c) Alt + Shift + S (d) Alt + S

vi. Header and Footer option is available under which of the following tab?

(a) Home (b) Insert
(c) Design (d) Layout

2. Fill in the blanks:

i) The Ribbon in MS Word is divided into different sections called _____.
ii) Mistakes can be checked using _____ facility in MS Word.
iii) To take a duplicate of a existing file use _____facility in MS Word.
iv) _____ is the shortcut key for creating a new document in MS Word.

3. Provide descriptive answers of the following questions.

i) Write down the uses of Microsoft Word?
ii) What are the basic functions of MS Word?
iii) Differentiate between Save and Save As.
iv) Write down the purpose of Multimedia Presentation.
v) Define the term email address, password, contact and write the uses of email address.
vi) Write down the purpose of inbox, sent, trash and spam.

Class Activity

Instructions for Teachers

- Teacher should motivate and courage students to explore various resources and continue learning independently.
- Divide class into group of 2 or 3 students to perform following activities

i. Assign each group a task like create Birthday Invitation, Party theme or school timetable, academic detail etc. Help them to research, write a script using MS Word, design the script using different ribbon commands to make proper document.

ii. Ask class to make PowerPoint presentation of the following
   - give concept about geometrical figures triangles, squares, rectangles, circle, etc.
   - Animate a Poem or Quote, animate each line with different entrance effect.

iii. Guide students through the process of creating an email address using a popular email service. Discuss the importance of choosing a professional username and password.

iv. Guide students to practice send emails to their classmates. Instruct them to include a subject line, proper content, and signature. Encourage them to explore the To, Cc, Bcc fields and attach a file.

Chapter 3

Algorithmic Thinking and Problem Solving

Student Learning Outcomes:

After the completion of this unit students will be able to:

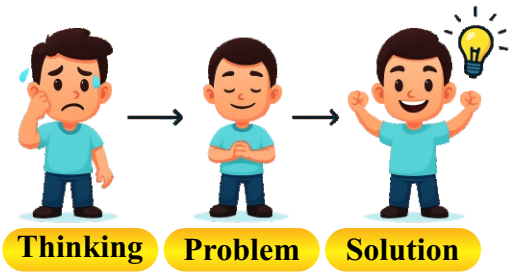
- Solve complex problems by applying computational thinking.
- Understand different steps of computational thinking to solve a complex problem.
- Define algorithms and provide simple real-life examples of algorithms.
- Design algorithms for complex problems.
- Draw flowcharts for representing algorithms.
- Understand control structures including conditions and loops.
- Apply conditions and loops for designing algorithms.
- Infer clear instructions to produce correct results.
- Analyze different ways to solve the same problem.
- Understand and validate the algorithms to solve the problem.

Introduction to Unit:

This chapter introduces algorithmic thinking to solve complex problems. In this chapter, we will learn how to think like a computer scientist by applying computational thinking to solve problems in a smart and organized way. This chapter also covers how to design algorithms and flowcharts for solving different problems using algorithmic notations.

3.1. Computational Thinking:

Computational thinking helps to solve big problems step by step. It works like a computer.

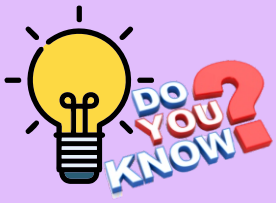


Its key steps:

1. **Break it down** – Split big problems into small parts.
2. **Ignore extras** – Remove things that don't matter
3. **Plan clearly** – Make a smart step-by-step solution

Example: Planning a school trip:

Break: (Step 1) Pack bag, (Step 2) board bus, reach school
Ignore: Weather forecast (not needed now)
Plan: Step 1 → Step 2 → Done.



- A **simple problem** is one that can be solved in two to three easy steps.
  Example: Tying shoelaces or solving 5 + 3.
- A **complex problem** needs more steps, planning, and decisions.
  Example: Organizing a school event.

Computational thinking is comprising of following four important skills as shown in Fig. 3.1.

Computational Thinking

Decomposition	Abstraction	Logical Thinking	Decision Making
Breaking down a problem into smaller parts which are easier to solve.	Identifying a given problem step-by-step in a clear and organized way	Solving a given problem step-by-step in a clear and organized way	Selecting the best solution among different options

Figure 3.1: Important Skills of Computational Thinking

3.1.1 Applying Computation Thinking to Solve Complex Problems:

Consider a problem to organize an event "Clean and Green Pakistan Day". Students will clean classrooms. They will plant trees. They will spread awareness to keep Pakistan clean.

This is a complex problem. It needs computational thinking to solve it. Break it into small steps.

Steps of Computational Thinking:

1. **Understand the Problem** – What needs to happen? Who joins? When and where?
2. **Break It Down** – Split into parts: Planning, cleaning, planting, awareness.
3. **Find Patterns** – Reuse ideas, like group teams for all tasks.
4. **Ignore Extras** – Skip things not needed, like fancy decorations.
5. **Make a Plan** – Step-by-step: Invite people, get tools, do the event, check results.

The important skills of computational thinking are 1) Decomposition, 2) Abstraction, 3) Logical Thinking and 4) Decision Making.

1. Decomposition:

Breaking big or complex problem into smaller manageable tasks. For example, organizing an even "Clean Pakistan Day". The smaller manageable tasks may include following:

- prepare a task list
- register volunteer for each task
- prepare list of equipment for each task
- choose team leads
- set day and time of each event

Example Plan:

- Step 1: List supplies (brooms, seeds, posters).
- Step 2: Assign jobs (Group A cleans, Group B plants).
- Step 3: Practice speeches for awareness.
- Step 4: Hold the event and clean up.

2. Abstraction:

Abstraction means:

- Ignore things that do not help
- Focus on only important details

Important (Keep)	Irrelevant (Ignore)
Number of volunteers	Color of their shirts
Number of trees to plant	Brand of planting tools
Cleaning areas (classrooms)	Shape of the dustbins
Date and time	Weather next week
Items for safety (gloves and masks)	Brand of masks
Getting permission from school	

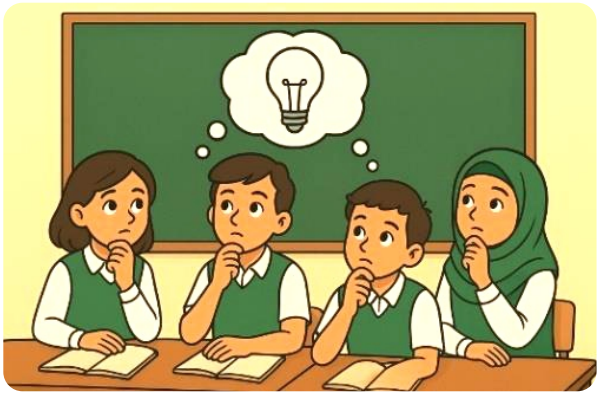
Abstraction helps to 1) save time, 2) keep plan simple, and 3) Helps to finish task quickly.

3. Logical Thinking:

Make a clear and simple plan.

Event Plan:

Clean and Green Pakistan Day



1. Get permission

- Ask the principal to approve the event

2. Make volunteer groups

- **Cleaning Group**
  Clean classrooms
- **Planting Group**
  Plant trees
- **Awareness Group**
  Make and paste posters

3. Arrange materials

- Brooms, gloves, saplings, paper, colors

4. Set date and time

- Friday, 8:00 AM to 12:00 PM

Example:

- Step 1: Principal says YES
- Step 2: 10 students in Cleaning Group
- Step 3: Buy 20 trees
- Step 4: Event on Friday at 8 AM

4. Decision Making:

Good choices help event successful — even with problems/challenges.

Event: Clean and Green Pakistan Day

Challenge Faced	Smart Decision
Low budget	Choose cheap plants (like local seeds)
Few volunteers	Join two groups into one
Rain coming	Move event inside or pick a new date

Example:

- Rain forecast?
  Hold poster-making in the hall
- Only 5 helpers?
  One team cleans and plants

Note: **Think fast, act smart** - every problem has a fix.

Activity Time

Consider a challenging problem to arrange elections for class monitor. Apply computational thinking for solving this real-world problem step-by-step. You need to make sure that the whole process of election should be fair, simple, and well-managed.

3.2 Algorithm:

An algorithm is a step-by-step plan to solve a problem. It is a well-defined and finite sequence of instructions to solve a problem or perform a specific task.

Everyday Life Examples:

- Following a cake recipe
- Solving a math problem step by step

Problem:

A customer buys Mouse at Rs. 500, Keyboard at Rs. 1200 and Watch at Rs. 800. Find the total amount to pay.

Algorithm (Step-by-Step):

1. Start
2. Write price of mouse = 500
3. Write price of keyboard = 1200
4. Write price of watch = 800
5. Add all prices: 500 + Algorithms 1200 + 800
6. Total = 2500
7. Stop

Total Amount: Customer pays Rs 2500.

Algorithm: To calculate total price paid by a customer on buying three products.

Step-1: Input price of mouse, 'P_1'
Step-2: Input price of keyboard, 'P_2'.
Step-3: Input price of watch, 'P_3'.
Step-4: Calculate total price, Price = P_1+ P_2+ P_3.
Step-5: Print Total Price.
Step-6: End

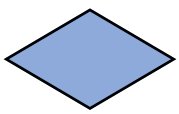
Let's say:
- Price of mouse = Rs. 100
- Price of keyboard = Rs. 250
- Price of watch = Rs. 200

- Total Price = 100 + 250+200
  = Rs. 550
- Thus customer pays Rs. 550 as total price.

3.3 Flow Charts:

A flowchart is a graphical representation of an algorithm. Table 3.1 shows commonly used symbols for drawing flowcharts along with their description.

Table 3.1: Flowchart Symbols

Shape	Symbol	Name	Purpose	Example
	Oval	Terminator	Shows Start or End of a flowchart	Start, End
	Parallelogram	Input / Output	Used for taking input or showing output	Input number, Display result
	Rectangle	Process / *Action*	Represents a process or step to perform	Add 2 numbers, Calculate area
	Diamond	Decision	Represents a decision or condition	Is number > 0?, Is it raining?
	Arrow	Flowline / Arrow	Shows direction of flow	Connects symbols to show sequence

3.4 Control Structures for Writing Algorithms:

Control structures are building blocks of algorithms. There are two main types of control structures:

- Conditions
- Loops/Iteration

This section will explore how these control structures can be applied to solve complex problems.

3.4.1. Conditions:

Sometimes, user wants to choose different actions based on different situations. Conditions allow algorithms to make choices. For example:

- If it rains today, then I will take umbrella.
- If it is holiday, I will not go to school. Otherwise, I will go to school.
- If the password is correct, allow login.

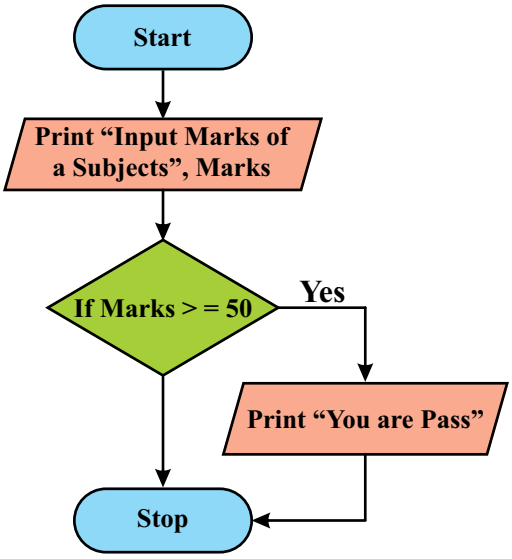
Following are types of conditional statements.

i) If Statement:

This statement gives only one choice. If condition is true then it will take some action, otherwise it will skip the action. For example, if today is holiday I will not go to school. An example of algorithm and its flowchart of using IF statement is given below.

Algorithm: To check if you are pass in a subject.

Step-1: Start
Step-2: Input marks of a subject, Marks
Step-3: If Marks >= 50, then:
Step-4: Print "You are Pass"
Step-5: End



In this algorithm, if given condition, Marks>=50, becomes true only then it will take an action. The action will be to display "You are Pass". Otherwise, no action is performed then condition is false.

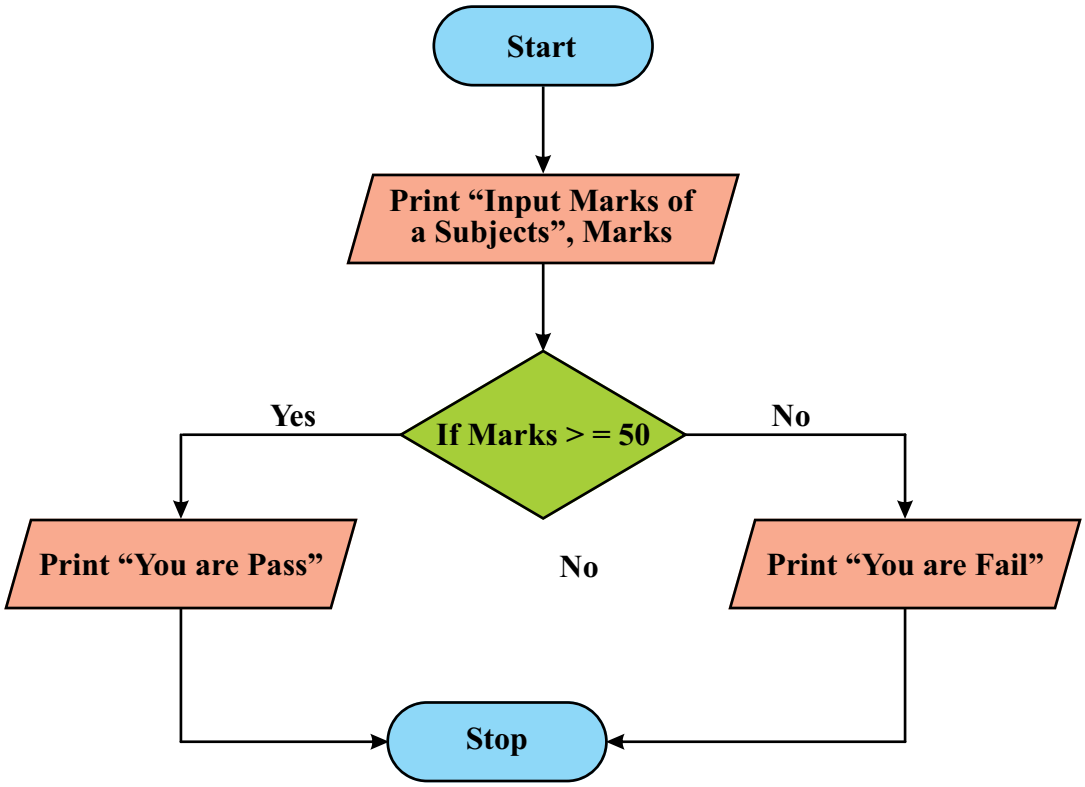
ii) If-Else Statement:

This statement gives two choices, if given condition is true it takes an action but when condition is false it takes alternative action. For example: if you obtain 50 marks then you are pass otherwise you are fail. The algorithm and flowchart of this example are given below.

Algorithm: To check if you are pass or fail in a subject.

Step-1: Start
Step-2: Input marks of the subject, Marks
Step-3: If Marks >= 50, then:
Step-4: Print "You are Pass"
Step-5: Else:
Step-6: Print "You are Fail".
Step-7: End

- In this algorithm, when given condition, Marks>=50, becomes true then it will take an action (Print Pass). When condition is false it takes another action. (Print Fail).



iii) If-ElseIf-Else Statement:

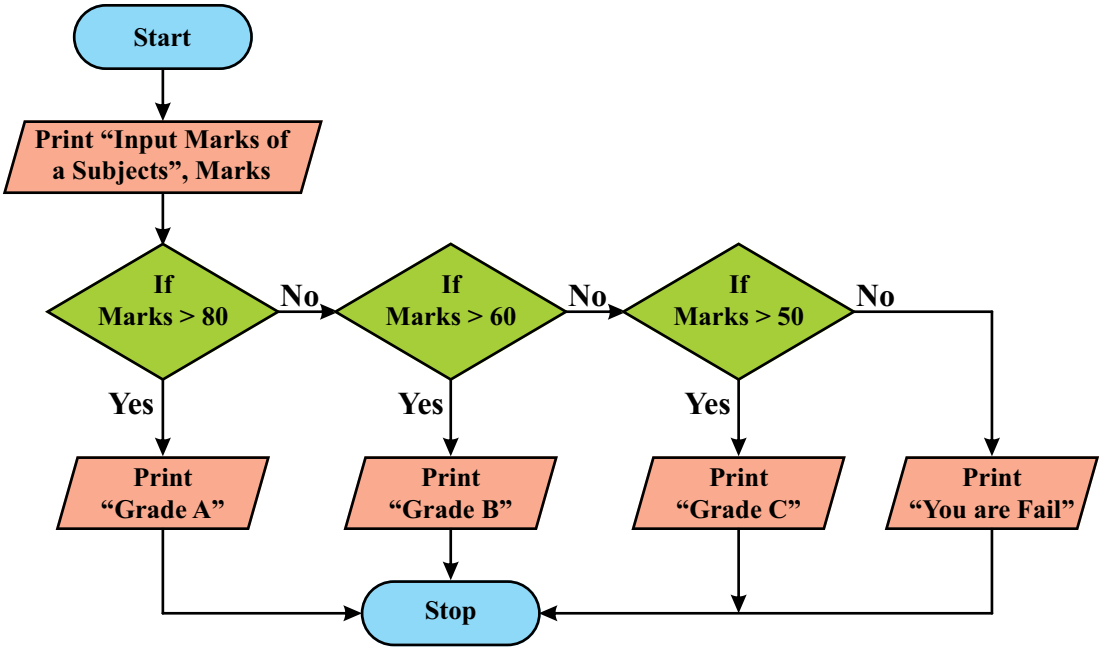
If-ElseIf-Else statement allows to check multiple conditions. Computer will check all conditions in a given order, and it only runs the one that is true. For example:

- If your marks are above 80, you get Grade A.
- Else If marks are above 60, you get Grade B.
- Else If marks are above 50, you get Grade C.
- Else, you are Fail.

