

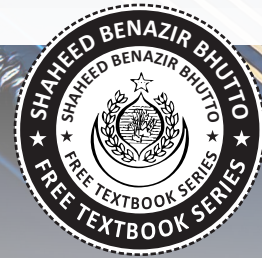
Test Edition



A Textbook of

Computer Education

For Class VI



Sindh Textbook Board, Jamshoro

**Published by:
Sindhi Kitab Ghar - Karachi**

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Prepared and produced by the Sindh Textbook Board, Jamshoro. Reviewed by Bureau of Curriculum & Extension Wing, Sindh, Jamshoro. Approved by the Sindh Education and Literacy Department, Government of Sindh vide letter No. SELD/HCW/18/2018/409/, dated: 9th December, 2024 for the Students of the Province of Sindh.

Patron-in-Chief

Pervaiz Ahmed Baloch
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Supervisor

Moona Aziz Pathan
Sindh Textbook Board

Authors

Dr. Yasir Arfat Malkani
Dr. Muhammad Ahsan Ansari
Mr. Syed Hassan Raza Zaidi
Mr. Sajid Ahmed Qazi
Ms. Saima Mahmood

Reviewers

Dr. Naeem Ahmed Mahoto
Mr. Muhammad Zahid Shaikh
Mr. Muhammad Arif Rao
Mr. Ajmal Saeed
Mr. Imran Pathan
Ms. Zufishan Kamal
Ms. Moona Aziz Pathan
Ms. Shahnaila Daudpota
Mr. Mushtaq Ahmed Ansari

Technical Assistance and Co-ordination

Mr. Shahanshah Vighio
Sindh Textbook Board

Proof Reader
Sadam Hussain

Editor
Zulifqar Ali Bhatti

Composing and Layout Designing

I.T D.T.P Section
Sindh Textbook Board

Printed at : Sindhi Kitab Ghar - Karachi.

PREFACE

The Grade - VI Computer Education Textbook published by the Sindh Textbook Board has been designed to introduce young learners to the world of technology in a structured and engaging way. In this rapidly evolving digital age, it is essential to equip students with the foundational knowledge and skill needed to understand and interact with computers effectively.

We expect this Textbook will fulfil the diverse needs of students studying public and private schools across Sindh. The Textbook contents cover key areas such as the role of Technology in everyday life, the basics of programming and safe use of the Internet etc.

This Textbook encourages students to think critically, solve problems and explore the exciting possibilities offered by computer science. By focusing on both theoretical and practical aspects, it lays the groundwork for advanced learning in the subject.

We extend our gratitude to the educators, curriculum developer, subject's expert, authors and reviewers who contributed to the preparation of this book remains a helpful resource for students and teachers alike.

We hope this Textbook inspires students to explore the fascinating world of computer science and builds a strong foundation for their academic and professional growth.


Feedback from reader will be appreciated to help us further improve the quality and relevance of future edition.

Chairman
Sindh Textbook Board



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UNIT 01

INTRODUCTION TO COMPUTERS



Student Learning Outcomes:

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

- Recognize various Information and Communication Technology (ICT) devices and their applications. Summarize the different developments in the history of Computers.
- Define and differentiate computer hardware and software.
- Identify and analyze (basic) hardware components of a computer system (e.g. Input, Output, processor, memory, and storage).

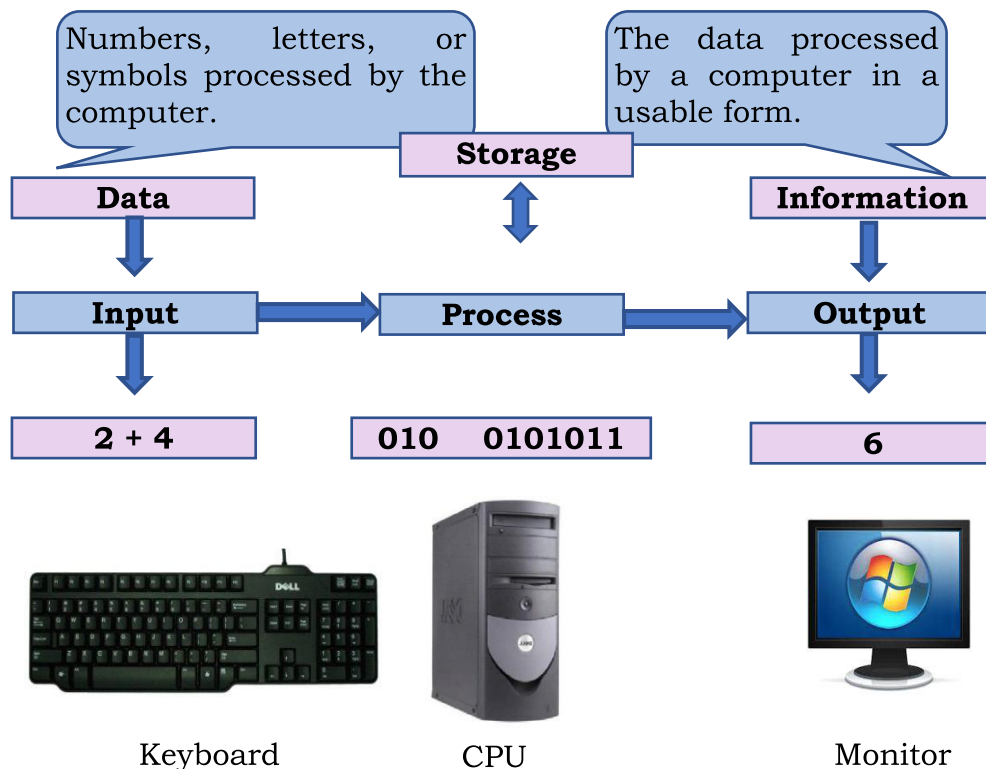
Introduction to the Unit:

This unit covers the different components of computers (processors, input/output devices, and storage devices) and their functionality, advantages, technological development, and uses in the field of communication, business, and manufacturing. This unit contributes in recognizing computer systems and various ICT devices; differentiating hardware and software and analyzing the importance, advantages, and uses of ICT devices.



1.1. What is computer?

A computer is an electronic data processing machine that accepts the input (data), processes it, and produces output (information).



CPU processes and stores data entered by the user and converts into 0's and 1's because computer only understands machine language i.e. binary.

Figure 1.1 Computer

1.2. Difference between data and information

Data is raw, unorganized facts or symbols that represents quantities, measurements, or descriptions. It can be in the form of numbers, words, images, sounds, etc. Data has no context or meaning on their own. For example:

- For students in the class, data could be like names of students, their roll numbers, or their ages, etc.

S. No.	Name	Roll No.	Age
1	Abdullah	74	11y
2	Sahil	45	12y
3	Murkh	32	12y
4	Ali	27	13y

- For books, data could be the title of the book, subject, or author etc.

	Title	Subject	Author
1	Toot batoot	Poems	Sufi Tabasum
2	Sindh ki Kahani	History	Hameda Khoro
3	A Christmas Carol	Stories	Charles Dickens
4	Chirion ki alif laila	Stories	Kirshan Chandar

Information is what we get when we organize and interpret data. It's processed data that has meaning, context and relevance. Information helps to answer questions, solve problems, or make decisions. For example:

- If we take the student's data and say, "Abdullah is younger than Ali," that's turns data into information.
- If we organize unarranged books (data) by subject or title, it becomes information. Now, we can search for any book easily.