Algorithm: To check which grade is obtained.

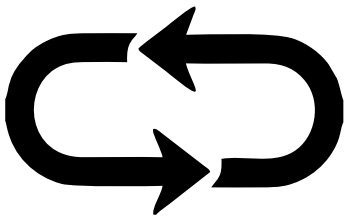
Step-1: Start
Step-2: Input marks of a subject, Marks
Step-3: If Marks > 80, then:
Step-4: Print "Grade-A"
Step-5: Else If Mark > 60, then:
Step-6: Print "Grade-B".
Step-7: Else If Mark > 50, then:
Step-8: Print "Grade-C".
Step-9: Else
Step-10: Print "You are Fail".

- In this algorithm, if given condition, Marks>80, becomes true then it will take an action (Print: Grade-A).
- Otherwise, it will check another condition, Marks>60, and if this condition is true it will take another action (Print: Grade-B).
- Otherwise, it will check another condition, Marks>50, and if this condition is true it will take another action (Print: Grade-C).
- If none of given conditions is true then it takes another action which is specified in Else portion. (Print: You are fail).



3.4.2. Loops/Iteration:

Imagine giving instructions to a robot to perform same action thing over and over again. For example, 'clap your hands', 'clap your hands', 'clap your hands'...". This repetition is called a loop.



i) Finite Loops

A finite loop is a set of instructions that repeats for a fixed number of times, and then it stops. It always has a clear end point. For example,

- Taking input of five numbers from user,
- Clapping 10 times,
- Doing fifteen push-ups, etc.

In all these examples someone repeats actions for a specific number of times, not forever. A finite loop is used in following two situations:

1) Knowing exactly how many times to repeat. For example: we do homework 3 times.

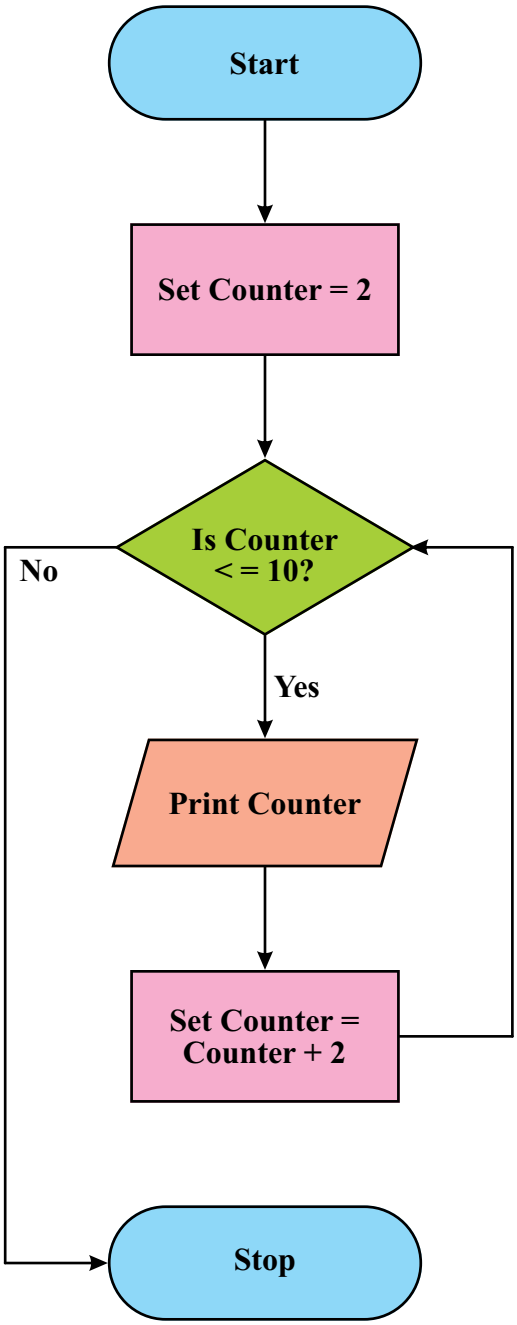
2) Not knowing exactly how many times to repeat but task is repeated until some goal is achieved. For example: we brush our teeth until they get clean.

Some examples of algorithms using finite loop are given below.

Algorithm-1: Display even numbers from 2 to 10.

Step-1: Start
Step-2: Repeat step 3 and 4 for Counter = 2 to 10
Step-3: Print Counter
Step-4: Increase Counter by 2
Step-5: End

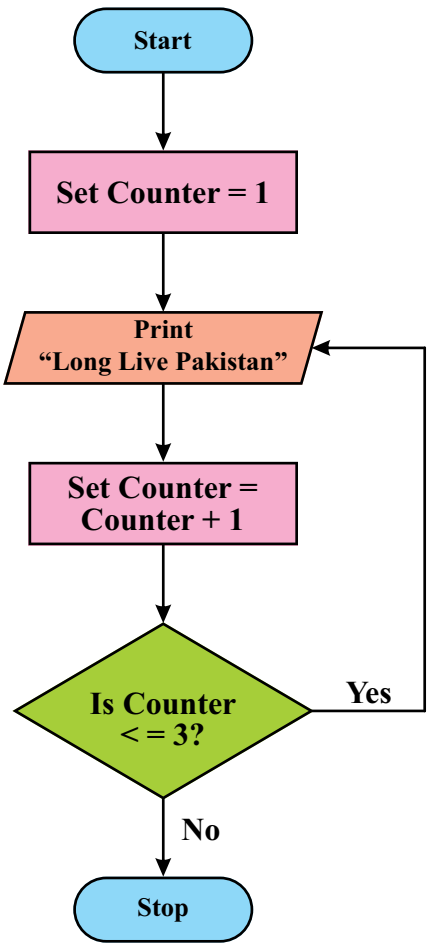
It is known that loop will repeat for a fixed number of times.


Start
Set Counter = 2
Is Counter < = 10?
No
Yes
Print Counter
Set Counter = Counter + 2
Stop

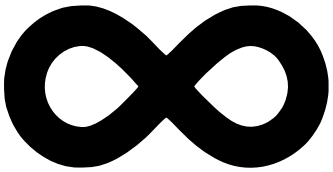
Algorithm-2: To display a sentence three times on screen.

Step-1: Start
Step-2: Set Counter =1
Step-3: Repeat steps 4 to 6
Step-4: Display "Long Live Pakistan"
Step-5: Increase Counter by 1
Step-6: Until Counter >3
Step-7: End

- This algorithm will repeat exactly three times and each time it will print "Long Live Pakistan".
- When Counter becomes greater than 3, the loop stops.



ii) Infinite Loops



Infinite loops are tasks which keep on repeating over and over and never stop. For example:

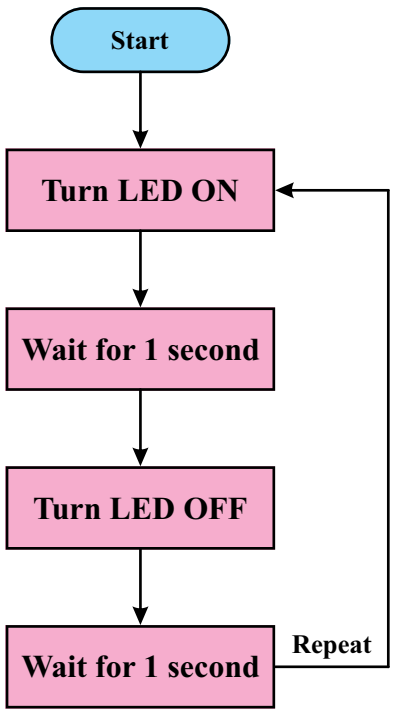
- Heart beating,
- Monitoring by a security camera, etc.

An infinite loop describes a series of instructions that repeats forever or until someone stops them. Following are some examples of algorithms that are using infinite loop.

Algorithm-1: Keep Blinking an LED Light

Step-1: Start
Step-2: Repeat steps 3 to 6 Forever:
Step-3: Turn LED ON.
Step-4: Wait 1 second.
Step-5: Turn LED OFF.
Step-6: Wait 1 second.

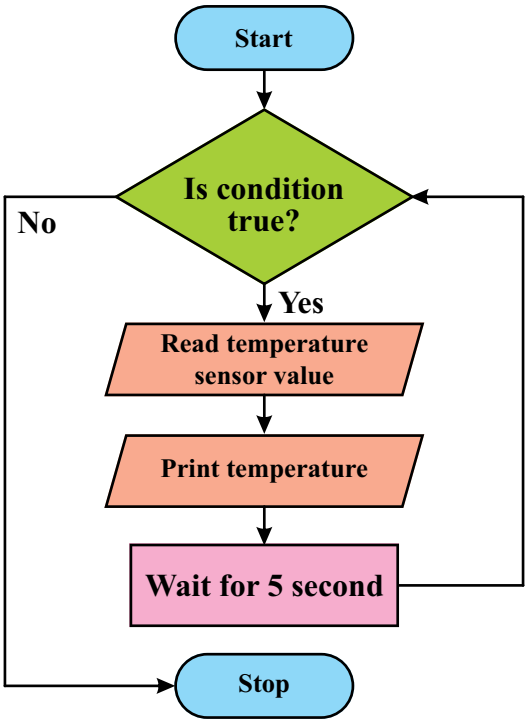
In this algorithm, the steps inside this loop (step-3 to step-6) will keep repeating forever unless manually stopped (e.g., turning off the device).



Algorithm-2: To check temperature

Step-1: Start
Step 2: Repeat Steps 3 to 5
Step-3: Input temperature through sensor
Step-4: Print temperature
Step-5: Wait 5 seconds
Step-6: End Repeat
Step-7: End

This algorithm will keep on taking input of temperature forever.



3.5 Using Loops and Conditions for Designing Algorithms:

By understanding, breaking down, and planning, you can solve any complex problem with a clear algorithm.

Examples of Complex Problems:

1. Finding the shortest path to school during traffic
2. Planning a study schedule for exams
3. Sorting 100 books in the library by name
4. Programming a robot to water plants

Robot Watering Algorithm (Example):
Problem:

Plants are in a straight line. Each has a moisture sensor. Robot must water only dry plants and skip wet ones.

Algorithm (Step-by-Step):

1. Start at the first plant
2. Check moisture sensor
3. If low → Pour water
4. If normal → Skip
5. Move to the next plant
6. Repeat until the last plant
7. Stop

Example Run/Execution:

Plant	Moisture	Action
1	Low	Water
2	Normal	Skip
3	Low	Water
4	Normal	Skip

Algorithm: A robot waters a plant if moisture level is low, otherwise move to the next plant.

Step 1: Start
Step 2: Set PlantCounter = 1;
Step 3: Set TotalPlants = N;
Step 4: while (PlantCounter <= TotalPlants) Do

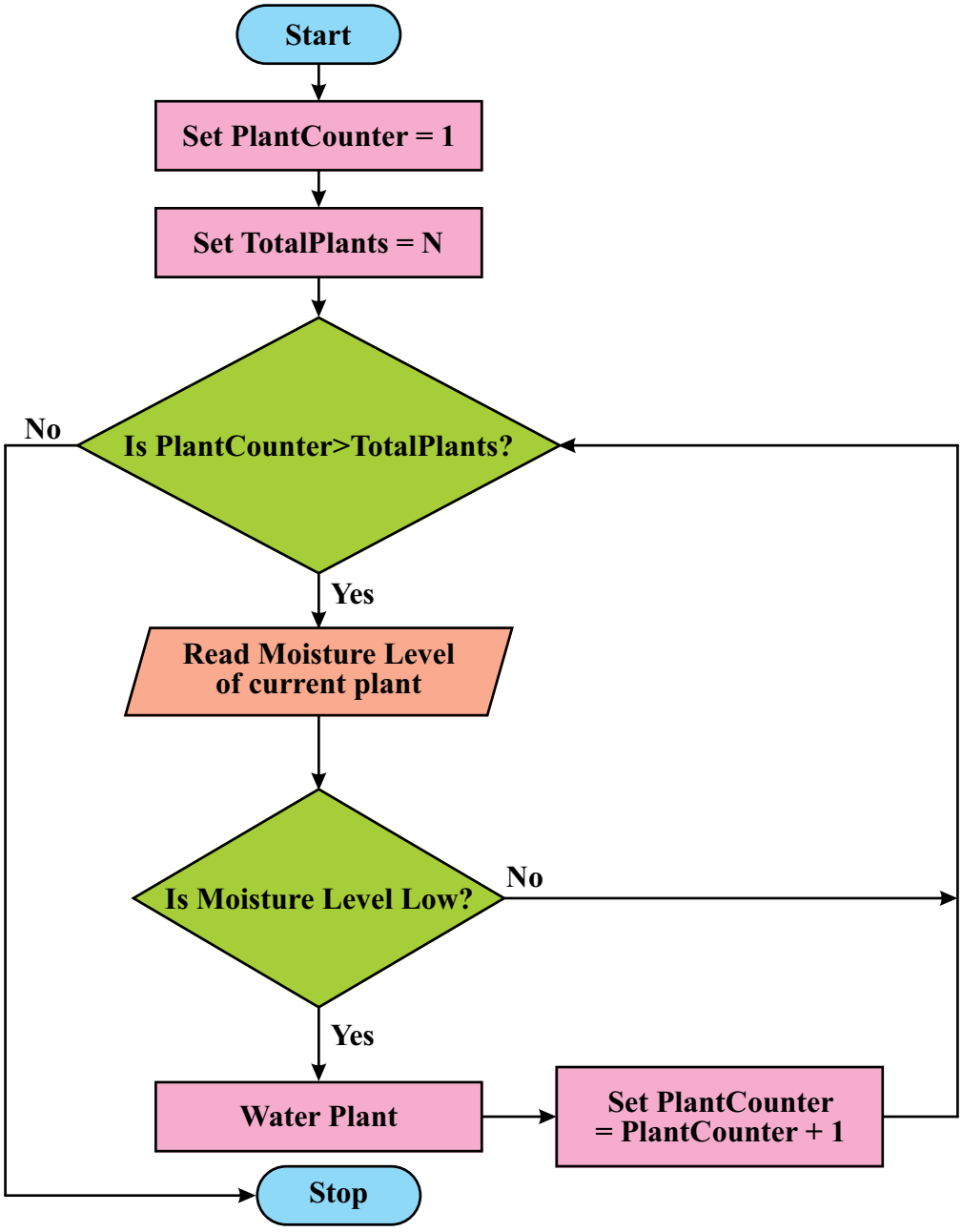
(a) Read Moisture level of current plant
(b) If moisture level is low, then water Plant
(c) Set PlantCounter = PlantCounter + 1

Step 5: End While
Step 6: End

This problem is complex because

- It involves making smart decision based on moisture level.
- Additionally, it also shows involvement of input from environment (moisture level from sensor).

The flowchart for this algorithm is given below on the next page.



3.6 Inferring Clear Instructions:

An algorithm must have clear steps. A computer follows them exactly. If steps are confusing, the result will be wrong.

Imagine: Wali tells a robot to build a LEGO car. If his instructions are not clear, the robot may build a boat or plane instead.

Rules for Clear Algorithm Instructions

- Use simple words – Say "pick red brick" not "select crimson piece".
- Give one step at a time – Don't mix actions.
- Be exact – Say "place 2 wheels on left side" not "add some wheels".
- List steps in order – Step 1, Step 2, Step 3…
- Check the result – Make sure the car moves and has 4 wheels.

Example: Build a LEGO Car (Clear Steps)

1. Take a yellow base plate (4×8).
2. Attach 2 black wheels to the back.
3. Attach 2 black wheels to the front.
4. Place a red seat in the middle.
5. Add a blue steering wheel.
6. Done Wali has a car.

Rule-1: Be Specific and Do Not Guess

Computers don't think like humans. They follow only what a person tells. They cannot guess.

Bad Instruction (Unclear) Example: "Make a red car."

Problem with Bad Instruction:

1. Which part is red?
2. How much red?
3. Robot might make only wheels red or everything green!

Good Instruction (Clear) Example:

1. Take four 2×4 red LEGO bricks.
2. Attach one red 2×4 brick on top of each black 2×2 wheel base.

Result: Robot builds the correct red car body every time.

Rule-2: Break Down the Instructions into Smaller Steps

Always try to break big tasks into smaller easy to follow tasks. For example, if robot has to build a LEGO car, then only instruction, "build car" is considered as too big. Instead, if give following instructions then it will be easier for a computer to understand.

Step-1: Take one 5×10 gray colored base plate.

Step-2: Take four black 3×3 wheel bases.

Step-3: Attach one black 3×3 wheel base to each corner of the 5×10 gray base plate.

Step-4: Take two 1×4 black axles.

Step-5: Attach one axle to the front two wheel bases and one axle to the back two wheel bases.

Step-6: Take four small black tires.

Step-7: Attach one tire to each end of the axles.

Rule-3: Clear Start and End Points

To write algorithm, one should clearly specify where it starts and where it ends.

Step-1: Start
Step-2: Take one 5×10 gray colored base plate.
Step-3: Take four black 3×3 wheel bases.
Step-4: Attach one black 3×3 wheel base to each corner of the 5×10 gray base plate.
Step-5: Take two 1×4 black axles.
Step-6: Attach one axle to the front two wheel bases and one axle to the back two wheel bases.
Step-7: Take four small black tires.
Step-8: Attach one tire to each end of the axles.
Step-9: End

Specifying "Start" and "End" makes it clear when algorithm is active.

Rule-4: Specify Conditions Appropriately

While writing algorithms, one should clearly specify conditions; because, sometimes, an algorithm needs to do different things depending on situation. For example, to ask a robot to pick up a toy, one needs to clearly tell robot what to do when toy is not there. It should not get stuck if it cannot find a toy.

Step-1: Start
Step-2: Look for a toy on floor.
Step-3: If you see a toy, then:
a. Move towards toy.
b. Pick up toy.
c. Carry toy to toy box.
d. Put toy in toy box.
Step-4: Else (if you do not see a toy), then:
a. Look in a different spot.
Sep-5: If all toys are in toy box, then
Stop.
Step-6: Else (if there are still toys on the floor), then:
a. Go back to step 1.

The clear specifications of conditions help robot to make smart decisions because it cannot make a guess.

Rule-5: Specify Loops Appropriately

Just like conditions, it is necessary to specify clearly when to repeat task. For example, ask a robot to clean 3 tables. Simply say "keep wiping tables until there are no more dirty ones". Instead of saying, "wipe table 1, wipe table 2, wipe table 3".

Step-1: Start
Sep-2: Go to first table.
Step-3: Repeat if there are still dirty tables in row
a. Wipe down current table.
b. Move to next table in row.
Step-4: Goto Step-3
Sep-5: End

Following these rules, computer (robot) will be able to perform instructions perfectly and will produce correct results.

Activity Time

Analyze given examples thoroughly and think why instructions in the 3rd column of "Unclear Instructions" are not clear.

S#	Example Task	Clear Instructions	Unclear Instructions
1	Checking if a Number is Even or Odd	1. Start. 2. Input a number: N. 3. If N % 2 == 0, display "Even". 4. Else, display "Odd". 5. End.	➢ Take a number. ➢ Decide if it's even or odd. ➢ Show result.
2	**Finding Average of 3 Test Scores**	1. Start. 2. Input three test scores: score1, score2, score3. 3. Calculate total: total = score1 + score2 + score3. 4. Calculate average: average = total / 3. 5. Display average. 6. End.	➢ Get marks. ➢ Add them. ➢ Find average.

3.7 Different Ways to Solve Problem:

One problem can have many solutions. Each algorithm may work differently but give the same correct answer.

Problem: Check if a number is even or odd.

Algorithm 1: Using Division

1. Take the number
2. Divide by 2
3. If remainder = 0 → Even
4. Else → Odd

Example: Number = 8 8 ÷ 2 = 4 (remainder 0) → Even

Algorithm 2: Using Last Digit

1. Look at the last digit
2. If it is 0, 2, 4, 6, or 8 → Even
3. Else → Odd

Example: Number = 15 Last digit = 5 → Odd

Algorithm 3: Using Bit Check (Advanced)

1. Look at the least significant bit (LSB)
2. If LSB = 0 → Even
3. If LSB = 1 → Odd

Example: Number = 10 (Binary: 1010) LSB = 0 → Even

Number	Algorithm 1	Algorithm 2	Algorithm 3	Final Answer
7	7÷2 = 3 rem 1 → Odd	Last digit 7 → Odd	LSB = 1 → Odd	Odd
12	12÷2 = 6 rem 0 → Even	Last digit 2 → Even	LSB = 0 → Even	Even

Remainder check method:

This method divides given number by 2 and then checks for remainder value. If the remainder value is zero means the number is even otherwise, the number is odd.

Solution-1: To check if given number is even or odd using "Remainder check method".

Step-1: Start
Step-2: Input number, Num
Step-3: If (Num%2= = 0), then:
Step-4: Print num is even
Step-5: Else:
Print: num is odd.
Step-6: End.

- If Num is 7, then, 7÷2 is 3 with a remainder of 1. If remainder is not equal to 0,then Num (7) is odd.
- If Num is 8, then, 8÷2 is 4 with a remainder of 0. If remainder is equal to 0,then Num (8) is even.

Look last digit method:

This method is a simple way to check if a number is even or odd by only looking at its last digit. If the last digit is 0, 2, 4, 8, then the number is even. Otherwise, if the last digit is 1, 3, 5, 7, and 9, then it is an odd number.

Solution-2: To check if given number is even or odd using "look last digit method".

Step-1: Start
Step-2: Input number, Num
Step-3: Look at the very last digit of Num
Step-4: If the last digit is 0, 2, 4, 6, or 8, then:
Step-5: Print num is even
Step-6: Else-if the last digit is 1, 3, 5, 7, or 9
Print: num is odd.
Step 7: End.

- If Num be 124, since the last digit of 124 is 4, 124 is Even.
- If Num be 7, since the last digit of 7 is 7, 7 is Odd.

3.8. Understanding and Validation of Algorithms:

Writing an algorithm is not enough. Person must understand it and check if it really works.

1. Understanding an Algorithm

It means:

- Know what each step does
- Know why the step is needed
- Know how it helps solve the problem

If a person does not understand then he/she may miss details and make mistakes.

2. Validating an Algorithm

It means:

- Test if it gives correct results
- Try it with different inputs
- See if output is right

If wrong → Fix the steps.

Key Terms in Validation

Term	Meaning	Example
Statement / Data	Input the algorithm gets	Numbers, text, prices
Correct Data	Normal inputs it should handle	Age = 12, Name = "Ali"
Incorrect Data	Wrong or extreme inputs	Age = -5, Name = "" (empty)
Determining Output	Follow each step with input	See if total price = 2800

Example: Test Total Price Algorithm

Algorithm:

Add prices of mouse (500), keyboard (1200), watch (800).

Input Type	Test Data	Expected Output	Result
Correct	500, 1200, 800	2800	✅ Pass
Incorrect	-100, 1200, 800	Should show error	✅ Pass (if handles error)

Example-1: Write algorithm to check the age of a person for driving.

Algorithm: To check age of a person for driving.

Step-1: Start
Step-2: Input Age of person, Age
Step-3: If (Age>=18), then:
Step-4: Print: You are eligible to drive.
Step-5: Else:
Print: You are not eligible to drive.
Step-6: End

Now, do testing using different data values and see what output is produced by the above algorithm. To perform testing, consider following three different examples of data,

- Case-1: Age=20 (It represents valid data)
- Case-II: Age=17 (It represents valid data)
- Case-III: Age=-5 (It represents invalid data)

Summary

- **Computational thinking** is the foundation of writing algorithms to solve complex problems and is comprising of four important skills: Decomposition, Abstraction, Logical Thinking, and Decision Making.
- **Algorithm:** A well-defined sequence of steps to solve a problem.
- A **flowchart** shows visually steps required to complete a task and an order that is to be performed.
- **Conditions** allow algorithms to make smart choices.
- **If** conditional statement gives only one choice. If condition is true then it will take some action, otherwise it will do nothing.
- **If-Else** statement gives two choices, if a given condition is true, it takes an action but if condition is false, it takes another action.
- **If-ElseIf-Else** statement allows to check for multiple conditions.
- **Loop:** A loop is an essential control structure that repeats set of instructions.
- A **finite loop** is a set of instructions that repeats a certain number of times, and then it stops.
- An **infinite loop** describes a series of instructions that repeats forever or until someone stops them.
- There can be **more than one algorithm** to solve a problem.

Terms to Remember

- **Complex Problem:** Complex problems are those which have many parts, require smart thinking, and can be solved in more than one ways.
- **Decomposition** means to break down a problem into smaller manageable parts.
- **Abstraction** ignores irrelevant information and will focus on only important details of a problem to be solved.
- **Logical thinking** is creation of a clear and organized plan of what to do, and in what order.
- **Decision making** is a process of making smart and good decisions in presence of challenging situations.
- **Validation**: Validation is a process of checking if algorithm really works as expected.

EXERCISE

1. Encircle the correct answer:

i. Which of the following is not a part of computational thinking?

(a) Guesswork (b) Decomposition
(c) Abstraction (d) Logical Thinking

ii. Which of the following is not a valid age?

(a) 12 (b) -5
(c) 30 (d) 18

iii. Which of the following is an example of decomposition?

(a) Solving the puzzle all at once
(b) Breaking puzzle into corners and edges
(c) Coloring the puzzle
(d) Looking at the puzzle picture

iv. Which symbol is used to show the *Start* or *End* of a flowchart??

(a) Rectangle (b) Diamond
(c) Oval (d) Circle

v. Why it is important to test an algorithm with correct and incorrect data?

(a) To make algorithm longer
(b) To make a guess what might happen
(c) To make sure algorithm produces right results in all cases
(d) To make fun

2. Fill In the blanks.

i) To represent a process in a flowchart _____ symbol is used.
ii) There are _____ types of loops.
iii) _____ is the process of organizing a plan where the tasks are organized in a clear and step-by-step order.
iv) There can be _____ ways to solve a problem.
v) _____ statement allows to check for multiple conditions.

3. Provide descriptive answers to the following questions.

i) Why do we use flowcharts if we already have the steps written as an algorithm?
ii) Describe how loops are different from conditional statements?
iii) Why is algorithmic thinking important in real life, not just in computers? Give an example.
iv) Why is it important to test an algorithm with different inputs?

4. Draw flowcharts for following tasks.

i) Draw flowchart for a problem that reads three numbers and then display sum of these three numbers.
ii) Draw a flowchart for a problem that asks a user for a password. If the password is "SECRET", it says "Access Granted!". Otherwise, it says "Access Denied!".
iii) Draw a flowchart to calculate sum of first 10 natural numbers.
iv) Draw a flowchart for a problem that keeps asking for a number until user enters 0.

5. Write algorithm for following problems.

i) Write an algorithm that takes input of a number and then check if a number is positive, negative, or zero.
ii) Write an algorithm that reads price of a book and then display final discounted price of a book after applying a 10% discount on the original price.
Hint: The 10% discount is calculated by multiplying original price of a book by 0.10 and then subtracting the resultant value from the original price.
iii) Zaviyar is at a bookstore to purchase a book. Zaviyar will get a discount of 20% if the price of a book is more than 500 rupees, or if Zaviyar is a student. Otherwise, he will not get any discount.
iv) Write an algorithm that takes input of name and prints it 10 times on screen.

Class Activity

i) Consider following algorithm to calculate total tax, a customer must pay overall for buying following two products: mouse and keyboard where a sales tax of 10% is applied to each product. Draw a flowchart to represent the given algorithm.

Algorithm: To calculate the total tax paid by a customer on buying two products.
Step-1: Input price of mouse, 'P_1'
Step-2: Input price of keyboard, 'P_2'.
Step-3: Calculate tax on buying mouse, $Tax_1 = P_1 \times 0.10$
Step-4: Calculate tax on buying keyboard, $Tax_2 = P_2 \times 0.10$
Step-5: Calculate total tax, Total Tax = $Tax_1 + Tax_2$
Step-6: Print Total Tax
Step-7: End

ii) Identify which of the following tasks represent Finite/Infinite loop. Write "Finite" or "Infinite" in last column.

S#	Tasks	Type of Loop (Finite/Infinite)
1	Keep watering a plant UNTIL soil is wet.	
2	A game keeps going UNTIL a player's health reaches zero.	
3	A computer program keeps checking for new emails continuously.	
4	A traffic light keeps changing colors repeatedly throughout a day.	
5	A robot waters 3 plants, one after another.	
6	Keep guessing my secret number UNTIL you guess correctly.	
7	Inaya practices math until she solves 10 problems.	
8	A robot keeps on sweeping floor until its battery runs low.	
9	Hamza does his homework until it is completed.	
10	Count down from 10 to 1.	

iii) Identify which of the following tasks represent which type of condition. Write "If" or "If-Else"or “If-ElseIf-Else” in last column.

S#	Tasks	Type of Condition (If/If-Else/If-ElseIf-Else)
1	If password is correct, then login; else show error message.	
2	If user clicks “Submit”, then save form.	
3	If temperature > 40°C, show heat warning; else if temperature < 10°C, show cold warning; else show normal.	
4	If file exists, open it.	
5	Turn on fan if room is hot.	
6	If payment is successful, show receipt; else show error.	
7	If traffic light is red, then stop; else go.	
8	If mobile battery is low, show battery warning.	
9	If student is late, mark absent; else mark present.	
10	If Wi-Fi is connected, go online.	

Instructions for Teachers

- Teacher must start lecture with real-life examples to explain concept of an algorithm
- Teachers must turn algorithm writing into game by arranging class activities such as “making a student as robot” and then give step-by-step instructions to move a classmate (robot) from point A to B.
- Teacher must introduce concept of flowcharts alongside algorithms to visualize logic.
- Teacher must use color-coded shapes to explain the purpose of different shapes used for designing flowcharts.
- Teacher must teach each skill of computational thinking as a life skill, not just a coding skill by connecting it with real-life examples.
- Teacher must give students incorrect algorithms and ask them why it produces wrong results and how to fix it.
- Teacher must also encourage group thinking by asking them to write their own algorithm and then do testing of each other's work.
- Teacher must create worksheets that should include various tasks such as fill in the blanks, true/false, match given steps with tasks, etc.
- Teacher must arrange hands-on activities in class by giving students problems that they can solve using logical reasoning such as puzzles or games.

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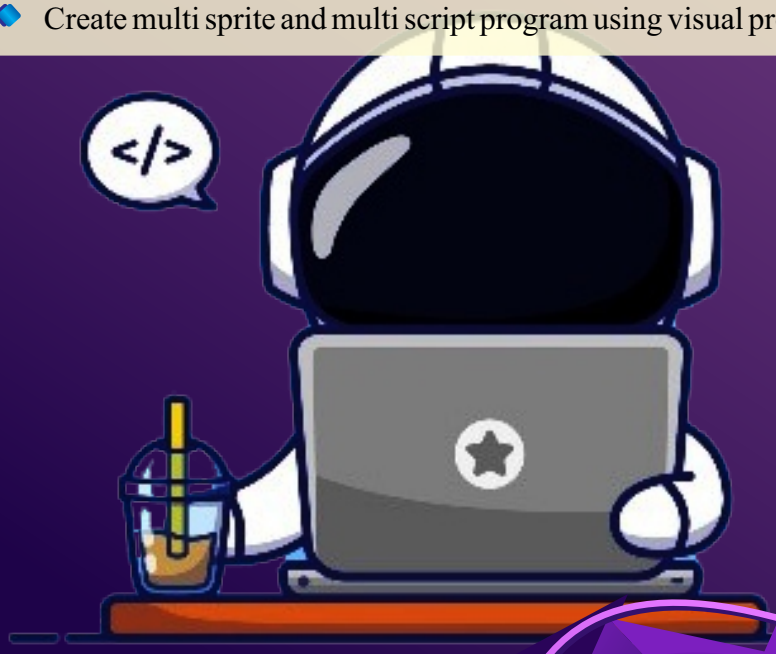
Chapter 4 PROGRAMMING

Student Learning Outcomes:

After the completion of this unit students will be able to:

- Understand Information Representation System
- Binary and Decimal Number System
- Differentiate between binary and decimal number system
- Convert decimal to binary and vice versa.
- Understand Encoding and Decoding Text in Binary using ASCII
- Encode and Decode Image in Binary
- Apply Fundamental programming concept.
- Create multi sprite and multi script program using visual programming tool.



Introduction:

In this chapter, students will learn about Number System, how computers encode and decode computer programs also apply fundamental programming concepts to create multi-sprite, multi-script programs using visual programming tools.

4.1 Representation Of Information:

Computer cannot understand text, pictures, or sounds, the way humans do. Instead, it uses numbers to represent all kinds of information. Inside a computer, everything such as text, images, videos, or sound is converted into numbers. These numbers are made up of **0s** and **1s**, which are called binary numbers.

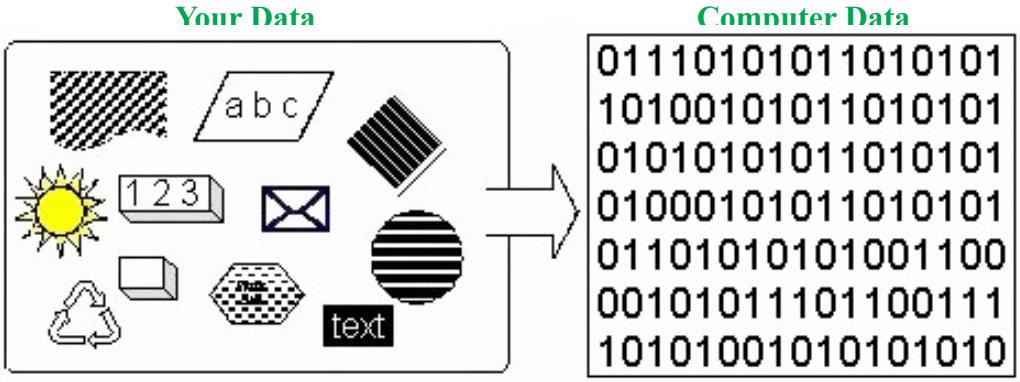


Figure 4.1 Data representation in Computer

4.2 Number System:

A number system is a method of writing or showing numbers using digits or symbols. In computers, number systems are used to store data and perform calculations. There are four common types of number system as shown in figure 4.2.