Unorganized Books



Organized Books

Data



Information

	★	▲	♥
001	★	▲	♥
002	★	▲	♥
003	★	▲	♥
004	★	▲	♥
005	★	▲	♥
006	★	▲	♥
007	★	▲	♥

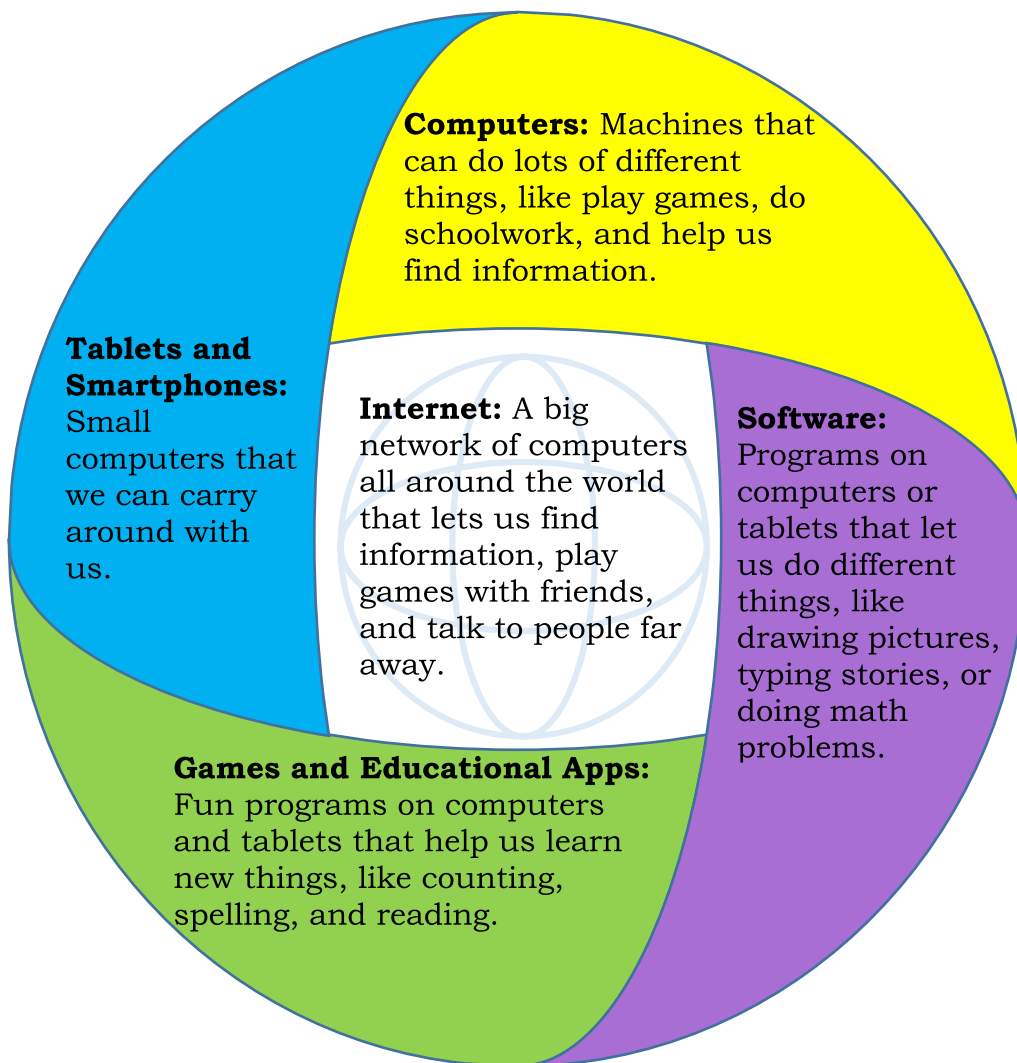
ACTIVITY

Use real-life examples from your environment to illustrate the concept:

Collect data (like counting objects in the classroom) and then work together to turn that data into useful information (like tabulating or graphing the results to see which object is most common).

1.3. Information and Communication Technology (ICT)

Information and Communication Technology (ICT) is all about using tools and resources to create, use, store, manage and communicate information. These tools include electronic devices like computers, tablets, and smartphones.



1.4. Evolution in the history of computers

The history of computers can be divided into five generations, based on major technological advancement. Each generation brought significant improvements in computing technology, leading to more powerful and versatile devices.

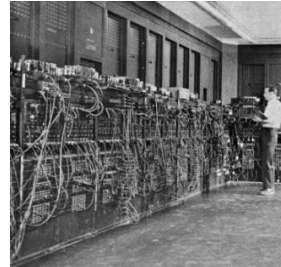
First Generation (1940s-1950s):

The first generation of computers used vacuum tubes for processing.

These computers were large, expensive, and consumed a lot of power.



Vacuum Tube



ENIAC-1

Second Generation (1950s-1960s):

The second generation of computers used transistors instead of vacuum tubes, making them smaller, faster, and more reliable than the previous generation.



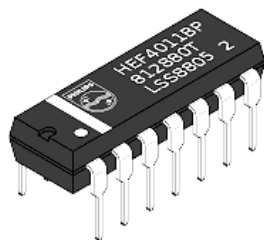
Transistor



CDC-164

Third Generation (1960s-1970s):

The third generation of computers used integrated circuits (ICs), which further reduced size, cost and power consumption while increasing speed and efficiency.



Integrated Circuit (IC)



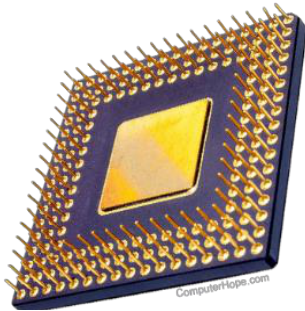
IBM Personal Computer

Fourth Generation (1970s-Present):

The fourth generation of computers used microprocessors, leading to the creation of personal computers (PCs).

The development of Graphical User Interface (GUI) made computers more user-friendly by allowing interaction through icons and windows.

The widespread adoption of the Internet in the 1990s revolutionized communication and access to information.



Microprocessor



Desktop Computer

Fifth Generation (Present and Future):

The fifth generation of computers is characterized by advancements in artificial intelligence (AI), quantum computing, Internet of Things (IoT), and other cutting-edge technologies.



Processor



Computing Devices

1.5. ICT Devices



Desktop Computer (CPU)



Printer



Scanner



Laptop



Tablet



Router



Satellite



Monitor



Biometric Scanners



Smart Board



Projector



1.6. Applications of ICT devices in daily life

Following are some explanations of use of ICT in various fields:

- **COMMUNICATION:**

Email: People can send messages quickly using computers and smartphones.



Video Calls: Applications like WhatsApp, Skype or Zoom let, people see and talk to each other even if they are far away.



Social Media: Websites and apps like Facebook, Snapchat and Instagram let people share pictures and messages with their friends and family.



- **BUSINESS:**

Online Shopping: People can buy things from websites like Amazon and Daraz without visiting a store.



Introduction to Computers

Digital Payments: People can pay for things using their phones or computers with apps like PayPal or Apple Pay.



Accounting Software: Businesses use software like QuickBooks to manage their financial records.



- **MANUFACTURING:**

Robots:

Robots help make things like cars and toys in factories.



Computer-Controlled Machines:

Computer control machines in factories to ensure accurate and efficient production.



Inventory Management: Computers help track the number of items in a factory or warehouse.



- **EDUCATION:**

- **Educational Games:**

Students learn new concepts through fun games on computers, tablets, and smartphones.



- **Online Learning:**

Websites like Khan Academy, Virtual University and W3schools offer lessons on various subjects.



- **Interactive Whiteboards:**

Teachers use large screens connected to computers to show videos, play games, and draw pictures to help students for learning.



- **Research and Development (R&D):**

Research and development is exploring and applying new ideas to make things better.

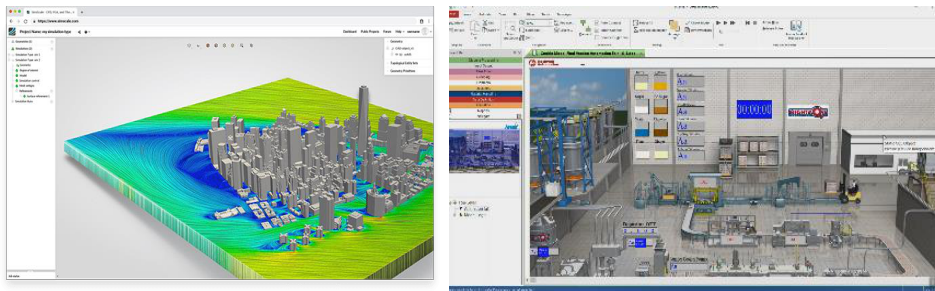
Example: Engineers build toys with new ideas for more fun.

ICT provide a large number of hardware and software tools for research and development.



- **Simulation Software:**

Computer programs are used to simulate experiments and test out ideas before building real **prototypes** e.g. Flight Simulator, Farm Frenzy, etc.



- **Data Analysis:**

Computers help researchers analyze large database to find patterns and make discoveries and predictions.



Collaboration Tools:

Tools like Google Docs and Dropbox enable teamwork, even from different locations. These are just a few examples of how ICT is used in different fields to help people communicate, work, learn, and create new things.