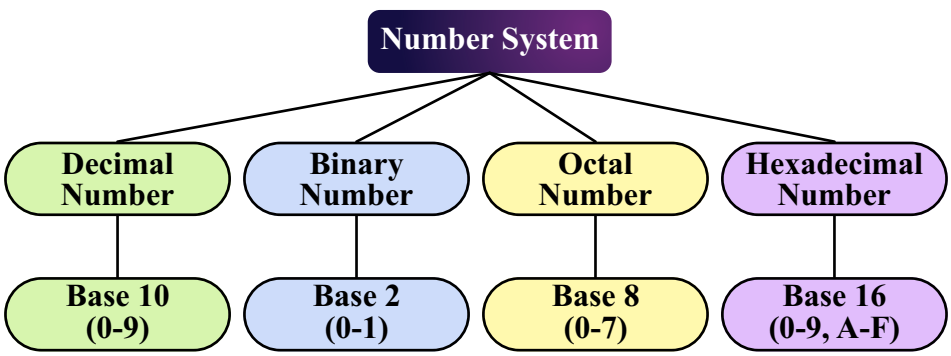


Figure 4.2 Common Types of Number System

4.2.1 Decimal/ Denary Number System:

The decimal number system is commonly used in everyday life and uses digits from 0 to 9 therefore it is known as Decimal Number System. As showing in below figure each digit's place value depends on its position and represented as a power of 10.

How It Work ?

- In decimal System ,read digits from right to left
- Right most digit = ones place (10^0)
- Next digit = tens place (10^1)
- Next = hundreds place (10^2)
- Next= Thousand place (10^3)
- The 4872 value is now read as Four thousand Eight Hundread and Seventy Two

4.2.2 Binary Number System:

The Binary number system is fundamental system used in computer. It uses only two digits, 0 and 1, to represent all data. This is because a computer understands two states: **on (1)** and **off (0)**.

4.2.3 Octal Number System:

Octa is a Greek word which means eight. The Octal Number System (base-8) uses digits 0 to 7 and was an important bridge between binary (machine language) and human-readable formats in early computing.

4.2.4 Hexadecimal Number System:

The Hexadecimal number system is a type of number system that has a base value equal to 16. It is also pronounced sometimes as **'hex'**. Hexadecimal numbers are represented by only 16 symbols. These symbols or values are 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E and F.

4.3 Conversion of Number System:

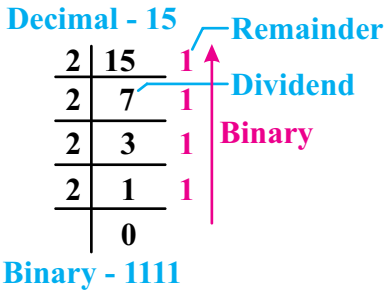
One important part of number systems in computers is being able to **change numbers from one system to another**. This is helpful for understanding how computers **store and process data** in different ways. Following are two most common types of number conversions:

4.3.1 Conversion of Decimal Number to Binary Number:

Consider the conversion of the denary number, 15 into binary:

Method 1:

This method involves successive division by 2. Start with the denary number, 15 and divide it by 2. Write the result of the division including the remainder (even if it is 0) under the 15 (that is 15 ÷ 2 =7 remainder 1); then divide again by 2 (that is, 7÷ 2 = 3 remainder 1) and keep diving until the result is zero or one. Finally write down all the remainders in reverse order.



2	**15**				Read the remainders from bottom to top to get the binary number **1 1 1 1**
2	**7**	**remainder:**	**1**		
2	**3**	**remainder:**	**1**		
	1	**remainder:**	**1**		

Method 2:

The denary number 15 is made up of 8 + 4 + 2 + 1 (that is 15 – 8= 7; 7- 4 = 3; 3 – 2 = 1; in each stage, subtract the largest possible power of 2 and keep doing this until the value 0 or 1 is reached). This will give us the following 8-bit binary number.

128	64	32	16	8	4	2	1
				1	0	0	1

Example: $(25)_{10}$ to (? $)_2$

Method 1

2	25
2	12
2	6
2	3
2	1
	0

1 ← First remainder
0 ← Second remainder
0 ← Third remainder
1 ← Fourth remainder
1 ← Fifth remainder

Read up

Binary Number = 11001

Method 2

128	64	32	16	8	4	2	1
			1	1	0	0	1

Example: $(31)_{10}$ to (? $)_2$

Method 1

2	31	
2	15	1
2	7	1
2	3	1
	1	1

$(31)_{10} = (11111)_2$

Method 2

128	64	32	16	8	4	2	1
			1	1	1	1	1

Activity Time

Convert following Decimal into Binary number.

i. 54 iii. 35

ii. 21 iv. 47

4.3.2 Conversion of Binary Number to Decimal Number:

Consider the conversion of the binary 1011, into denary:

Method 1:

The conversion from binary to denary is a relatively straightforward process. Each time a 1-value appears in a binary number column, the column value (heading) is added to a total. This is best shown by three example which use 8-bit, 12 bit and 16-bit binary numbers.

128	64	32	16	8	4	2	1
				1	0	1	1

The equivalent denary number is 8 + 0 + 2 + 1 = 11

Method 2:

To convert a binary number to decimal one needs to perform a multiplication operation on each digit of a binary number from right to left with power of 2 starting from 0 and add each result to get the decimal number of it.

Write each binary digit (right to left) with corresponding powers of 2 from right to left

For $(1011)_2$ $= 1 \times 2^3 + 0 \times 2^2 + 1 \times 2^1 + 1 \times 2^0$

$= 1 \times (2 \times 2 \times 2) + 0 \times (2 \times 2) + 1 \times 2 + 1 \times 1$

$= 1 \times 8 + 0 \times 4 + 1 \times 2 + 1 \times 1$

$= 8 + 0 + 2 + 1$

$= (11)_{10}$

Activity Time

Convert following Binary into decimal number.

i.	1001	iii.	1000
ii.	1100	iv.	1010

4.4 Encoding And Decoding System:

Computers are powerful machines, but are not intelligent such as humans. They do not think, guess, or feel. Instead, they depend on specific instructions written in a format they understand to perform any task. These instructions must be in a specific format such as **binary** (0s and 1s) or a programming language.

An **Encoding** system is a way of changing data into a specific format therefore a computer can read, store, and process it. A computer only understands 0s and 1s (binary), everything such as letters, numbers, images, and sound must be converted into binary code.

Example:

Changing the letter **A** into binary code will be 01000001

Decoding is the process of changing the coded (binary) data back into its original form that humans can understand it.

Example:

Converting 01000001 back to the letter **A.**

4.4.1 Encoding and Decoding Text using ASCII:

ASCII stands for American Standard Code for Information Interchange. It assign each character (letters, numbers, symbols) a unique binary number. The encoding and decoding of text using ASCII is showing in figure 4.3.

ASCII - Binary Character Table					
Letter	**ASCII Code**	**Binary**	**Letter**	**ASCII Code**	**Binary**
a	097	01100001	A	065	01000001
b	098	01100010	B	066	01000010
c	099	01100011	C	067	01000011
d	100	01100100	D	068	01000100
e	101	01100101	E	069	01000101
f	102	01100110	F	070	01000110
g	103	01100111	G	071	01000111
h	104	01101000	H	072	01001000
i	105	01101001	I	073	01001001
j	106	01101010	J	074	01001010
k	107	01101011	K	075	01001011
l	108	01101100	L	076	01001100
m	109	01101101	M	077	01001101
n	110	01101110	N	078	01001110
o	111	01101111	O	079	01001111
p	112	01110000	P	080	01010000
q	113	01110001	Q	081	01010001
r	114	01110010	R	082	01010010
s	115	01110011	S	083	01010011
t	116	01110100	T	084	01010100
u	117	01110101	U	085	01010101
v	118	01110110	V	086	01010110
w	119	01110111	W	087	01010111
x	120	01111000	X	088	01011000
y	121	01111001	Y	089	01011001
z	122	01111010	Z	090	01011010

Figure 4.3 ASCII Table

4.4.2 Encode and Decode Images in Binary using RGB:

An image is a **picture or visual** format that shows what something looks like or how it is seen. Images are classified in following types.

- **Binary Images** represent the most basic type of digital image. The permissible pixel values in Binary images are 0 (Black) and 1 (White). Therefore, only two values are needed to define an image wholly, a single bit is sufficient for storage, which is why binary images are also known as 1-Bit images

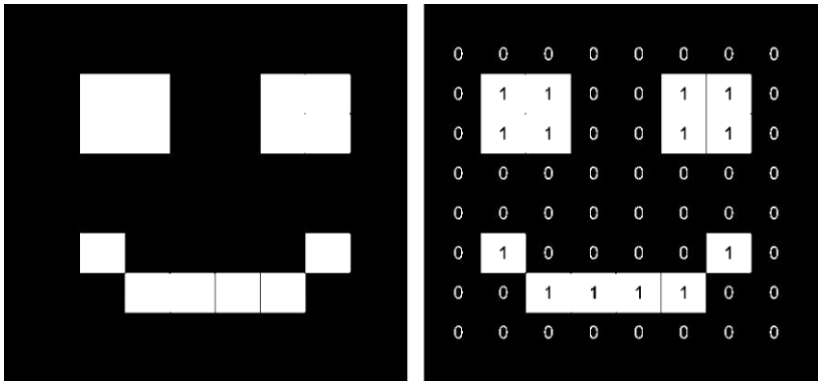


Figure 4.4 Binary Image

- **Color Images** Color images can be understood as having three layers: Red, Green, and Blue (RGB), placed on top of each other. Each layer holds brightness (intensity) of its color at every pixel. In a color image, each pixel is usually made up of 24 bits, with 8 bits coming from each color (Red, Green, and Blue).

Encoding an Image in Binary

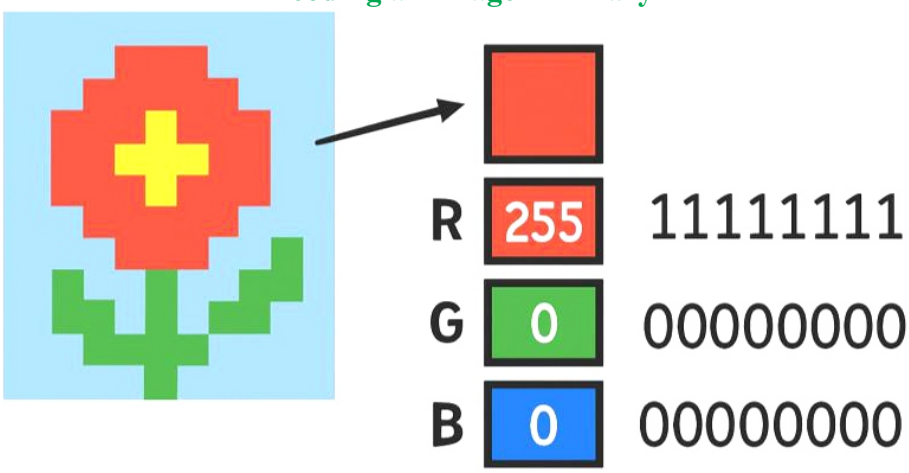


Figure 4.5 RGB Color Image

4.5 Programming with Scratch:

Scratch Programming is a visual, block-based coding platform to make programming easy, fun, and creative. It is mainly used to teach kids and beginners the foundations of programming and computational thinking.

The basics of Scratch programming are learnt in previous class. For example, scratch editor and the tabs (Code, Costume, Sound).

Code: contains 9 block palettes (Motion, Looks, Sound, Events, Control, Sensing, Operators, Variables, My Blocks).

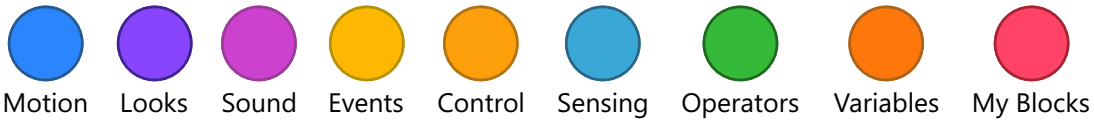


Figure 4.6 Scratch Block Palettes

Costumes: used to design or edit the appearance of sprites.

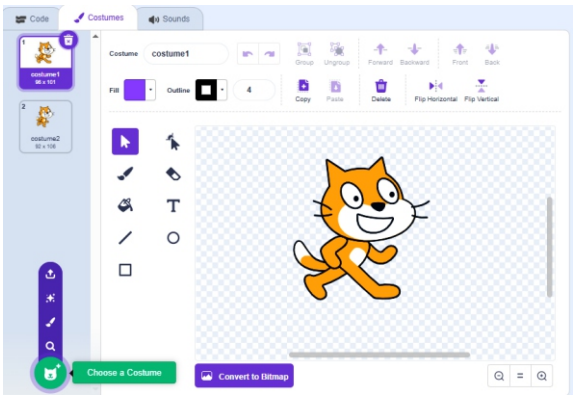


Figure 4.7 Scratch Costume Tab

Sounds: used to add or edit sounds for sprites.

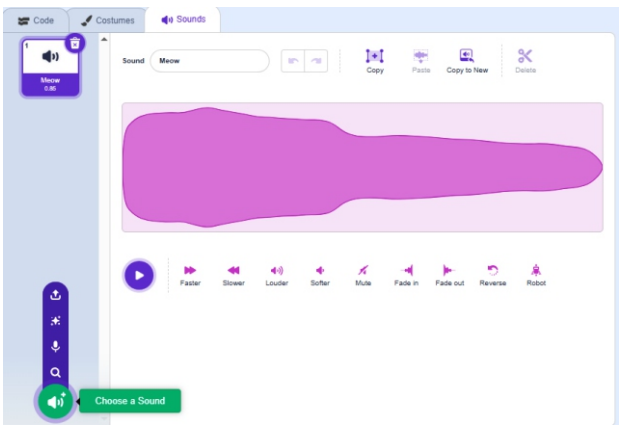


Figure 4.8 Scratch Sound Tab

In Editor there are three main area Code Block, Script area, Stage.

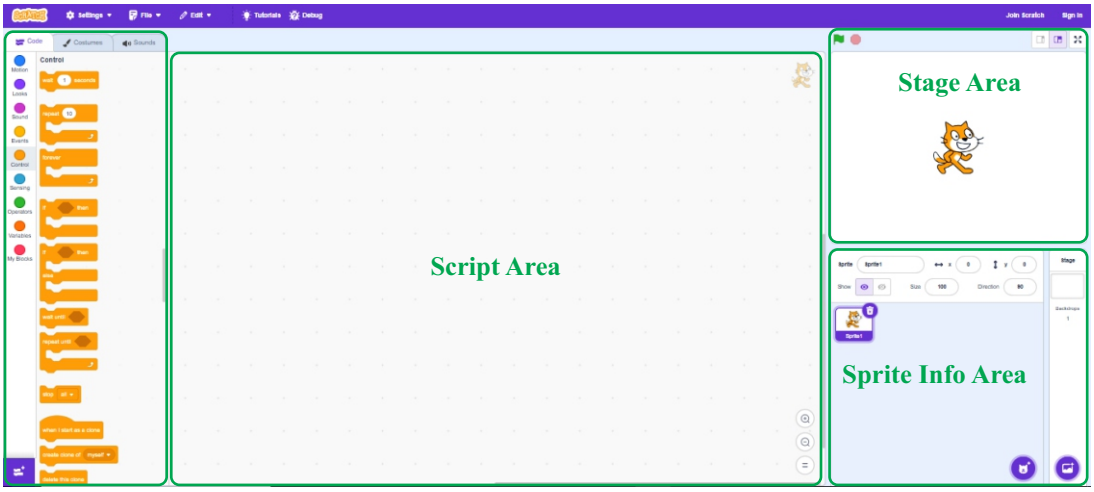


Figure 4.9 Scratch Editor

Stage Area:
The space where sprites perform actions and the program runs.

Sprite Info Area:
Shows all sprites included in the project.

Code Palette:
Contains coding blocks organized into categories.

Script Area:
Where blocks are dragged and connected to create programs.

In this chapter students will learn about the advance topics Events, Coordinates, Condition using mathematical operators on a variable using Scratch.

4.5.1 Events:

An event is something a program knows about and reacts to such as pressing key, clicking a mouse button, touching screen or any object. There are Events code block palette in which following are the code block.

Event	Code Block	Description
When Green Flag Click	when clicked	Start program
When key pressed	when space key pressed	Responds to a specific keyboard key is pressed
When the sprite clicked	when this sprite clicked	When a sprite is clicked perform some action.

4.5.2 Changing Sprite position:

Position of a sprite can be determined by stage area coordinates. Scratch uses x and y coordinate numbers to indicate locations on Stage. The x coordinate gives left–right position, and the y coordinate gives up–down position. The coordinate of center of Stage is (x=0, y=0).

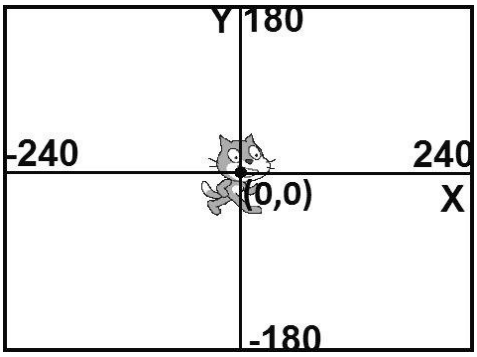


Figure 4.8 Stage coordinates

A **Sprite** in Scratch is an object or character that performs actions in a project.

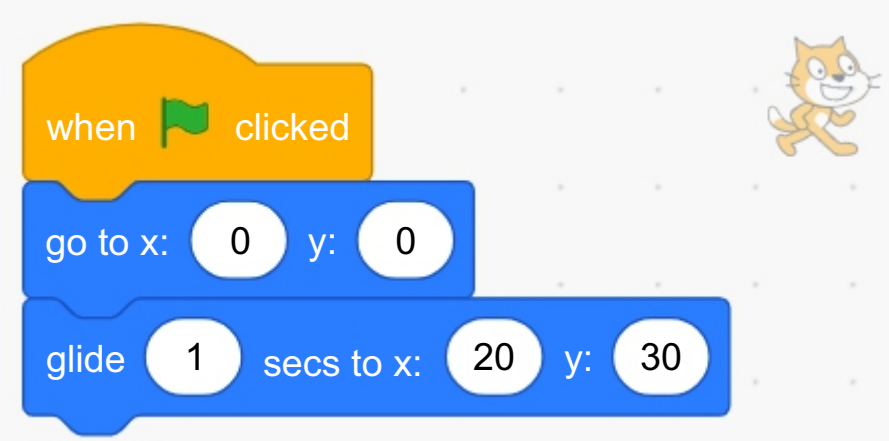
Activity Time

How to change the position of Sprite:

The simplest way to change a sprite's position in Scratch is using Motion blocks. This program moves sprite to a set location when green flag is clicked.

1. From Events category, drag out when clicked block.
2. From Motion category, drag out go to x: 0 y: 0 block. It will position sprite in center of stage.
3. From Motion category drag out glide 1 secs to x: 0 y: 0 block and set value of X and Y to desired position.

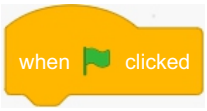
4. Snap all above block under when green flag clicked block.



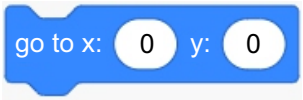
When user click green flag button cat sprite starts its position from center of stage and will move in Y direction (upward).

4.5.3 Combining Events and Coordinates for Automatic Movement of Sprite:

To start a movement of a sprite when an event happens and changing sprite's coordinates, without manual input. By performing following steps, A sprite moves automatically across screen and returns back when it reaches edge.

1. Open Scratch editor, go to **Event** block palette and use 

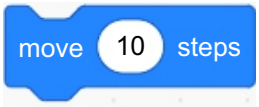
block

2. Go to **Motion** block and select block 

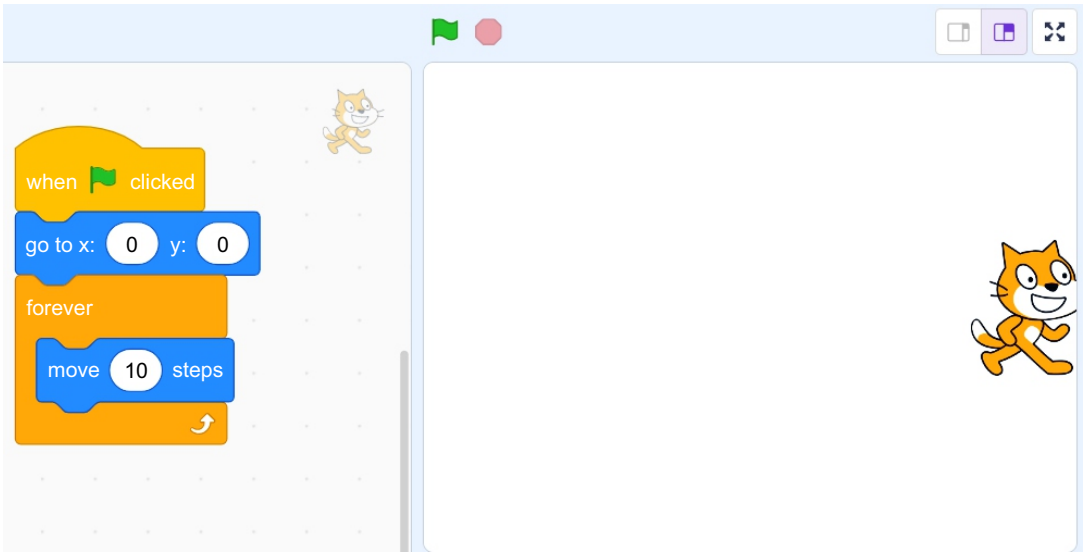
to set position of sprite to 0,0 in x and y direction means center of screen.

3. Go to **Control** block and use block 

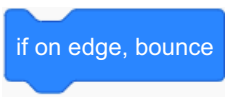
to keep sprite moving.

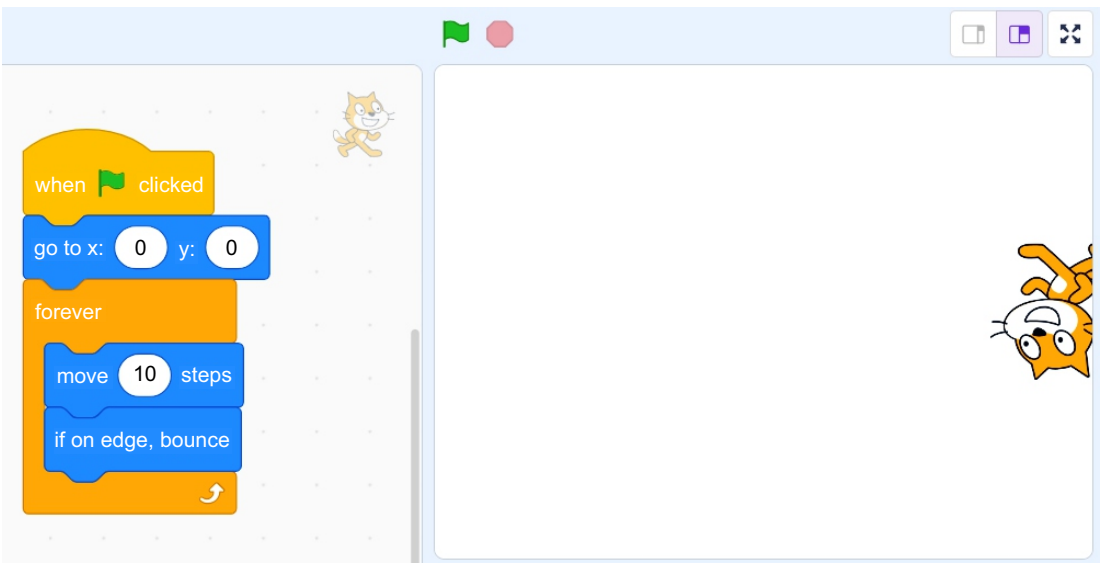
4. Go to **Motion** block and use block 

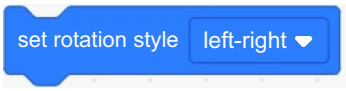
to make movement in x coordinates.



When user click on green flag Sprite will move in X coordinates and move out of screen. User can return back Sprite by add following point.

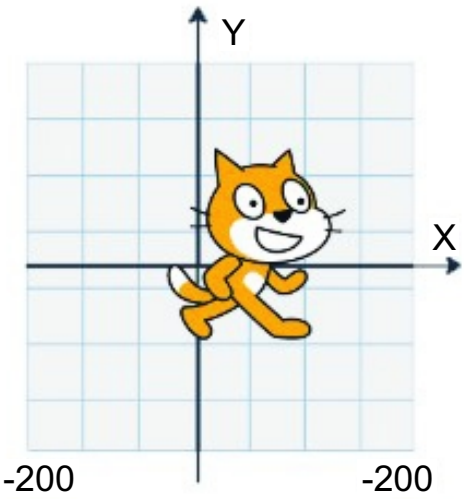
5. Go to Motion block and use block  in forever loop to check position of sprite. If Sprite reaches to wall if on edge, bounce block will return back sprite and changes its position upside down.

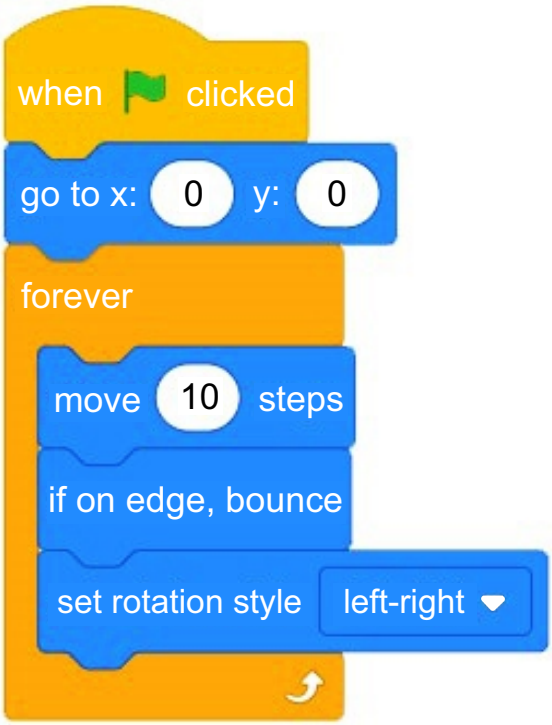


6. To set position of sprite, use 

from Motion block.

7. Run program. Sprite will move in x coordinate and bounce (return) back when it will hit with edges (wall of stage).



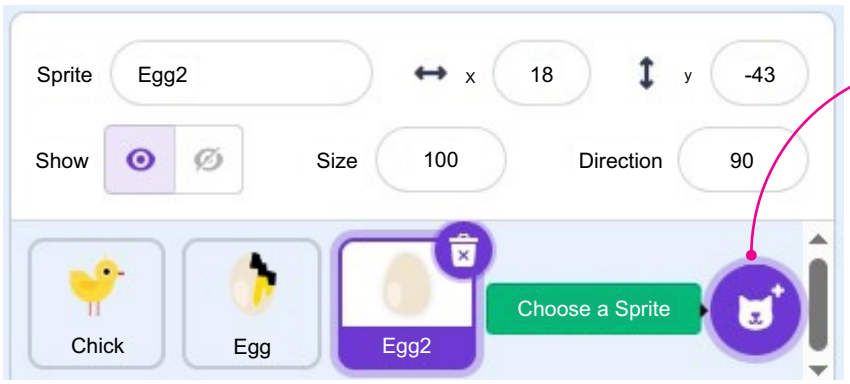


Activity Time

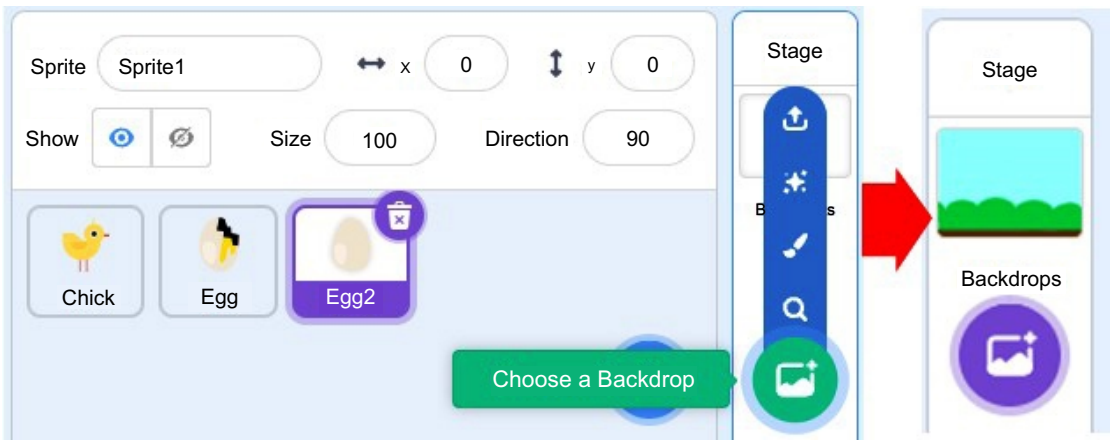
Allow a user to move a sprite (flying cat  , Parrot ) using arrow keys or make sprite move automatically in all over screen without user intervention when program start.

4.5.4 Gaming Project:

By performing this activity, user can build interactive game with Scratch. It works with two sprites one is Chick and other is egg. User can select sprites from available sprites list as showing in below figure.

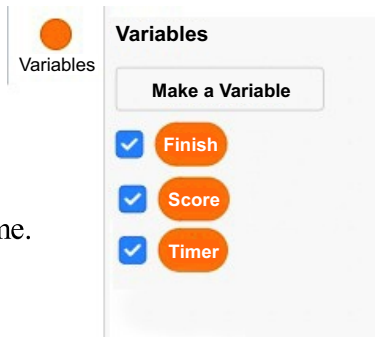


Choose backdrop to make background of stage attractive.



After setting up sprites and backdrop follow the steps.

- Create three variables in Variable code palette by clicking on Make a variable button with following name
  - **Timer:** uses for counter or duration
  - **Score:** uses for score count
  - **Finish:** uses for determining the end of game.

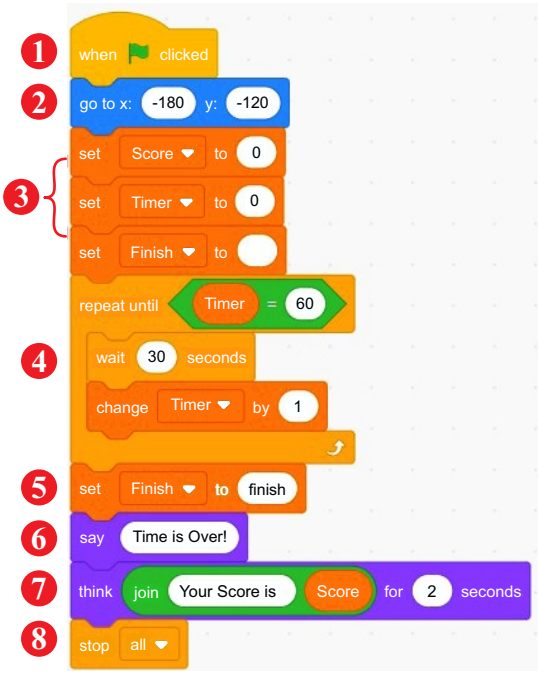


- Now user can develop code step by step in following sequence
  i) Create Count down for game only run for a minute.
  ii) Movement of Chick sprite
  iii) Movement of Egg sprite
  iv) Collision of Chick sprite with Egg Sprite

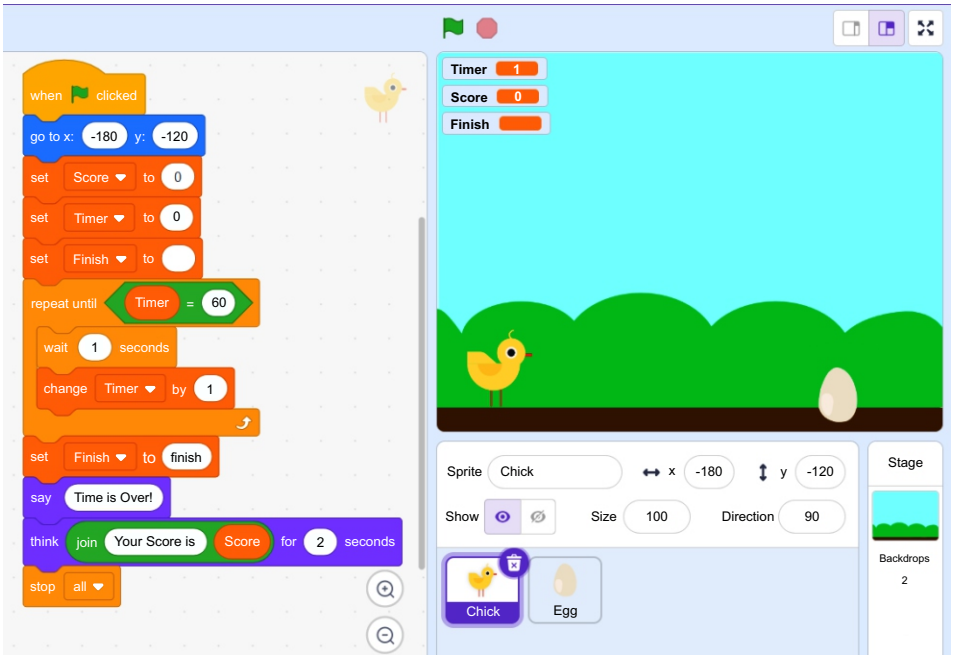
i) Create Count down:

Select first sprite Chick, drag and drop code block as shown below.