1.7. Advantages and disadvantages of ICT devices

Advantages	Disadvantages
<p>Enhanced Learning: ICT provides access to a wide range of educational resources, including interactive games, video sharing platforms, and apps like Khan Academy, Duolingo, BYJU'S, Ilmkidunya, Sabaq.pk, etc.</p>	<p>Distraction: ICT devices can be highly distracting for student, leading to decreased focus and productivity, if not used properly and monitored closely.</p>
<p>Communication: ICT helps to stay connected with people worldwide through email, messaging apps and social media like WhatsApp and Skype</p>	<p>Health Concerns: Excessive screen time on ICT devices can lead to various physical health issues, including eye strain, headaches, disrupted sleep patterns, and muscular injuries.</p>

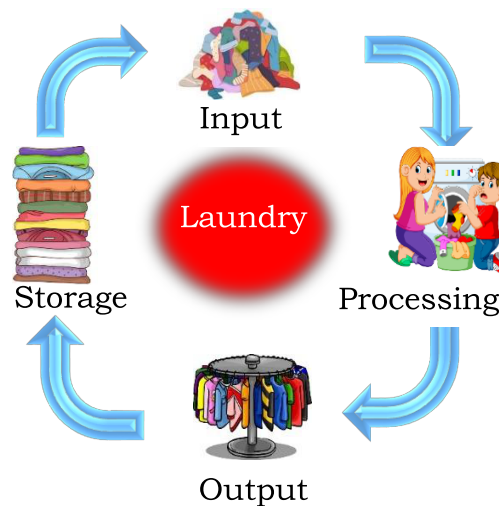
<p>Efficiency and productivity: Through ICT we can automate repetitive tasks and save a lot of time like Paint, Canva, Photoshop, YouTube, Spotify, etc.</p>	<p>Cybersecurity Risks: ICT devices are vulnerable to cybersecurity threats such as viruses, malware, hacking, and phishing attacks.</p>
<p>Collaboration: ICT devices facilitate collaboration among students by allowing them to work together on projects using tools like MS Teams, Zoom, Dropbox, etc.</p>	<p>Dependency: Overreliance on ICT devices can lead to dependency and addiction.</p>

1.8. Data Processing Cycle

Computers process data in a series of steps called the data processing cycle. Let's take a simple example of making bread ("Roti"), to illustrate the idea that data goes through different stages to become useful information.

Steps of the Data Processing Cycle

- **Input:** Like gathering your used clothes for laundry, at this stage data is collected and entered into the computer system.
- **Processing:** Like washing your clothes, the stage when computer works on the data to produce useful information.
- **Output:** Like collecting your washed clothes, output is where the processed information is presented to the user.
- **Storage:** Like storing the clothes in some cupboard, storing data on the computer's memory or hard drive.



1.9. Components of a Computer

A computer can be divided into two categories of components, **Hardware** and **Software**.

Hardware

Hardware refers to the physical parts of a computer that you can see or touch like Keyboard, Mouse and Display.



Software

Software consists of program (set of instructions) and data (consumed or produced by these programs) such as MS Windows, LINUX, Paint, Word, and the images or documents created through these programs.



Types of Software:

Software are divided into two broad categories:

System Software:

This includes Operating System like Windows, LINUX, Android, Mac OS, etc. Device drivers like drivers for the sound card LAN (Local Area Network) card and VGA (Video Graphics Adapter). System software manages and controls the hardware resources of the computer.



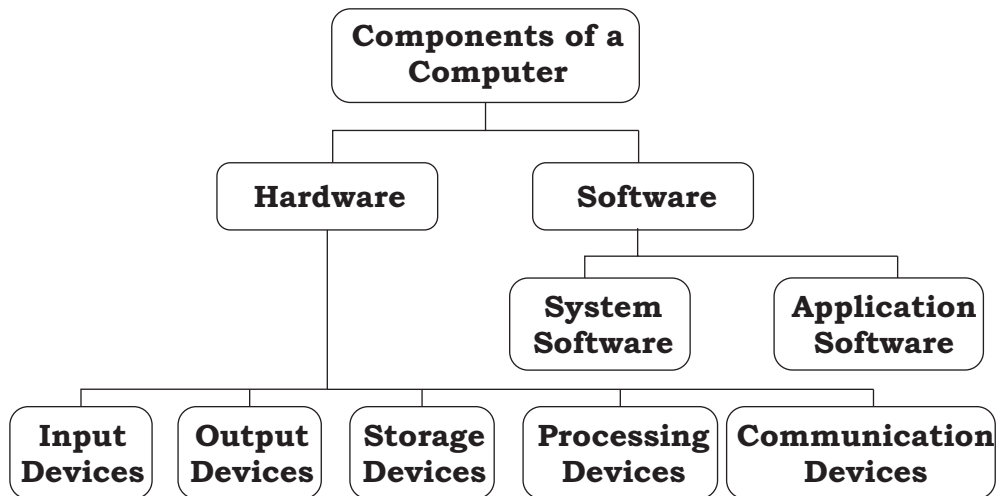
Application Software:

Application software are used to assist users in their daily routine tasks like word processing, image manipulation, games and entertainment, etc. like MS Word, MS Paint, Media Player, Chrome, Skype, etc.



ACTIVITY

Teacher will show and describe some software tools to students, also describe the purpose of using that particular tool, let them describe the advantages of using the software tool.





1.10. Hardware Components of a Computer







Hardware components of a computer can be categorized in following five broad categories as given in the above diagram.

1.10.1 Input Devices

Input devices are used to supply data from the user to the computer for processing.



	Keyboards are used to input textual data such as. Characters, Numbers, and Letters.
	A mouse inputs data by moving a cursor on the screen and clicking on Icons.

	<p>Touch pad allows the user to move the cursor on the screen by moving the figure or stylus (a pen) on the pad. We can draw with drawing pad and play games with game pads</p>
	<p>Camera is used to input image and/ or video.</p>
	<p>Scanners are used to input image data. By scanning objects and store for further use.</p>
	<p>Microphones are used to input sound or voice data for further processing.</p>
	<p>Barcode and QR (Quick Response) scanners are used to input Barcode or QR code data for processing.</p>
	<p>Various kinds of detectors are used to capture quantities like light, fire, smoke, and motion for processing.</p>







ACTIVITY


Teacher will demonstrate functions associated with various keys on the keyboard e.g. typing keys, control keys, function keys, navigation keys, and the numeric keypad.

1.10.2 Output Devices

After processing the data, the computer sends the information to the user through the output devices.


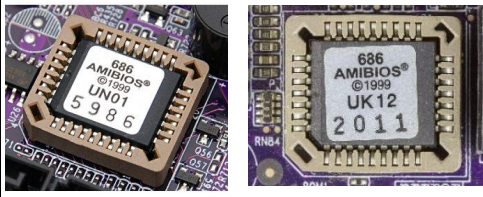
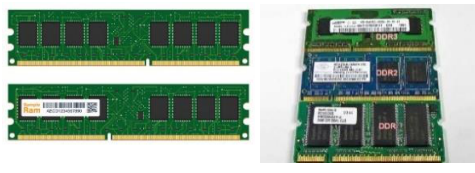



	<p>Computer monitors are the primary output devices. The computer communicates textual, image, and video information through monitors.</p>
	<p>Printers are used to get textual and graphic information on paper.</p>
	<p>Audio or sound information are send through speakers.</p>
	<p>Projectors can be connected to the computers to get the textual, graphics, and video information on large screens.</p>
	<p>Plotters are used to print out large images on the papers and some other mediums like Pena flex and fabrics etc.</p>
	<p>3D printer print outs 3D objects with plastic, polymers, resins metal, and carbon fibers etc.</p>

	<p>Fax are used to send or receive documents over the telephone lines</p>
-----------------------------------------------------------------------------------	---------------------------------------------------------------------------

1.10.3 Processing Devices

Processing devices are components that help computers to do task. Example: Central Processing Unit helps computer to play music.

	<p>All the processing and computation in a computer are performed by the microprocessor.</p>
	<p>ROM (Read Only Memory) is a small memory present in a computer. It contains the initial program BIOS (Basic Input Output System) to start the computer.</p>
	<p>RAM (Random Access Memory) is the main memory. All the programs and data for processing and the result produced from the processing reside in the RAM.</p>
	<p>Motherboard is the main board of a computer used to connect all the hardware like Power supply, Microprocessor, RAM, ROM, Storage devices, etc.</p>

ACTIVITY

Teacher will Show the students some hardware components of computers physically and ask them to identify the components.

1.10.4 Storage Devices

Storage devices are used to store the data and information permanently.

	<p>Hard Disk Drives (HDD) are the secondary storage of a computer where all programs and data are permanently stored.</p>
	<p>CDs DVDs and Blu-ray are removable storage, they can store 700 MB, 4.7GB, and 25 GB of data respectively.</p>
	<p>USB Flash Drives are designed to carry your digital stuff in your pocket.</p>
	<p>USB Flash cards (Memory Card) are designed to extend the available memory of various devices like cameras, cell phones, etc.</p>





• **Comparison of various storage devices**

Storage Devices	Advantages	Disadvantages
Hard Drive	<ul style="list-style-type: none"> • Holds lots of data. • Usually, cheaper. 	<ul style="list-style-type: none"> • Slower to read and write. • Can be big and heavy.
Solid State Drive	<ul style="list-style-type: none"> • Very fast to read and write data. 	<ul style="list-style-type: none"> • More expensive.

	<ul style="list-style-type: none"> • Smaller and lighter. 	<ul style="list-style-type: none"> • Holds less data than Hard Drives.
USB Flash Drive	<ul style="list-style-type: none"> • Small and portable. • Fast for transferring files. 	<ul style="list-style-type: none"> • Can be lost easily. • Holds less data than Hard Drives and SSDs.
Cloud Storage	<ul style="list-style-type: none"> • Accessible from anywhere. • Can store large amounts of data. 	<ul style="list-style-type: none"> • Requires internet connections. • Monthly fees may apply.