1. From Event pallet take block code when green flag is clicked.
2. From Motion pallet take go to x: y: block code to position chick sprite on surface of backdrop.
3. From Variable pallet take set block code to initialize variable with value. **Score**, **Timer** variable should assign 0 and **Finish** variable should be empty.
4. From Control pallet take Loop until block for calculating time. Put condition that **Time** variable equals to 60, Loop will execute and wait 30 sec and add 1 to variable Time.
5. Once loop execution is completed set **Finish** variable to "finish" so user can stop execution of a program.
6. From **Looks** pallet take **Say** control and show message that "Time is Over!"
7. From same pallet take **Think for 2 sec** code blocks to show result. User may use join block from operators to join string.
8. From **Control** pallet take **stop all** code block to stop execution of other code.

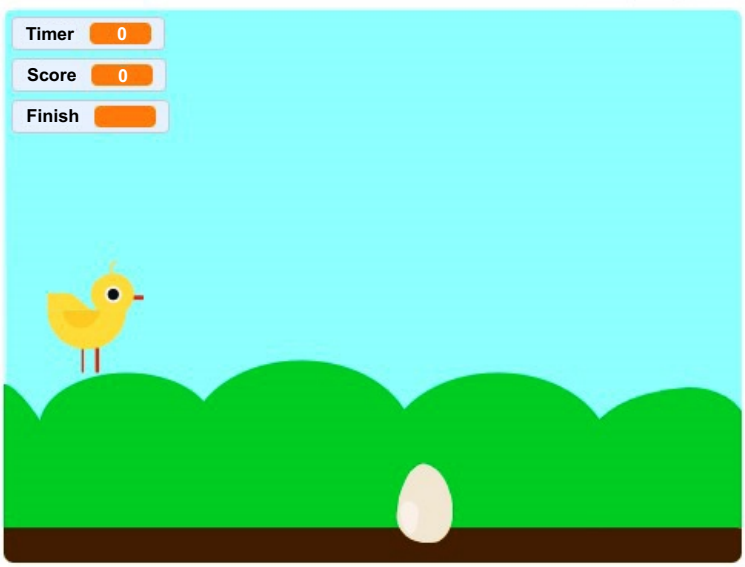


Above code snipped will create a Count down which will limit execution for 1 minute as shown in below image.



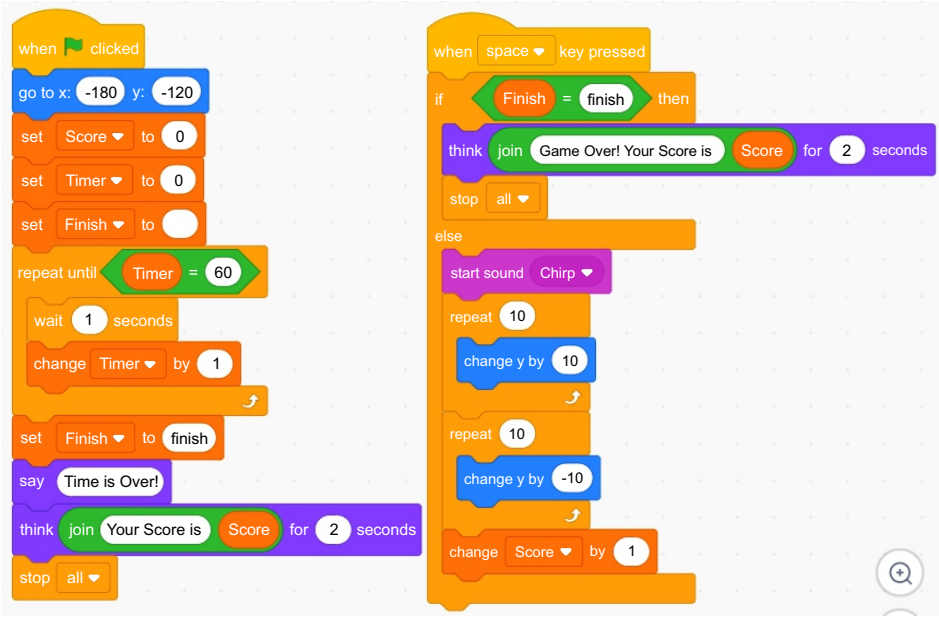
ii) Movement of Chick Sprite:

Write another code for same Chick sprite to jump (up down movement) over egg sprite as showing below.



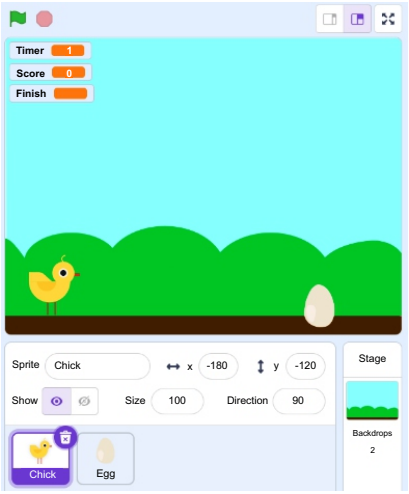
1. From Event pallet take block code when key pressed.
2. From Control pallet use if else block. Use **Finish** variable to check its value equal to "**finish**"
3. If condition in step 2 is true than body of if block is executed and a message will show for 2 sec with the score result. After that **stop this script** block will execute (to stop execution of remaining blocks).
4. In else block **sound of chirp** from Sound pallet is executed.
5. Repeat 10 loop executed to move sprite in y axis upside to feel like jump in air.
6. Repeat -10 loop execute to move sprite in y axis downside to feel like back to ground from air.
7. Change variable value increase by 1

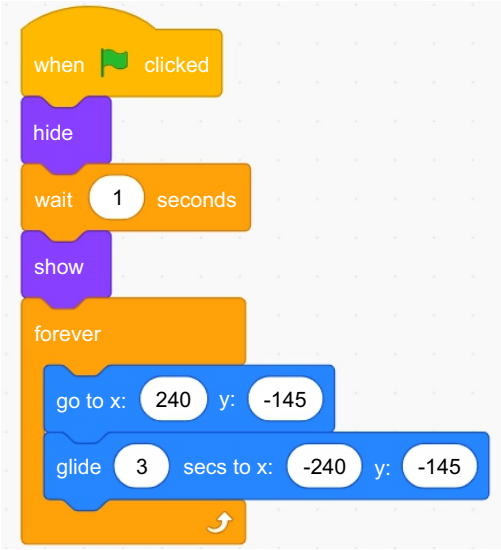
Step i) and Step ii) are shown in below figure.



iii) Movement of Egg Sprite:

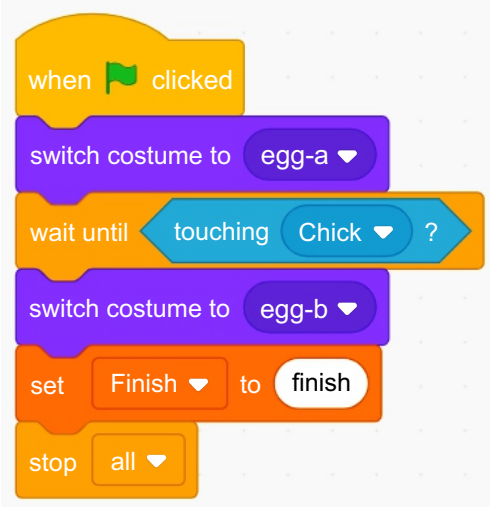
Select **Egg** sprite and write code, it switches its costume to **'egg-a'** to look like a complete egg. It will then move horizontally along the X-axis and check if it touches **Chick** sprite. If it does, **Egg** costume will change to **'egg-b'** (hatch).

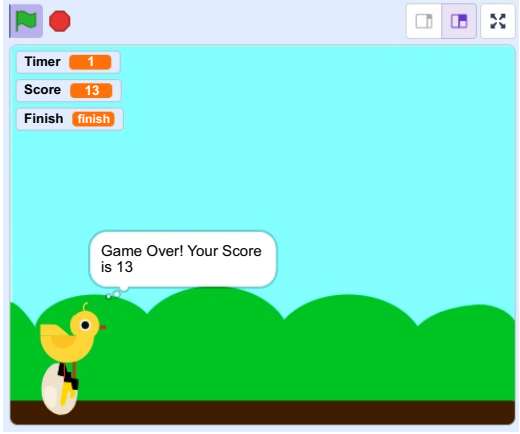




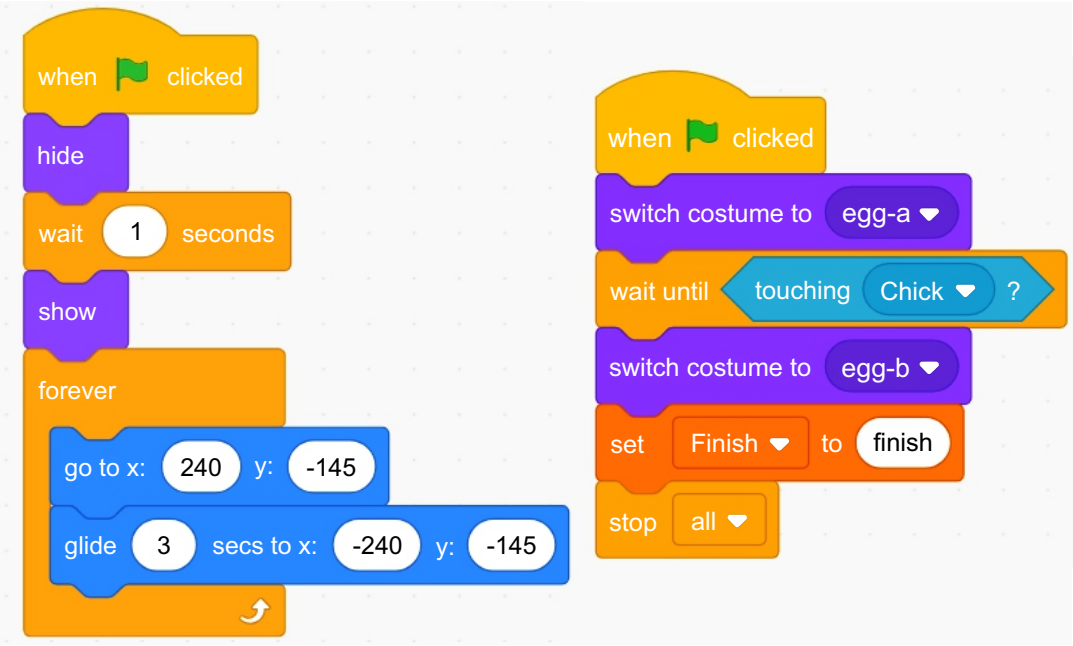
iv) Collision of Chick sprite with Egg Sprite

On the same Egg2 sprite develop following code which will check **Egg** touches (collide) **Chick** sprite. If it does, **Egg** costume will change to **'egg-b'** (hatch).





Both pieces of code will be written (develop) in **Egg** sprite as shown in the below figure. The sprite will glide (move) along X-axis, and if it touches **Chick** sprite, it will change its costume to **'egg-b'**, set Finish variable to 'finish', and stop all scripts.



- After setting up all code, press green button to start game and enjoy.

Summary

- Computers use **binary number system** (0 and 1) to store data and process all information.
- **Encoding** changes data into binary, thus computer can use it.
- **Decoding** changes data back into human readable format.
- **ASCII (**American Standard Code for Information Interchange) is a system that assign binary number to characters.
- **Scratch** programming is a **friendly, visual coding platform** that uses drag-and-drop blocks to create animations, games, and interactive stories.
- **Sprite** is a characters or objects that can move, talk, or interact.
- **Stage** is background area where action happens.
- An **event** in Scratch is a trigger that starts a script. It could be a click, key press, broadcast message, or background change.
- **Events** are essential to make programs interactive and responsive.
- A **variable** is like container or storage box that holds a value.
- A **variable** used to keep track of scores, lives, timers, levels, or player information in games and projects.

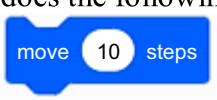
EXERCISE

1. Encircle correct answer

i. ASCII Stands for

(a) American Scientific character for Information Interchange
(b) American Standard Code for Information Interchange
(c) American Simple Clause for Information Interchange
(d) American Structural Character for Interchange Information

ii. Building blocks in Scratch are divided into many categories, Which Category does the following block belong to?

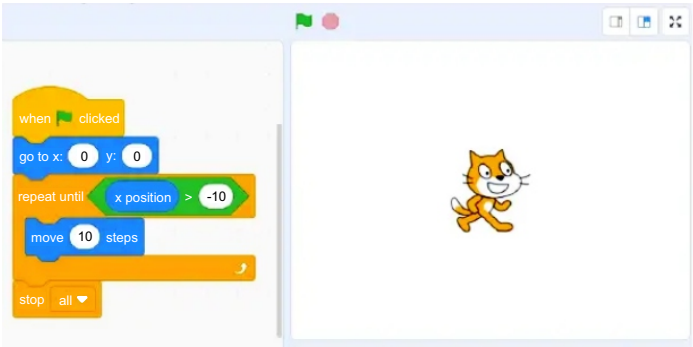


(a) Events
(b) Operators
(c) Motion
(d) Control

iii. Which of the following is not a binary number.

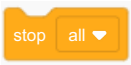
(a) 1111
(b) 101
(c) 11E
(d) 000

iv. Refer to the following image



Which of the following options can make sprite Cat move to (10,0)?

(a) Click Green Flag (b) Click on Cat

(c) 

(d) 

v. ___ is center coordinate of XY plane

(a) X=0 , Y=0 (b) X=0 , Y= 180

(c) X= -240, Y=0 (d) X=0, Y=-240

2. How information is stored on computer?

3. Differentiate between binary and decimal number system.

4. How many types of blocks pallets are there in Scratch programming?

5. Define Events in Scratch and give some examples.

6. Define following terms:

i) Sprite ii) Stage iii) Costume iv) Variable

7. Fill in the blanks with appropriate word/terms.

i) The base value in binary number system is _____.

ii) The binary equivalent of decimal number 10 is _____.

iii) ____ is decimal value of binary equivalent 10101.

iv) Computer only understands ____ and ____.

Class Activity

Instructions for Teachers

- Teacher should motivate students to explore various resources and continue learning independently.
- Divide class into group of 2 or 3 students.

1. Create a Countdown timer.
2. Award player a score point under certain conditions, such as if they can touch another sprite that is automatically moving, or if player clicks on a moving sprite.

Chapter 5

DIGITAL CITIZENSHIP

Student Learning Outcomes:

After the completion of this unit students will be able to:

- Identify appropriate and inappropriate behavior while using the digital environment.
- Describe Cyber Bullying
- Describe the importance of netiquettes, being safe, responsible, and respectful while being online.
- Discuss issues of bias on digital platform.
- List improper use of computer resources.
- Describe threats and ways of actively protecting devices and networks from viruses, intrusion, vandalism, and other malicious activities.
- Discuss positive and negative impacts of using social media, both online and offline.

Introduction to unit:

This unit covers the norms of digital citizenship, emphasizing responsible and respectful behavior while using the Internet or digital devices such as computers and mobile phones.

5.1 Digital environment:

A digital environment is a space where people use devices like computers and mobile phones to connect with each other. While using it, some people behave appropriately and some do not. To know the right way to behave, follow the below rules.

5.1.1 Appropriate Online Behavior:

- **Be kind:** Use polite words in messages and chats.
- **Respect friend's privacy:** Do not share their private information or pictures.
- **Protect yourself:** Use strong passwords and never share personal details.
- **Ask first:** Check with an adult before downloading files or visit new websites.
- **Speak up:** Always tell a trusted adult if someone experiences cyberbullying or something harmful.
- **Think before posting facts or chatting**: Do not spread rumors or harmful things.

5.1.2 Inappropriate Online Behavior:

- **Being a bully:** Sending mean or hurtful messages to others.
- **Sharing confidential information:** Posting personal or friends' private information.
- **Talking to strangers:** Accepting requests or chatting with unknown people.
- **Taking risks:** Clicking on strange links or downloading from untrusted websites.
- **Copying others:** Using someone else's work or pictures without asking them first.
- **Ignoring rules**: Ignoring rules leads to inappropriate behavior.

5.2 Cyberbullying:

Cyberbullying means using Internet devices like phones, computers, or tablets to intentionally hurt someone online. This includes sending mean messages, sharing embarrassing photos, or spreading lies.

Figure 5.1:
An illustration of cyberbullying

5.2.1 Forms of Cyberbullying:

i) Harassment:

Harassment means someone is repeatedly sending mean or threatening messages to another person on social media. For example, when Ali keeps sending angry messages to Hassan on WhatsApp, calling him names and making fun of him, Hassan feels very sad he may lose his self-confidence.

Figure 5.2: An Illustration of Harassment

ii) Impersonation:

When someone pretends to be another person online to post rude or hurtful things. For example, Sara created a fake Facebook account using Amina's name and photo and then posted rude comments, making people think Amina was being meant.

Figure 5.3:
An Illustration of impersonation

iii) Outing:

When someone shares another person's private or embarrassing information online without their permission. For example, Hamza shared a screenshot of Ali's personal message in a group chat, and others laughed at Ali.

Figure 5.4:
An Illustration of Outing

iv) Exclusion:

Leaving someone out of a chat group for any reason or intention can make them feel hurt. Hira and her friends made a group chat to plan a class party, but they did not add Fatima on purpose. They talked about the party in front of her, making her feel left out.

Figure 5.5: An Illustration of Exclusion

v) Cyberstalking:

When someone keeps watching, messaging, or following another person online in a way that feels scary or makes them uncomfortable. For example a girl keeps checking her classmate's posts, sends messages every day, and follows her in all online games, even after being asked to stop.

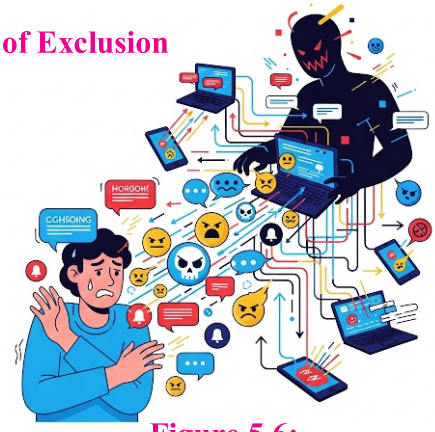


Figure 5.6:
An Illustration of Cyberstalking

5.2.2 Dealing with Cyberbullying:

Below are some safety steps one can take if someone is being cyberbullied

i) Tell a trusted adult:

Talk to a parent, teacher, school counselor, or any trusted adult.

Figure 5.7: An illustration of telling trusted elders

ii) Do not respond or fight back:

Stay calm. Replying can make things worse.

Figure 5.8: An illustration to not respond or fight back

iii) Block the bully:

Use the app's settings to block the person sending hurtful messages.

Figure 5.9: An illustration of block the bully

iv) **Report the bully:**

Report the post or user to the platform (like Facebook, Instagram, or TikTok).

Figure 5.10: An illustration of report the bully

v) **Save the evidence:**

Take screenshots or keep messages as proof to show a trusted adult.

Figure 5.11: An illustration of saving the evidence

vi) **Stay safe online:**

Avoid sharing personal details and set your profiles to private.

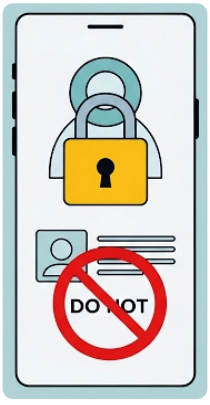


Figure 5.12: An illustration of stay safe online

5.3 Netiquettes:

Netiquette is a combination of the words "network" and "etiquette." It means showing courtesy and politeness when communicating and interacting with others while using the Internet and social media apps like WhatsApp, Facebook, Instagram, Snapchat, Twitter(x) and TikTok.

Figure 5.13: An illustration of importance of netiquettes

5.3.1 Importance of netiquette:

- It helps to stay kind and respectful, even when chatting or posting online.
- It reminds one to think before typing to avoid accidentally hurting someone's feelings.
- It teaches to respect each other's personal information and privacy.
- It helps to make good friends online and enjoy safe, fun experiences.
- It teaches healthy mental habits and helps one stay smart when using the Internet in the right way.

5.3.2 Importance of being Safe:

While using apps like WhatsApp, Facebook, TikTok, Snapchat, Instagram, YouTube, and Twitter (X), one should always keep personal information private. This helps to be safe from strangers and bad things online. Below are the tips to follow to stay safe.

- Never share full name, home address, phone number, or school name with strangers.
- Use a strong password to keep account safe, for example password: 2014@12Sun!
- If someone is being mean or sending weird messages, block and report it to a trusted adult.
- Keeping safe online is just as important as staying safe on the playground.

Figure 5.14: An illustration of keep information safe with strong password.

5.3.3 Importance of be responsible:

It is important to be responsible by thinking carefully before posting or sharing anything on apps like WhatsApp, Twitter(X), Snapchat, and Instagram. One should take care if sharing is kind, true, and safe for everyone to read.

Figure 5.15: An illustration of being responsible.

5.3.4 Importance of be respectful:

It is important to be kind while using social media platforms. To gain respect, one must avoid posting mean comments, making hurtful jokes, or sharing someone's private information.

Figure 5.16: An illustration of being respectful.

Activity1: Online Safety" Poster Activity

Objective: To help students create a visual reminder of how to be safe and responsible online.

Activity:

1. **Create a Team:** Work with a partner to make a poster.
2. **Choose a Title:** Give poster a catchy name like "Online Safety Squad" or "Be a Good Digital Citizen."
3. **Draw and Write "Do's":** On poster, draw and write examples of what one *should* do online, like using polite language or asking an adult for help.
4. **Draw and Write "Don'ts":** Next, draw and write examples of what one *should not* do online, like sharing private photos or spreading rumors.
5. **Display:** Hang completed posters in the classroom to help everyone remember rules of online safety.

5.4 Bias on Digital Platform:

Digital platform biasness happen when social media users, news reporters, TV hosts, or even famous people share information online in a way that is unfair or presents only one side of a story. Anyone who uses digital platforms to spread information that favors a particular viewpoint or group, often by highlighting certain facts and ignoring others, is contributing to this bias. This skewed presentation of information on the Internet is digital platform biasness.

On Instagram, someone may post only happy moments and hide sad ones.

Instagram

On facebook, a post may support one person in a fight without showing the full story.

Facebook

On X (Twitter), a message may blame someone without proof.

X (Twitter)

News channels may talk only about one side of an event.

Channels

Figure 5.13: An illustration of biasness on digital platform.

5.5 Improper uses of computer resources:

i) **Using someone else's login without permission:**
Illegal logging in with a friend's ID or password.

ii) **Playing games during class time:**
Downloading games or tools that teacher or school did not allow.

iii) **Installing or changing someone else's work:**
Removing a classmate's project from a shared folder.

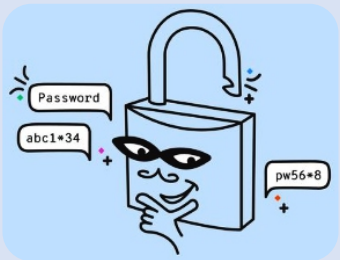
iv) **Deleting or changing someone else's work:**
Removing a classmate's project from a shared folder.

v) **Sharing personal or private information:**
Posting someone's address or phone number on social media.

vi) **Copying rude or mean messages:**
Writing hurtful comments in a group chat or on school forums.

5.6 Computer Threats:

A computer threat is anything that can harm a computer, network, or the information stored in them. It can cause damage, steal private information, or stop the computer from working properly. Below are some examples of Computer Threats.

#	Threat	Definition	Protection from Threats
1	Weak Passwords	 Someone can easily guess password if it's too simple like "1234".	Use a strong password with letters and numbers like P@$$wo&d. Keep it secret.
2	Phishing	 Someone sends a fake email or message to steal user's password or personal info.	Do not click strange messages. Ask an adult first.

3	Fake Websites	 Someone makes a website that looks real to trick people.	Fake sites often have spelling mistakes (like faceboook.com instead of facebook.com). Safe sites start with **https://** and show a lock 🔒 symbol.
4	Hacking	 Someone gets access into computer, email or social media account without permission.	Use a strong password. Always log out. Do not click unknown links.
5	Malware	 Someone tricks users into downloading a file that harms user computer.	Do not download unknown files. Use antivirus software.
6	Virus	 Someone spreads a bad computer program that can break or delete files.	Do not open strange files. Use Licensed antivirus.

7	Ransomware	 Someone locks computer files and asks for money to unlock them.	Do not open unknown files. Back up work.
8	Spyware	 Someone secretly installs a program on a user's computer to watch what user does.	Ask elders before installing any apps. Use safe programs only.
9	Spam	 Someone sends lots of junk messages or emails with bad links.	Delete junk messages. Do not click strange links.
10	Vandalism	 Someone deletes or breaks other people's files on purpose.	Respect others work. Do not change or delete their files.

5.7 Positive and Negative Impacts Of Using Social Media:

Social Media Platform	Definition	✓ Positive Use	✗ Negative Use
Facebook	A social networking site for sharing posts, pictures, and chatting with family and friends.	**Online:** Talk to family, join learning groups **Offline:** Feel happy and stay in touch	**Online:** viewing mean, sharing fake posts, exposure to propaganda **Offline:** May waste time or feel sad
Tube	A video platform for watching, sharing, and creating videos.	**Online:** Watch lessons, tutorials to learn skills. **Offline:** Improve school work, stay creative	**Online:** Watching inappropriate videos **Offline:** Eye strain or late sleeping
Instagram	An app for sharing photos, short videos (Reels), and stories.	**Online:** Exchanging personal talent and creative ideas. **Offline:** Finding new ideas and getting appreciation for work	**Online:** See fake or overly-edited pictures and be exposed to hurtful comments. **Offline:** May lead to feeling bad about yourself or trying to copy others.
TikTok	An app for creating and watching short, entertaining videos.	**Online:** Produce creative videos and share content. **Offline:** Discover new practice and skills.	**Online:** Follow silly or dangerous trends, or become addicted to scrolling. **Offline:** May cause user to neglect homework, chores, or real-life activities.

WhatsApp	WhatsApp is an app to share messages, pictures, videos and calls using the Internet. It is also used for school assignments and online classes.	**Online:** Talk to friends or teachers **Offline:** Feel close to loved ones	**Online:** May be used to spread fake news or rumors. **Offline:** May lead to a strong dependence on phone, making it hard to focus.
Snapchat	Snapchat is an app where user can share photos and short videos. User can also use fun filters that change how it looks and add effects to pictures.	**Online:** Share quick, fun moments with friends. **Offline:** Feel connected and cheerful throughout the day.	**Online:** May be used to send inappropriate or unsafe photos. **Offline:** Could lead to privacy issues or loss of focus of user surroundings.
Twitter (X)	Twitter (now called X) is an app where user can share short messages, news, and ideas with people all over the world.	**Online:** User can learn news fast, follow teachers or leaders, and share our ideas. **Offline:** User can discuss useful news with friends or in class.	**Online:** Fake news and mean comments can spread. **Offline:** Too much use may stop us from talking face-to-face.
LinkedIn	LinkedIn is an app where people share their jobs, skills, and learning to connect with others.	**Online:** User can learn about jobs, careers, and get study tips. **Offline:** User can use the knowledge to plan our future studies.	**Online:** Some people may copy or misuse our info. **Offline:** It may lead children to think about careers instead of school education.

Tip for Offline

Offline means things that user does in real life, not on the Internet.

Summary

- **Digital Environment:** The online world you enter when you use a computer, phone, or tablet to connect to the internet.
- **Appropriate Online Behavior:** Be kind, respect friends' privacy, use strong passwords, and tell an adult if something wrong is seen.
- **Inappropriate Online Behavior:** Do not bully people, share private information, talk to strangers, or click on strange links.
- **Cyber bullying:** Using technology to hurt, embarrass, or scare someone again and again.
- **Dealing with cyber bulling:** Tell a trusted adult, do not reply to the bully, block them, and save the evidence.
- **Netiquette:** The rules for being polite and respectful online.
- **Harassment:** Repeatedly sending mean, insulting, or threatening messages to someone online.
- **Impersonation:** Pretending to be someone else online by using their name or photos to post rude or hurtful things.
- **Outing:** Sharing someone's private or embarrassing information online without their permission.
- **Exclusion:** Intentionally leaving someone out of an online group, chat, or activity to make them feel hurt and alone.
- **Cyberstalking:** Repeatedly watching, messaging, or following someone online in a way that makes them feel scared or uncomfortable.
- **Bias:** When information online is unfair and only shows one side of a story.
- **Computer Threat:** A computer threat is anything that can harm a computer, network, or the information stored in them. It can cause damage, steal private information, or stop the computer from working properly
- **Phishing:** When someone sends a fake message to trick you into sharing your password or personal information.
- **Hacking:** When someone gets into your computer or online accounts without permission.
- **Malware:** A harmful program that can damage user computer.
- **Virus:** A bad program that can copy itself and spread, deleting or damaging files.
- **Spam:** Unwanted, junk messages or emails, often sent to many people at once, usually containing ads or bad links.
- **Ransomware:** A type of malicious software that locks your computer files and demands money to unlock them.

EXERCISE

1. Encircle the correct answer:

i. Which of the following is an example of appropriate behavior online?
(a) Sharing someone's private photos
(b) Spreading false information
(c) Using polite language in messages
(d) Ignoring cyberbullying

ii. What does the term 'netiquette' refer to?
(a) The study of computer viruses
(b) Proper and respectful behavior on the Internet
(c) Illegal online activities
(d) Rules for online shopping

iii. Which one is a positive impact of using social media?
(a) Online scams
(b) Making global friends and learning
(c) Cyberbullying
(d) Addiction to screen time

iv. Which one is a proper way to protect a computer from viruses?
(a) Disabling the firewall
(b) Sharing r password
(c) Opening unknown email attachments
(d) Installing antivirus software

v. What does digital bias mean?
(a) Treating all opinions fairly
(b) Spreading rumors
(c) Treating people unfairly online
(d) Sharing someone personal data

2. Fill in the blanks with appropriate given words:

i) Respecting others' opinions is an example of _____ behavior online.
ii) _____ software helps protect device from viruses.
iii) Sending _____ messages to a classmate on a game chat is an example of cyberbullying.
iv) Spreading _____ about someone is an inappropriate action.
v) Downloading _____ software is an example of improper use of computer resources.

3. Provide descriptive answers of the following questions.

i) What is netiquette?
ii) What is cyberbullying?
iii) Name one positive effect of using social media.
iv) What is digital bias?
v) What is a computer threat? Give any five examples of computer threats.

Class Activity 1

Read each action below. Put a ✓ in the box that shows the action is **Appropriate** or **Inappropriate.**

Action	Appropriate (✓)	Inappropriate (✓)
Helping a friend who forgot their homework.	☐	☐
Reporting cyberbullying or any harmful behavior to a trusted adult	☐	☐
Visiting safe websites and asking an adult before downloading apps or files	☐	☐
Ignoring a friend who fell and got hurt.	☐	☐
Saying “please” and “thank ” politely.	☐	☐
Spreading rumors about someone.	☐	☐

Class Activity 2

Read each situation below. Put a ✓ in the box that shows an example of Cyberbullying or Not Cyberbullying.

Situation	Cyberbullying (✓)	Not Cyberbullying (✓)
Your friend sends a funny video of a cat.	☐	☐
Someone sends mean messages to your classmate on a game chat.	☐	☐
You accidentally send a text message to a wrong person by WhatsApp.	☐	☐
A person posts an embarrassing picture of another student online without permission.	☐	☐
Someone keeps excluding from an online group where your friends are.	☐	☐
Your teacher sends a link to an educational video.	☐	☐

Instructions for Teachers

- Teachers should emphasize active learning, demonstrations, and learner-centered methods in the classroom.
- Teacher should encourage hands-on activities, role-playing, and group work instead of relying only on lectures.
- Teachers should also create a supportive environment that promotes responsible digital citizenship.
- The focus should be on building practical skills, helping students learn to use online tools safely, responsibly, and respectfully in their daily lives.

Chapter 6

ENTREPRENEURSHIP

Student Learning Outcomes:

After the completion of this unit students will be able to:

- List steps of design thinking process.
- Identify use and benefits of design thinking for entrepreneurs
- Describe how innovation has changed the entrepreneurial mindset.
- Discuss benefits to an innovation process of each design thinking step.
- Explain a project through the design thinking process.
- Understand sustainable development goals in the context of world problems facing that need to be solved.
- Share examples of problems faced that could be solved by a product or a service.

Introduction to unit:

This unit covers how entrepreneurs use creativity and Design Thinking to build businesses. Students will also learn how honesty, hard work, and good ideas can help families, communities, and the country grow.

6.1 Entrepreneurship:

Entrepreneurship means starting a business with new and creative ideas to make useful products or services that help people and earn money. A person who does entrepreneurship by selling a product or providing a service is called an entrepreneur.

For example:

- Sara started selling lemonade on hot days to earn pocket money.
- Ali designed handmade greeting cards and sold them to friends and family.
- Aslam baked cupcakes at home and sold them during school events.

6.1.1 Product:

A product is anything that people make or sell to help others or make life easier and better. For example clothes, shoes, and snacks.

6.1.2 Service:

A service is work done by people to help others and make life easier and better. Below are example of service.

- A teacher teaches students to learn.
- A doctor takes care of people to keep them healthy.
- A driver transports people safely.

A customer is a person that buys product or services from a company.

Class Activity1: Understand Product vs. Service

Objective:

To understand the difference between a **product** and a **service**.

Activity:

1. **Solve a Problem:**
   The teacher will divide the class into groups and give each group a problem card, for example "People need help carrying groceries home".
2. **Think of Solutions:**
   Each group will think of solution that is product (a grocery cart) and a solution that is service (a delivery service).

3. **Share with the Class:**
   Each group will explain their product and service, and describe how a product is different from a service.

6.2 Design Thinking Process:

Design thinking is a step-by-step method for solving real-life problems and turning them into business ideas. Design thinking involves the following stages.