1.10.5 Communication Devices

Communication devices are used to build a network of ICT devices to communicate or exchange data.

	<p>NIC (Network Interface CARD) or LAN (Local Area Network) cards are used to connect computer with other computers or communication devices.</p>
	<p>Network Switches are the devices to connect multiple computers and from a network.</p>
	<p>Routers are devices for connecting two or more networks. For example in our home, router connects our home network to the ISP's (Internet Service Provider) network.</p>
	<p>Bluetooth is used for exchanging data between fixed and mobile devices over short distances.</p>

 **ACTIVITY**

Teacher will Show the students some ICT devices and ask them to identify those devices.

COMPUTER MEMORY MEASUREMENT

The smallest unit of measuring information in computers is a “bit”. Which a binary digit and can either be “0” or “1”. Eight (8) bits makes a “byte”. Following table shows the various units of measurements.

Unit	Abbreviation	Storage Capacity
Bit	b	Single binary digit
Nibble	-	4 bits
Byte	B	8 bits
Kilo Byte	KB	1024 Byte
Mega Byte	MB	1024 KB
Giga Byte	GB	1024 MB
Terra Byte	TB	1024 GB


Summary

- **Computer** is an electronic data processing machine that accepts the input (data) and processes it to produce output (information).
- **Data** consist of raw, unorganized facts or symbols that represent quantities, measurements, or descriptions. Data doesn't have any context or meaning on their own.
- **Information** is what we get when we organize and interpret data. Information helps answer questions, solve problems, or make decisions.
- **Information and Communication Technology (ICT)** is all about using tools and resources to create, use, store, manage and communicate information.
- The development of computer throughout history can be divided into five generations based on the major technological

advancements. Each generation brought significant advancements in computing technology, leading to more powerful and versatile devices.

- **ICT** helps people in communication, business, manufacturing, education, and research & development.
- **ICT devices** have their advantages and disadvantages
- Computers process data in a series of steps called the data processing cycle. These steps are input, process, output, and storage.
- A computer can be divided into two categories of components, Hardware and Software.
- **Hardware** in the computer are the physical parts and Software is the program (set of instructions) and data (consumed or produced by these programs).
- **Software** is divided into two broad categories System software and Application software
- We categorize Hardware components of a computer into five broad categories Input Devices, Output Devices, Processing Devices, Storage Devices, and Communication Devices.

Important Terms To Remember

Vacuum Tubes: Early computers were made up of vacuum tubes. These were the first electronic devices used for computing. These were large and fragile glass tubes which consume much power and produce much heat when operated. Vacuum tubes were very slow.

Transistors: Transistors are discrete solid-state devices used in second generation computers. Transistors are fast, are small in size, consume less power, and produce less heat as compare to vacuum tubes.

Integrated Circuits (ICs): ICs are compact circuits composed of hundreds of transistors. One IC can replace hundreds of transistors resulting in more power and space saving, produce less heat and much faster than transistors.

Microprocessors: Microprocessors are equivalent to thousands of ICs on a single chip. Microprocessors are very small in size as compare to the functionality performed. Microprocessors are much faster than ICs, consume less power and produce very little heat.

AI: Artificial Intelligence (AI) is making computer to learn and make decision by their own selves.

IoT: Internet of Things (IoT) when everyday things, like lights, home appliances, and any physical devices, etc. can connect to the internet and share information to make our lives easier and more fun.

Simulation Software: Simulation is a class of software and applications that test and execute an experiment on computer (not in actual) and produces the result. In this way, we come to know the results without actually performing the test or experiment.

Data Analysis: Data Analysis tools are used to study very large amount of data on computers and make decisions.

Collaboration Tools: Collaboration Tools are used by many people working on same project from different locations. These peoples communicate with each other and share their work by using ICT and do not need to be on same place.

HDD: Hard Disk Drive, secondary storage device, stores data and applications magnetically.

SSD: Solid State Drive, secondary storage device, stores data and applications on semiconductor medium.

Device Drivers: Device Drivers are system software that controls and manages a particular devices like sound card, LAN card, or VGA card etc. attached to your computer. The operating system communicates with the device through its driver.

RAM: RAM is the primary memory of the computer. It stores data and programs during the execution of the program. RAM stores its contents until power is on.

ROM: ROM is the permanent memory of the computer, we cannot alter or change the contents of the ROM. The contents of the ROM are available after the power is off.

Word Processors: Word Processors are application software, used to create, edit, print, and store documents in computers.

Dropbox: It is a cloud-based storage service that allows users to store, access and share files from any device connected to the internet.

Prototype: A prototype is an initial model of a product or system used to test a concept or process.

Exercise

1. Encircle the correct answer.

- i. Select the storage device from the following options
 - a. Microprocessor
 - b. Memory card
 - c. Router
 - d. Motherboard
- ii. The following Generation of computers consumes more power
 - a. 1st generation
 - b. 2nd generation
 - c. 3rd generation
 - d. 4th generation
- iii. The more powerful and efficient generation of computer is the following
 - a. 1st generation
 - b. 2nd generation
 - c. 3rd generation
 - d. 4th generation
- iv. The device from the following options that can be used as both an input and output device is
 - a. Plotter
 - b. Monitor
 - c. Interactive board
 - d. Track ball
- v. The device that can store more data is
 - a. CD
 - b. DVD
 - c. Blu-ray disk
 - d. Floppy disk

2. Fill in the blanks with appropriate words given below.

Network switch, Output devices, System software, Application software, Router.

- i. The communication device is _____.
- ii. The class of devices used to get information from a computer is _____.
- iii. The device used to communicate data among networks is _____.
- iv. The type of software which is used to manage and control the computer itself is _____.
- v. The class of software used to assist the user in daily routine tasks is _____.

3. Provide the descriptive answers of the following questions.

- i. What is a computer?
- ii. How can we differentiate computer hardware from computer software?
- iii. Differentiate input devices from output devices.
- iv. List five Storage devices.
- v. Describe Processing devices.
- vi. What are the main features of various computer generations?
- vii. What are the applications of ICT in Education?
- viii. What are the applications of ICT in Industry?
- ix. How can a student get benefits from ICT?
- x. What are the disadvantages of ICT for young people?

4. Describe the Function of the following ICT devices:

i. Router	ii. LAN Card	iii. HDD
iv. Touch Pad	v. Head Phones	vi. Projector
vii. Microprocessor	viii. Mother Board	ix. Flash Drive
x. QR Code Scanner		

5. Name the devices:



A.

B.

C.



D.

E.

F.



G.

H.

I.

6. Label the following as either Input, Output, Storage, Processing, or Communication devices:



A.	B.	C.
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D.	E.	F.
-----------	-----------	-----------



G.	H.	I.
-----------	-----------	-----------



J.

7. Group Activities

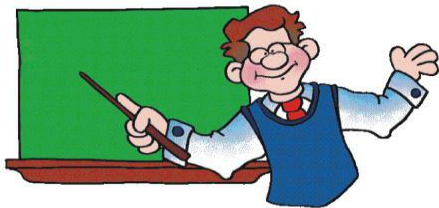
- i. Ask the students to draw some charts of computer hardware on drawing sheets.
- ii. Assign students a topic from ICT and ask them to prepare a small poster presentations (on drawing sheets).

Instructions for Teachers

- Teachers should engage students in interactive and hands-on activities.
- By keeping explanations simple and using relatable examples, students can easily grasp the difference between data and information.
- Introduce common ICT devices and tools such as computers, tablets, smartphones, keyboards, and other accessible devices.
- Use interactive demonstrations to show how ICT devices work.
- For example, demonstrate how a touchscreen device responds to touch or how a computer mouse moves the cursor on the screen.
- Show videos or animations that explain basic ICT concepts in a fun and engaging way. You may use some videos from YouTube.
- Provide hands-on activities where students can explore ICT devices and software under your supervision For example: let them practice typing on a keyboard using educational typing games.
- Relate ICT concepts to students' everyday experiences. For example: discuss how they use technology at home or in school for communication (e.g., chatting with friends, sending emails) and entertainment (e.g., watching videos, playing games).
- Assign collaborative ICT projects where students work in small groups to create something using technology (if resources are available) or create some posters presenting the usage of ICT in their daily life (if computer resources are insufficient). For example: create a digital or paper-based storybook using text, images, and/or audio recordings.
- Provide feedback and guidance to students throughout their ICT activities. Assess their understanding through observation, discussions, and simple quizzes or worksheets.

**Student Learning Outcomes:****After the completion of this unit, students will be able to:**

- Define operating system and identify its functions, discuss type of operating systems for computers and mobile phones, demonstrate the startup procedure of Windows operating system.
- Identify the desktop icons/tools and explain their functions, create, name, rename, delete, cut, copy and paste files and folders, drag and drop files/folders, and create a shortcut.
- Create, save, edit images using MS-Paint image processing software.
- Draw and colour freehand drawings, 2D shapes like squares, rectangles, circles, lines, etc., add text to a drawing, colour, outline and position drawings as needed.
- Define world wide web and web browser, list popular web browsers and activities performed using web browsers, describe search engines and demonstrate searching skills to look for certain topics.

**Introduction to the Unit:**

This unit covers different components of Windows 10 operating system and its functionality. It explores desktop and desktop icons, taskbar, start

button. It also explores how to manage the files and folders in Windows 10. It also explores image processing using MS-Paint. It also covers how to use the Internet to conduct a search query.

2.1 OPERATING SYSTEM AND ITS FUNCTIONS**2.1.1 Definition of Operating System:**

An operating system is a program that manages and controls all the activities of the computer system. It manages all the parts of the computer and its programs, making it simple and easy for us to use the computer.

2.1.2 Functions of an Operating System:

The most common functions of an operating system are shown in figure 2.1.



Figure 2.1 Functions of an operating system

An operating system manages computer resources such as memory, CPU, storage, and devices like the keyboard and mouse. It provides an easy way for you to interact with the computer using icons, buttons and menus. It helps run programs smoothly, organizes files and folders, and keeps your computer safe from viruses and unauthorized access.

2.2 TYPES OF OPERATING SYSTEMS

2.2.1 Operating Systems for Computers:

Some of the famous operating systems for computers include Windows, Mac OS, Linux and UNIX. Windows is an operating system developed by Microsoft Corporation. It is one of the most popular operating systems for personal computers. Windows

provides a graphical user interface (GUI) that allows users to interact with their computers easily.



Mac OS is an operating system developed by Apple Inc. It is designed exclusively for use on Apple Macintosh computers. Mac OS is known for its user-friendly interface, stability, and seamless integration with other Apple devices and services.

Linux is an open-source operating system derived from UNIX. It has many versions, called distributions. Linux is popular because of its flexibility, security, and user-friendly interface.

UNIX is an open-source operating system developed at AT&T Bell Labs in the USA. Linux and its various distributions are either derived from UNIX or influenced by it.

2.2.2 Operating Systems for Mobile Phones:

Most commonly used operating systems for mobile phones include Android, iOS and Windows 10 Mobile.

Android is developed by Google. It is the most widely used operating system for mobile phones. It supports the apps available through

the Google Play Store. iOS, developed by Apple, is exclusive to iPhones, iPads, and iPods. It is known for its user-friendly interface and easy integration with other Apple devices. It supports the apps available through Apple



App Store. Windows 10 Mobile is developed by Microsoft. It is designed for smartphones and tablets and supports Windows apps.

2.3 WINDOWS 10 STARTUP PROCEDURE

The windows startup procedure is a process of making computer ready for use. The steps of Windows 10 startup procedure are given in figure 2.2.

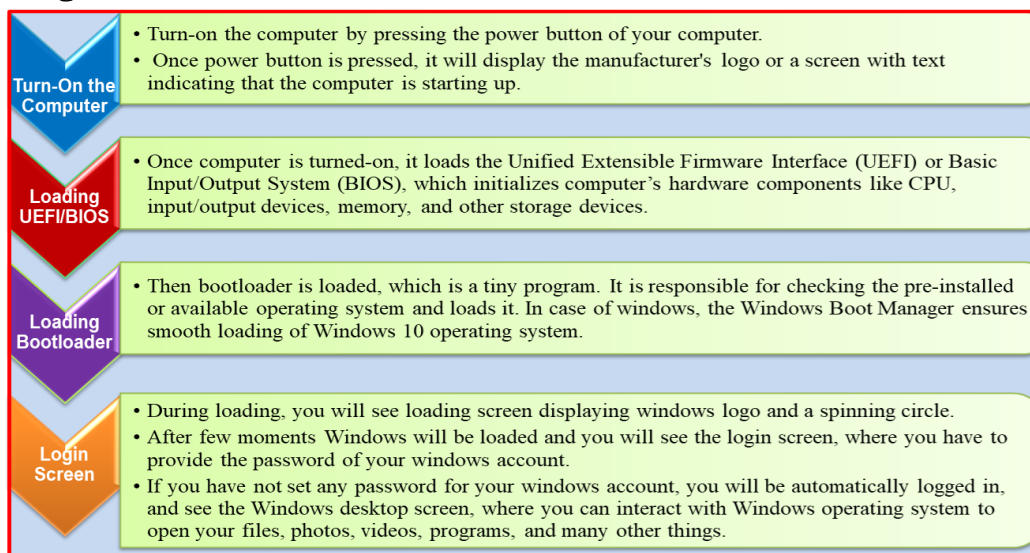


Figure 2.2 Windows 10 Startup Procedure

2.4 COMMON COMPONENTS OF WINDOWS 10

Figure 2.3 labels the main icons and tools on the Windows 10 Desktop, which are explained one by one in this section.

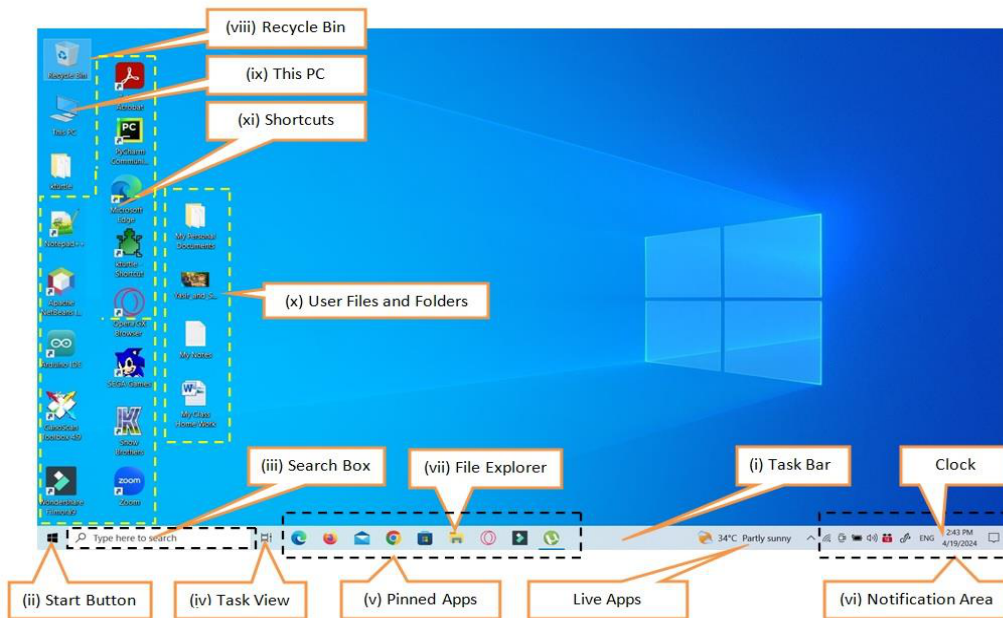


Figure 2.3 Windows 10 Desktop Components

(i) Task Bar:



The taskbar is available at the bottom of Windows 10 desktop. It is an organization tool that organizes and provides quick access to various Windows features ranging from quick search or opening of applications to viewing and setting date and time, etc.

(ii) Start Button:

The Windows start button is also known as the Windows icon or Windows button. It is the main navigation tool that is available on bottom left corner on the Windows 10 taskbar. By clicking on this button, you can open the Start menu that provides quick access to various Windows 10 features, like power options, system settings, accessing files, accessing user account options, application and system programs, recently used apps and documents, etc.



ACTIVITY

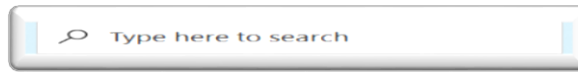
Exploring the Start Button and Power Options

Watch and Learn: Your teacher will show you how to use the Start button, especially the Power Options like Shut Down, Restart, and Sleep.

Hands-On Practice: After the demonstration, you will get a chance to try it yourself. Your task will be to either power off, restart, or put your computer into sleep mode.

(iii) Search Box:

The search box is next to the start button on the taskbar.



In search box you can type

keywords to search for photos, videos, files, folders, applications, and settings. You can also search items on web using this search box. The good thing of this search box is that it will provide you instant results as you start typing something in it that makes it easy for you to find what you need quickly.

(iv) Task View:

Next to the search box, there is a tiny button called Task View. Task view button allows you to switch between open windows and virtual desktops. It gives you a quick way to manage and organize multiple tasks as well as multiple workspaces.



(v) Pinned Apps/Quick Launch:



Pinned apps are also known as “taskbar shortcuts” or “quick launch”. Pinned apps on the taskbar provide quick and easy way to access the frequently used programs. By pinning an application (like a web

browser) to the taskbar, you can easily launch it with a single click instead of searching for it using the search box or in start menu.

ACTIVITY

Customizing Your Taskbar with Pinned Apps

Watch and Learn: Your teacher will show you how to add and remove apps in the quick launch/pinned apps area of the taskbar.