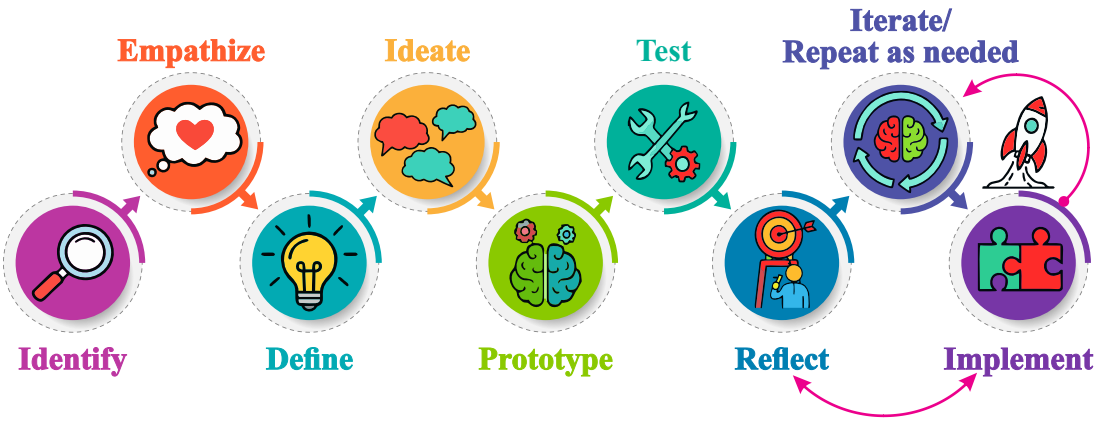


Figure 6.1: An illustration of Design thinking process.

Design Thinking Steps	Definition
Identify	Identifying means finding out something that is not working well or missing. This is how an entrepreneur finds a problem and thinks of a new idea to give a product or service that makes human life better.
Empathize	Empathize means an entrepreneur talks to people, listens carefully, and tries to understand their problems. This helps them get ideas to create products or services that people really need.
Define	Define means to describe a problem such that everyone understands it. When the needs of people are known, the best solution to fix the problem can be chosen.
Ideate	Ideate means thinking of new and smart ideas to solve a problem. An entrepreneur does this to create useful products or services that people need.

Prototype	Prototype means a model or sample of a product. It helps to show how an idea will look or work before making it real. An entrepreneur makes a prototype to test the idea and see if it can help people.
Test	Testing means trying a product or idea to see how well it works. An entrepreneur tests to find out if people like its prototype, if it works properly and what changes are needed before to selling it.
Reflect	Reflect means an entrepreneur thinks carefully about what he/she learned from feedback to improve product or idea.
Iterate	Iterate means an entrepreneur improves the product based on feedback and tries it again.
Implementation	Implementation means that an entrepreneur starts selling finished products for real customers.

Class Activity2: "Problem Finders" Scavenger Hunt

Objective:

To observe a real place, find things that cause trouble or make it hard for people to do their daily activities comfortably.

Steps:

1. **Form Teams:**
   The class will be divided into small groups.

2. **Get Tools:**
   Each team will receive a notepad and pencil from the teacher.

3. **Go on a Hunt:**
   Each group will visit a place, such as the classroom, library, or playground, to look for things that are not working well.

4. **Write It Down:**
   Note down at least three problems to find, for example “It is hard to find books in the library” and “The chairs are too small or uncomfortable.”

5. **Class Discussion:**
Each group will share their findings. The teacher will ask, "Why is this a problem for people?"

6. **Conclusion:**
The teacher will explain that this activity helps students understand people's feelings and why solving problems is important.

6.2.1 Benefits of design thinking:

Design thinking helps entrepreneurs understand problems deeply, generate creative ideas, collaborate effectively, and test possible solutions quickly. Below are some key benefits:

i) **Clear Understanding of the Problem:**
It helps people clearly understand the real problem before trying to fix it.

ii) **Creative Solutions:**
It encourages people to think of new and smart ideas to solve problems in better ways.

iii) **Team Collaboration:**
It promotes teamwork, idea sharing, and learning from one another.

iv) **Focus on People's Needs:**
It ensures that solutions truly match what people need and want.

v) **Quick Testing of Ideas:**
It allows rapid exploration and testing of ideas to find what works best.

vi) **Learning from Mistakes:**
It enables people to learn from what didn't work and improve their ideas.

vii) **Saves Time and Resources:**
It helps avoid wasting time and money by addressing the right problem in the right way.

6.3 Innovation and entrepreneurial mindset:

Innovation means using smart and new ideas to make life easier and better. It helps people change old ways of thinking and try new ways. When someone starts a new business, innovation helps them to explore creative ideas, test solution and make

improvements based on feedback. For example if someone makes a lunchbox that keeps food hot without fire or electricity, that's an innovative idea. It solves a real problem for students and workers, it can enhance mindsets by using following steps.

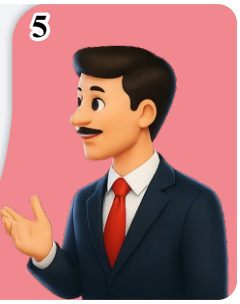
1 Think about Real-life Problems
Start by thinking: "What problem can I solve to help people?"

2 Ask People they Need (Survey)
Talk to family, teachers, or friends. Find out what they wish they had.

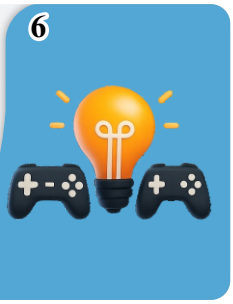
3 Try to Help Others
Good ideas often come from thinking how to make life easier or better.

4 Look Around and Observe
Watch carefully at school, home, or outside to find things that can be improved.

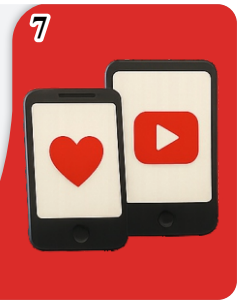
5 Learn from Business People
Ask successful people about their ideas and how they started.



6 Mix Old Ideas to Make a New One
Combine two things to create something useful and fun.



7 Check Social Media or TV Trends
See what is popular and what people are talking about.



8 Read Books or Watch Videos
Learn about cool inventions and creative ideas from around the world.

Figure 6.2:
An illustration of creative steps that helps to build an entrepreneur's mindset.

6.4 Benefits of innovative process in design thinking:

An innovatively creative approach makes entire Design Thinking process successful. Instead of just waiting for a big idea, person uses creativity at every single step from understanding a problem to building and testing a solution. This is how to transform a simple challenge into a clever solution that benefit for everyone. Following are some examples of innovative processes that can be used in design thinking for creative projects.

1. **Empathy Walk:** Go out and meet people or visit a real place to see what problems they have and how they feel.
2. **Idea Sketching:** Draw quick and fun pictures to show ideas clearly.
3. **Group Brainstorm:** Work in teams to share ideas and add new ones together.
4. **Prototype with Recycled Materials:** By using materials like paper, boxes and bottles one can build a small model of the idea
5. **Storytelling:** Tell a short and interesting story to present how an innovative idea can help people.

6.5 Design thinking project on origami gift business:

Objective:

Students will create a project using design thinking to make and sell origami gifts. The steps below show how to start an origami gift business using the design thinking process.

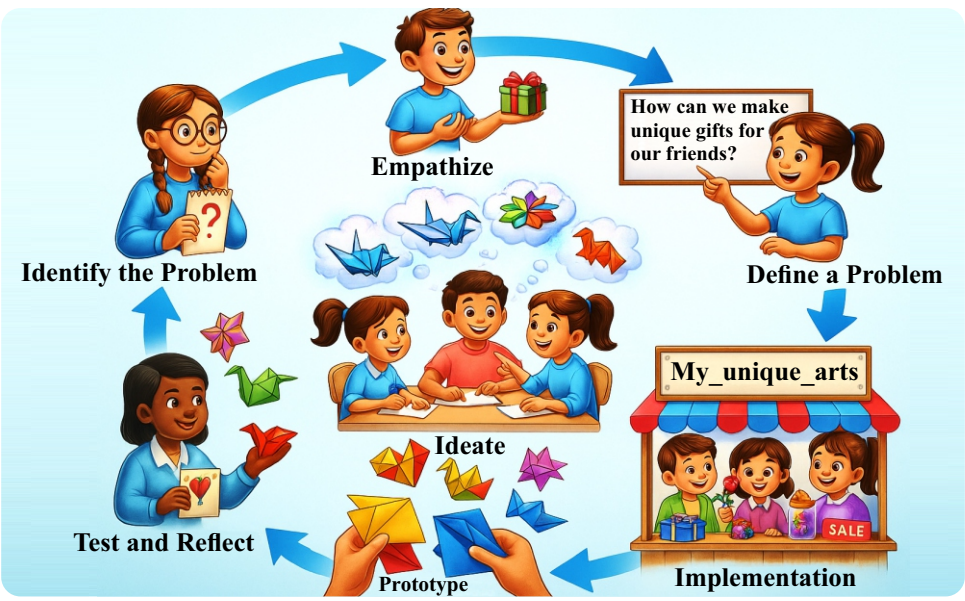


Figure 6.3:
An illustration of project development through design thinking process.

Activity:

i) **Form Teams:**
Divide the class into small groups of 4–5 students. Each group will act as a mini business team.

ii) **Understand the Task:**
Students will make paper gifts (Origami) by folding colored paper into shapes like flowers, animals, or stars.

iii) **Identify a Problem:**
Discuss in group and think: *What do students or teachers need?*
Example: "They want small, cute, and colorful paper gifts".

iv) **Empathize:**
Talk to classmates or teachers to find out what kind of Origami gifts they would like to buy. Note their interests and favorite colors or shapes.

v) **Define a problem:**
Clearly state what your team will make and why.
Example: "We will create colorful paper roses and animal figures as friendship gifts."

vi) **Ideate:**
Students think of many origami designs like colorful bookmarks and small paper animals that could be keychain.

vii) **Prototype:**
Create a variety of Origami designs and select the best ones to make sample gifts.

viii) **Test:**
Show Origami samples to classmates or teachers. Ask them what they like or what can be improved.

ix) **Improve Your Design:**
Use feedback to make Origami gifts more appealing and easy to make.

x) **Implement:**
Prepare final Origami products and set up a small display at a school fair or classroom market day. Decide prices, decorate a stall, and practice polite selling.

xi) **Reflect and Learn:**
After the activity, discuss with your group:

- What worked well?
- What problems did you face?
- What did you learn about teamwork and creativity?

6.6 Product or Service Solve a problem:

People often face many challenges when trying to turn a good idea into a successful business. The solutions they develop can lead to products and services that make life better and easier for everyone. Below are examples of problems and its solution products.

Problem Faced	Solution	Product or Service
People need cheap and safe transport	Start low-cost rides for students or workers	App-based ride-sharing for short distances (like a school van app)
Kids grow fast and clothes get small quickly	Create a reuse & resale system	Online platform like OLX for used school uniforms, shoes, or books
Students forget lunch or homework at home	Fast delivery for school items	App to connect nearby helpers who can deliver things to school
Parents cannot drop or pick up their kids	Provide transport help	Community carpool service or shared ride bookings using a mobile app
Villagers don't find quality products nearby	Help local shopping online	Set up a simple e-marketplace for local products (like soap, crafts)
People want to sell handmade items	Promote local creativity	Online store for handmade crafts, cards, jewelry (like Etsy for students)
No jobs for local youth	Offer digital skill training	Start a small computer learning center or app-based video course

6.7 Sustainable Development Goals (SDGs):

The world has some big problems like people being poor, hungry, sick, or not going to school. Some places do not have clean water or fresh air. That's why the **United Nations (UN)** made **17 special goals** called **Sustainable Development Goals**,

or **SDGs**. These goals help people, animals, and the Earth. SDG teach to **share, be kind, save nature**, and make sure **everyone lives a better life** now and in the future. Below are detail of 17 SDG goals.

Figure 6.4: An Illustration of SDG 17 goals

SDG NO.	Description of Sustainable Development Goals
1.	**No Poverty**: Making sure no one has to live in extreme poverty, thus everyone has enough money for food, clothes, and a safe place to live.
2.	**Zero Hunger:** Ensuring everyone has enough good food to eat thus they can be healthy and strong.
3.	**Good Health and Well-Being:** Helping all people, no matter of age, to be healthy and have a happy life.
4.	**Quality Education:** Making sure everyone gets a good education and has a chance to learn what they need to succeed.

5.	**Gender Equality:** Giving girls and boys similar opportunities and rights thus they can both have a fair chance at life.
6.	**Clean Water and Sanitation:** Making sure everyone has clean drinking water and a clean, safe place to use the toilet.
7.	**Affordable and Clean Energy:** Giving everyone access to electricity from clean sources like the sun and the wind, which are good for the planet.
8.	**Decent Work and Economic Growth:** Helping people get good jobs that are safe and pay fairly, thus they can earn a good living and help economy grow.
9.	**Industry, Innovation, and Infrastructure:** Building new roads, bridges, factories, and technologies to help countries grow and create better jobs.
10.	**Reduced Inequalities:** Making sure that everyone, no matter who they are or where they come from, is treated fairly and has the equal opportunities.
11.	**Sustainable Cities and Communities:** Making cities and towns safe and friendly places to live, with clean air, good homes, and green spaces.
12.	**Responsible Consumption and Production:** Encouraging everyone to buy and use things wisely and to not create much waste, thus we can protect our planet's resources.
13.	**Climate Action:** Taking quick action to stop climate change and its harmful effects on the world
14.	**Life under Water:** Protecting oceans, rivers, and all the animals that live there to help them stay healthy.
15.	**Life on Land:** Taking care of forests, plants, and animals on land and ensuring these are protected from harm.
16.	**Peace, Justice, and Strong Institutions:** Making sure that all countries are peaceful and fair, with good rules and laws that protect everyone.
17.	**Partnerships for the Goals:** Working together, as a team, with countries and people all over the world to make all these goals happen.

Summary

- **Entrepreneurship:** Starting a new business to solve a problem with a clever idea.
- **Entrepreneur:** A person who starts a new business to solve a problem.
- **Design Thinking:** A step-by-step way to solve problems and create new business ideas.
- **Empathize:** To talk to people and listen carefully to understand their problems.
- **Prototype:** A first model or sample of a product to test an idea.
- **Iterate:** To improve a product based on feedback and try again.
- **Implementation:** The final step of selling a finished product to customers.
- **Innovation:** Using new and smart ideas to make life easier and better.
- **Entrepreneurial Mindset:** Thinking like an entrepreneur by using creativity to find and test new solutions.
- **Benefits of Design Thinking:** Design Thinking is helpful because it makes sure that a person understand real problem, encourages creative solutions, helps teams work together, and allows to test ideas quickly to save time and money.
- **Innovation and an Entrepreneurial Mindset:** An entrepreneurial mindset means using creative thinking at every step, from finding a problem to testing a solution, to make a simple challenge into a clever solution.
- **Sustainable Development Goals (SDGs):** The UN created 17 SDGs to solve big world problems like poverty, hunger, and climate change. These goals are a guide for everyone to work together and make the world a better place for people to live.

Terms to Remember

- **Community:** A group of people who live together.
- **Opportunity:** A good chance to do something.
- **Innovative:** A very new and clever idea.
- **Product:** Something to sell.
- **Service:** A helpful thing for others.
- **Prototype:** A first example of an idea.
- **Feedback:** What people tell about an idea.
- **Beneficial:** Something that is good for people.
- **Resources:** Things in use, like money or materials.
- **Sustainable:** Something is made useful for a long time

EXERCISE

1. Encircle the correct answer:

i. The person who starts a new business called?

(a) Customer (b) Innovator
(c) Entrepreneur (d) Manager

ii. The art of folding paper into pretty shapes called?

(a) Design Thinking (b) Entrepreneurship
(c) Origami (d) Innovation

iii. How many special goals did the United Nations (UN) make?

(a) 10 (b) 15
(c) 17 (d) 20

iv. The stage where try out a product or idea to see if it works?

(a) Ideate (b) Reflect
(c) Test (d) Define

v. Model or sample of a product called?

(a) Service (b) Design
(c) Prototype (d) Plan

2. Fill in the blanks with appropriate given words:

i) Entrepreneurship means that someone identifies an opportunity and starts a new _____ to solve a problem.

ii) Innovation helps people change _____ ways of thinking and try new ways.

iii) Design thinking is a _____ method for solving real-life problems.

iv) The stage where products are improved based on feedback is called _____.

v) A _____ or service is work or help that someone provides to others to meet their needs.

3. Provide descriptive answers of the following questions.

i) What is problem identifying?

ii) What is the name of the stage where an entrepreneur starts selling finished products to real customers?

iii) What is design thinking process?

iv) Give any five examples of a problem solving in daily life?

v) What does sustainable development goal number one aim to end?

Instructions for Teachers

- Teachers should emphasize **active learning, demonstrations, and learner-centered methods** to develop entrepreneurial thinking.
- Teachers should encourage **hands-on activities, role-playing, brainstorming, and group projects** instead of relying only on lectures.
- Teachers should create a **supportive environment that promotes creativity, problem-solving, and entrepreneurship** in classroom activities.
- Teachers should encourage students by using Tube links to present real-life examples of young entrepreneurs, innovative projects, and small business ideas.
  - https:// tu.be/M6GfTYlLqXM
  - https:// tu.be/-dQ6ak7dHhk
  - https:// tu.be/a8LbpcyZtNM

Prepared by **SINDH TEXTBOOK, BOARD, JAMSHORO.**
Reviewed by **Directorate of Curriculum Assessment and Research Sindh, Jamshoro**
Prescribed by the Board of Intermediate and Secondary Education Hyderabad, Sukkur, Shaheed Benazirabad,Larkana, Mirpurkhas and Karachi for Secondary School Examination.
Approved by the **Education and Literacy Department, Government of Sindh.**

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Serial No.			Publisher Code No.
Month and Year of Publication	Edition	Quantity	Price