Hands-On Practice: After the demonstration, you will get a chance to customize your own taskbar by pinning your favourite applications like games, typing software etc

(vi) System Tray/Notification Area:

System tray also known as notification area is located at the bottom right corner of the taskbar. It shows icons for



applications and system notifications. It also displays system status indicators like battery level, volume control, network connectivity, and date/time. You can click on these icons to access settings and perform some actions on it like modifying date and time.

(vii) File Explorer:

File explorer icon is located on the taskbar in pinned apps/quick launch area. You can browse and manage files and folders on your computer using the File Explorer (as

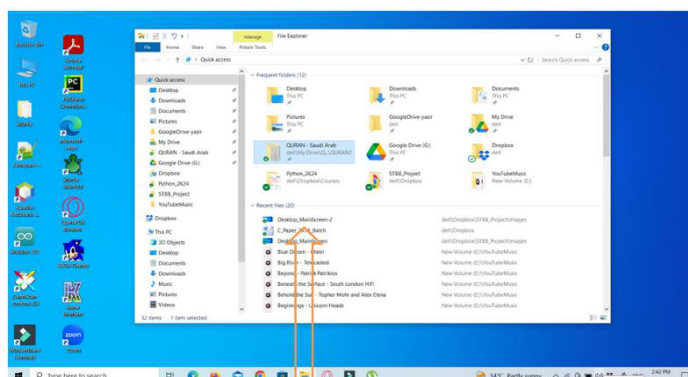


Figure 2.4 Windows 10 File Explorer

shown in Figure 2.4). It allows you to create, copy, move, rename, and delete files and folders. It also allows you access to various drives and storage locations, such as CD Drives, USB Drives and other Storage Devices.

(viii) Recycle Bin

Recycle Bin is a special type of system folder in Windows that temporarily stores all deleted files and folders. You can restore or recover deleted items from the recycle bin. However, any file or folder deleted from the recycle bin cannot be recovered.



(ix) This PC (My Computer)

The PC / My Computer icon (as shown in figure 2.5) provide you quick access to all the drives and storage devices connected to your computer such as local disk drives (e.g. C, D, E, etc), external hard drives, cloud storages (e.g. Google drive, Dropbox, etc), USB drives, and network drives.



Note

If you have deleted any file or folder using CTRL+SHIFT+DELETE shortcut key, it cannot be recovered.

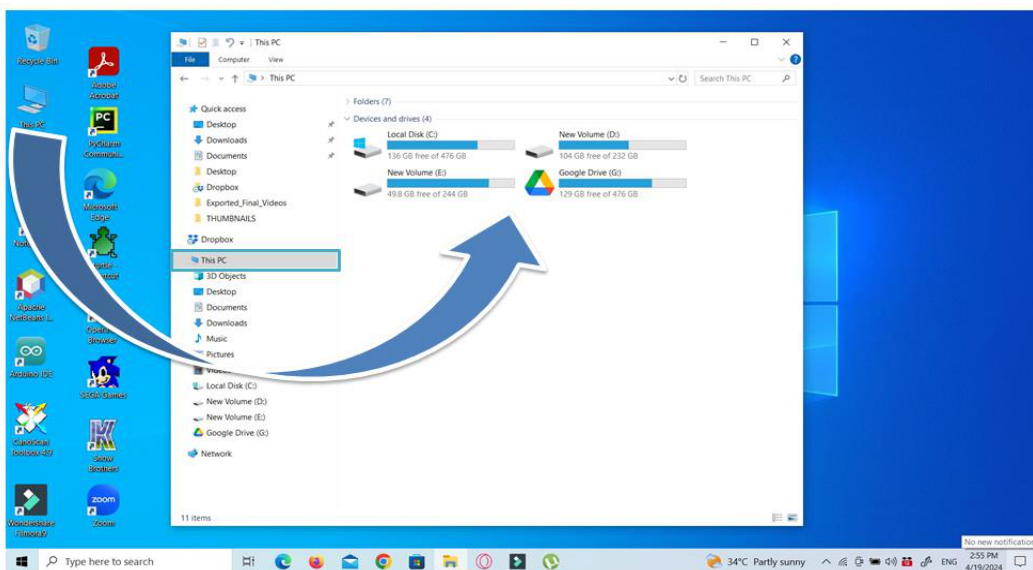


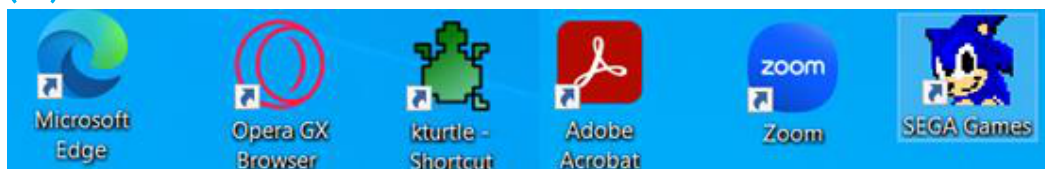
Figure 2.5 This PC (My Computer) Content

(x) User Files

Sometime users also store different types of files on the desktop. Common user files include downloaded web pages, word documents, excel spread sheets, pdf files, photos, audio and video files, and text files. These files are identified by their icons. Windows assigns each category of files a different icon as shown below.



(xi) Shortcut Icons:



A shortcut icon represents a specific program or application that is installed on your computer. An upward arrow sign indicates that it is a shortcut icon. By double clicking the shortcut icon, you can launch its corresponding application or program. By using shortcuts, you can access your favourite programs and applications in a quick and easy manner.

ACTIVITY

Exploring the Desktop

Watch and Learn: Your teacher will show you the desktop and explain the different items available on it.

Hands-On Practice: After the demonstration, you will explore the functions of various desktop items like the start menu, search box, quick launch, and notification area.

2.5 WORKING WITH WINDOWS 10

2.5.1 How to open a file or run an application program?

In Windows 10, you can open a file or run an application program from the desktop, the start menu, or the search box. Each of these methods is explained below.

(i) Open a file or run an application program from desktop

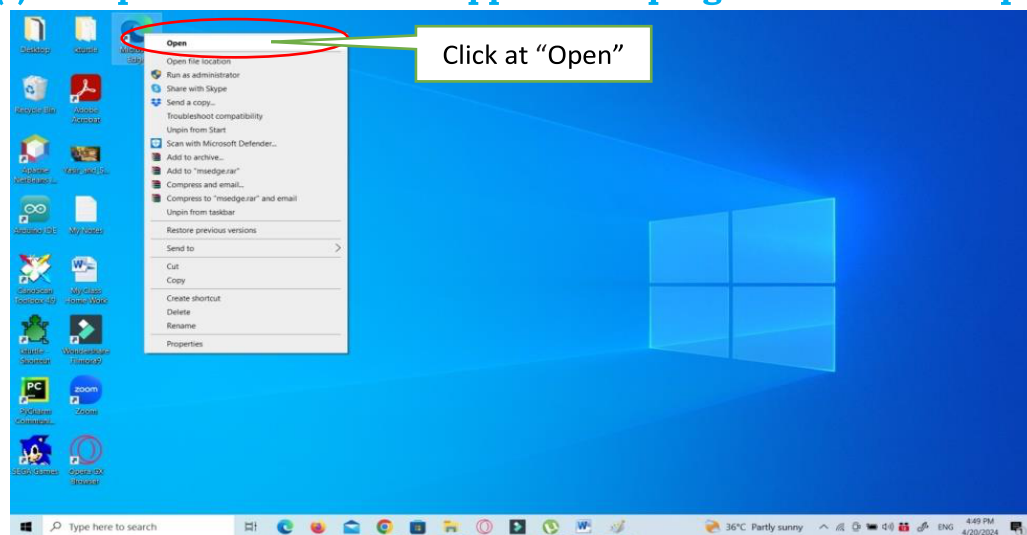


Figure 2.6 Open a file or run an application from desktop

You can see different types of icons on Windows 10 desktop. Each of these icons represents either a file/folder or an application program. You can open any of these files/folders or run any of these applications just by double clicking on the icon. Alternatively, you can also open a file/folder or run an application by right clicking on

its associated icon, and then clicking on “open” option in popup menu as shown in figure 2.6.

(ii) Open a file or run an application program from start menu

You can also open a file or run an application program from the start menu. The start menu contains the list of programs installed on the computer as well as recently opened files. To open any file or run any program from the start menu, simply press start/window button at the left bottom corner of the desktop/taskbar, and then click on the desired file or program name as illustrated in Figure 2.7.

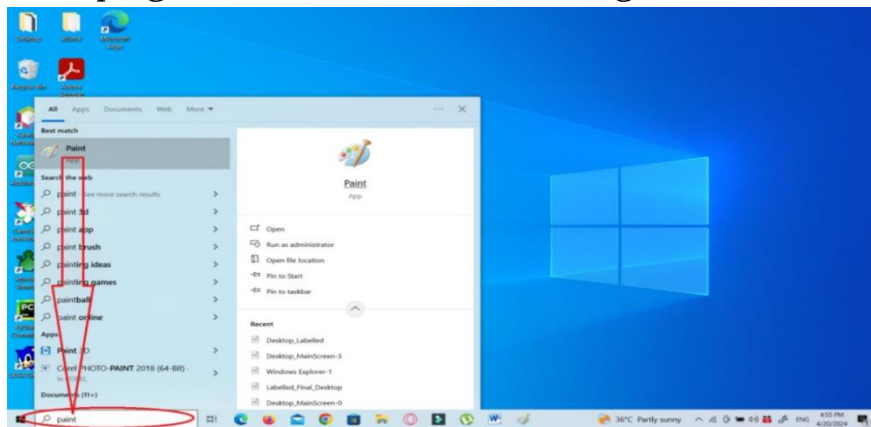


Figure 2.7 Open a file or run an application program from start menu

(iii) Open a file or run an application program from search box

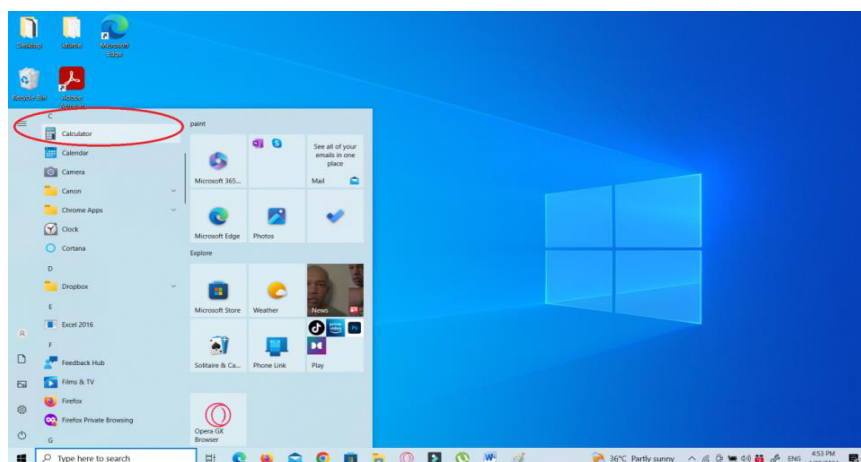


Figure 2.8 Open a file or run an application program from search box

It is very easy and quick way to open a file or run an application from the Windows search box just by writing their names, like type “calc” in search box and press enter key to open a calculator or type “paint” in search box and press enter key to open the MS-Paint program as shown in figure 2.8. Similarly if you type “notepad” in search box and then press enter key, it will open the Notepad text editor program, which is shown in figure 2.9.

ACTIVITY

Opening Programs in Windows 10

Watch and Learn: Your teacher will show you how to open programs like Calculator, Notepad, and Paint.

Hands-On Practice: After the demonstration, you will get to open different programs and files using the start menu, search box, and by double-clicking their icons.

2.5.2 Common Components of Windows Programs or Applications

Every Windows program or application, such as Notepad or MS-Paint, contains some common components, which are shown in figure 2.9.

(i) Title bar:

Title bar is a horizontal bar located at the top of a program window. It displays the program name and the name of opened file. It displays the program name of an opened folder, if you are working in file explorer.

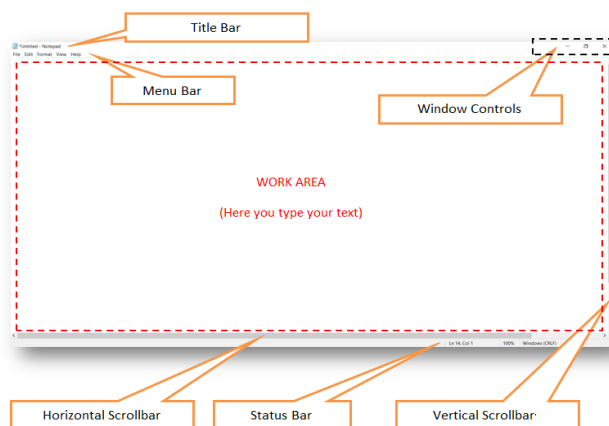


Figure 2.9 Common components of Windows programs (e.g. Notepad)

(ii) Window Controls

The title bar contains three buttons minimize, maximize/restore and close on its the top right corner as shown in figure 2.10. These buttons are also known as window controls.

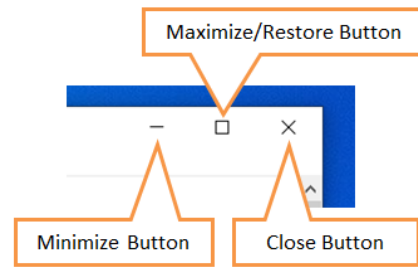


Figure 2.10 Windows Controls

Minimize Button: When you click on minimize button, it reduces/minimizes the current window to task bar. The shortcut key for the minimize button is Windows Key + M.

Maximize/Restore Button: Click on maximize/restore button to enlarge the window to its maximum size, and if the window is already at its maximum size, it switches back to its previous size. The shortcut key for the maximum/restore button is Windows Key + UP Arrow Key.

Note

The maximize/restore button is disabled on programs that are fixed sized programs.

Close Button: When you click on close button, it will close the current program or file. The shortcut key for the close button is ALT Key + F4.

(iii) Menu bar:

A menu bar is a horizontal menu displayed just below the title bar as shown in figure 2.11. It contains a set of menus, like File, Edit, View, etc. When you click any of these menu items, a drop-down menu appears that will show you further options like, New, Open Save, etc.

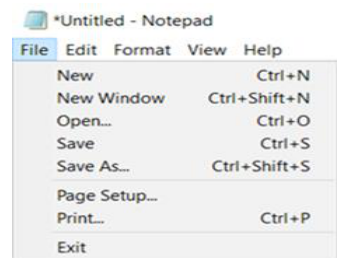


Figure 2.11 Menu bar of Windows "Notepad" program

(iv) Scrollbars:

Scrollbars are windows control elements that appear either on bottom (i.e. horizontal scrollbar) or on the right side (i.e. vertical scrollbar) of a window. Scrollbar are used to scroll left/right or up/down.

(v) Status bar:

Status bar is the horizontal bar at the bottom of the application window showing some status information about the current opened file/document like number of lines and number of characters. When you open file explorer and observe its status bar, you will see that file explorer's status bar displays the information about the number of items (files and folders) available inside it.

2.6 MANAGING FILES AND FOLDERS**2.6.1 Definition of file, folder, and drive**

A file is an object that stores data and information. It is identified by its given name on a computer. In contrast to file, a folder is a container used to hold different types of files and sub-folders. Folders help in organizing and managing files.



Figure 2.12 Icons of some common types of files in Windows 10

A file can be a text document, picture, audio or video, etc. In Windows, every file type is represented by a separate unique icon. The figure 2.12 shows the icons of some commonly used files, while folder icons are shown in figure 2.13. Files and folders are stored in permanent storage, typically a hard disk.

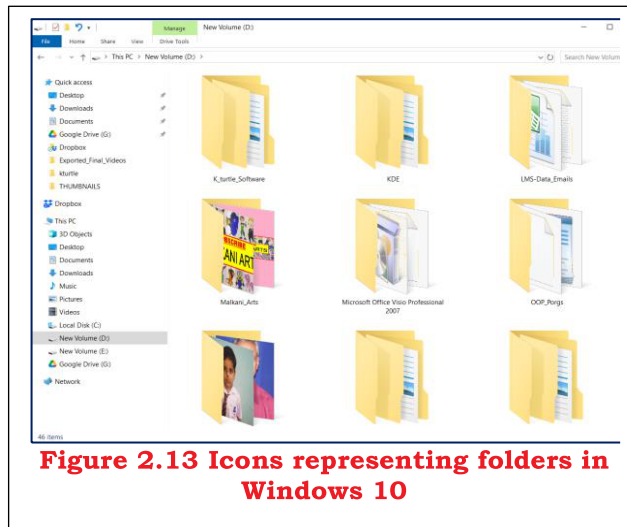


Figure 2.13 Icons representing folders in Windows 10

The hard disk can be divided into section called drives. Each drive is assigned a letter like C, D, E, etc. C drive is usually primary or root drive. When you click on “This PC” icon, it will show these drives and some removable or cloud drives as shown in figure 2.14.

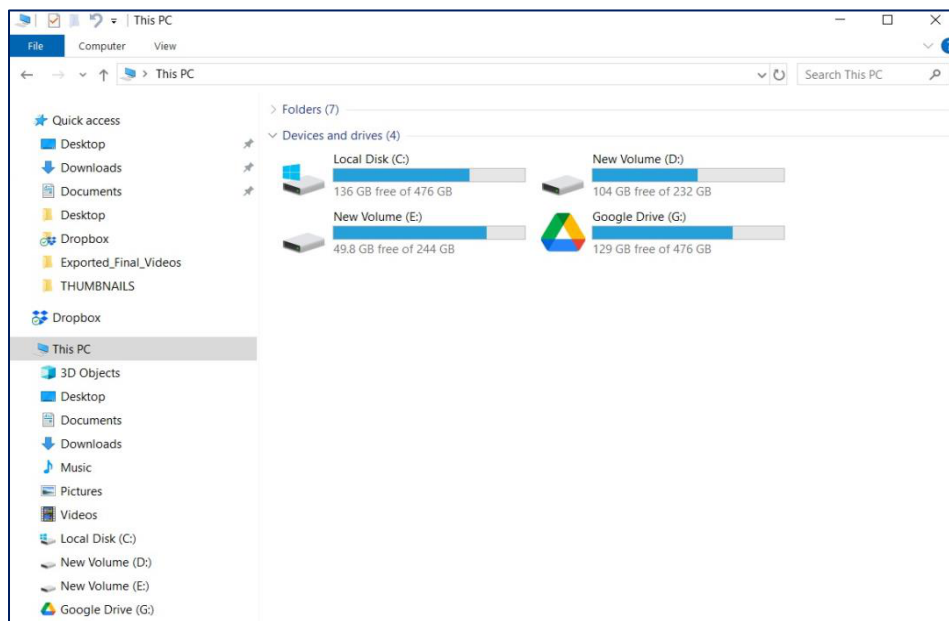


Figure 2.14 Hard disk's C, D, E drives and G Google Cloud Drive

2.6.2 Creating a new file

Follow the below steps to create a new file in Windows 10. All the steps are also depicted in figures 2.15 to 2.18.

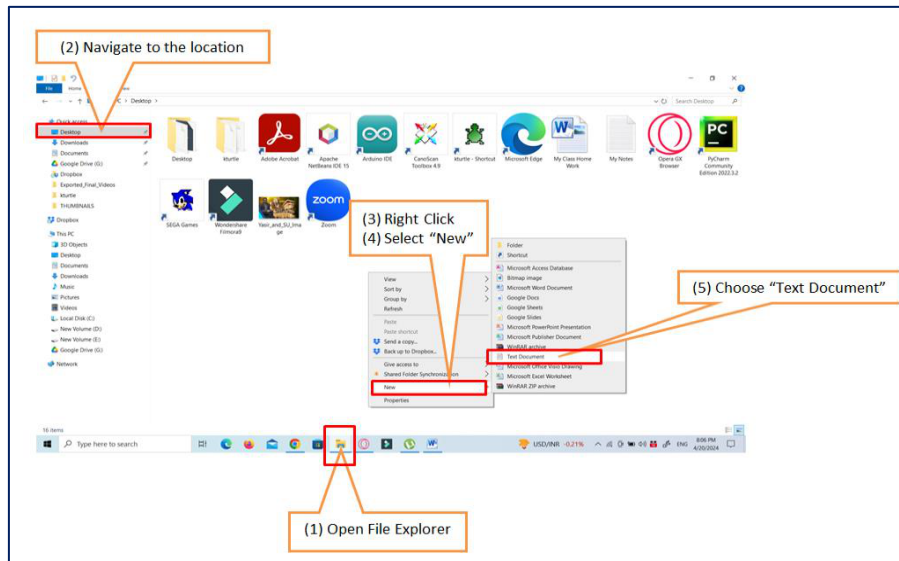


Figure 2.15 Create a new file in Windows 10 – steps 1 to 5

1. Click on the folder icon on the taskbar at the bottom of the screen to open the file explorer. Alternatively, you can also open file explorer by pressing the Windows Key + E on the keyboard.
2. Open File Explorer and go to the location where you want to create a new file. Such as the desktop as a folder like my document.
3. Once you navigate to the desired location in File Explore, right-click on an empty space that will open a pop-up menu.
4. In pop-up menu, choose "New" that will show you another sub-menu.
5. Finally, click on "Text Document" in sub-menu that will create a new empty text file.
6. Once file is created, it is automatically named as "New Text Document.txt" as shown in figure 2.16. In case you want to give a different name, then just click on the file name, and type file name of your own choice and press the enter key to save the new file name.

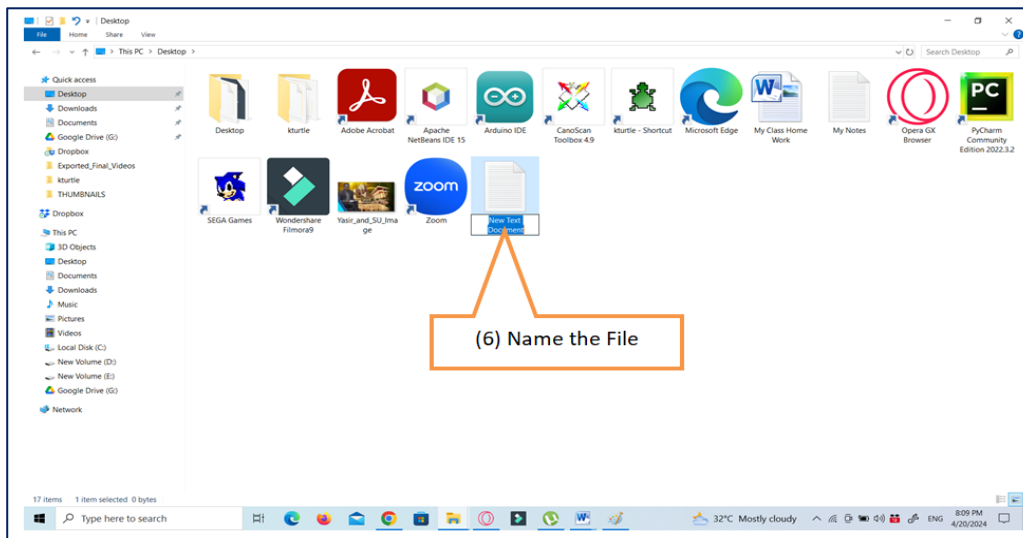


Figure 2.16 Naming newly created file

7. Now, you can open the newly created empty file in the "Notepad" program by double-clicking on its file name/icon.
8. Once file is opened in notepad, you can type your desired text or content into the file as illustrated in figure 2.17.



Figure 2.17 Opening newly created file and typing text into it

9. Once you have finished typing and editing the text, click on "File" menu in the top-left corner of notepad program, and

then click on "Save" as shown in figure 2.18. This will permanently save all of your modifications in file before closing the notepad program.

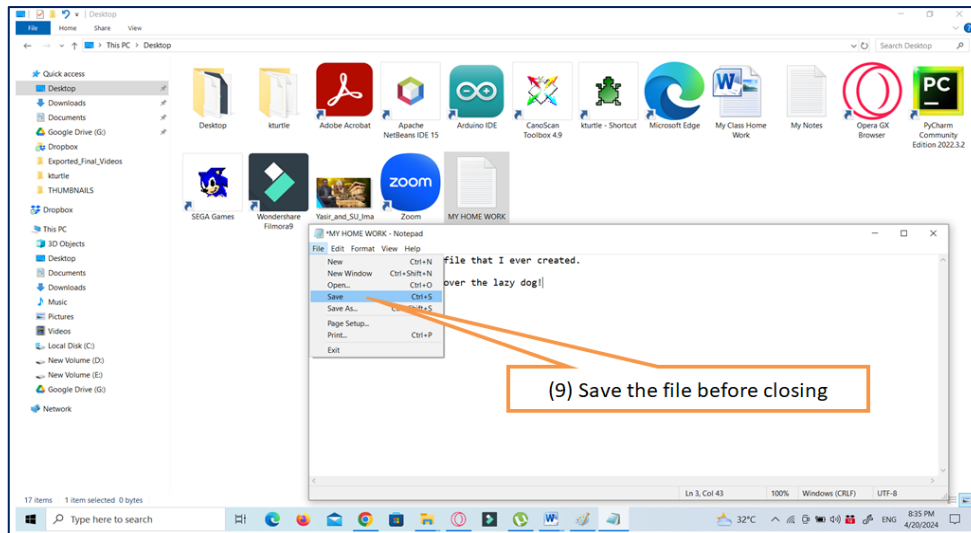


Figure 2.18 Save the file before closing the notepad program

2.6.3 Creating a new folder

The steps to create a new folder are shown in figures 2.19 to 2.21. Note that to create a new folder in Windows 10, the first four steps are exactly same as described in previous section for creating a new file.

1. Open the file explorer.
2. Navigate to the desired location where you want to create the file (in this case a folder).
3. Right click on empty space in file explorer.
4. Choose "New" in pop-up menu that will show you another sub-menu.
5. In the sub-menu, click on "Folder" option that will create a new folder in the current location. Steps 1 to 5 are illustrated in figure 2.19.

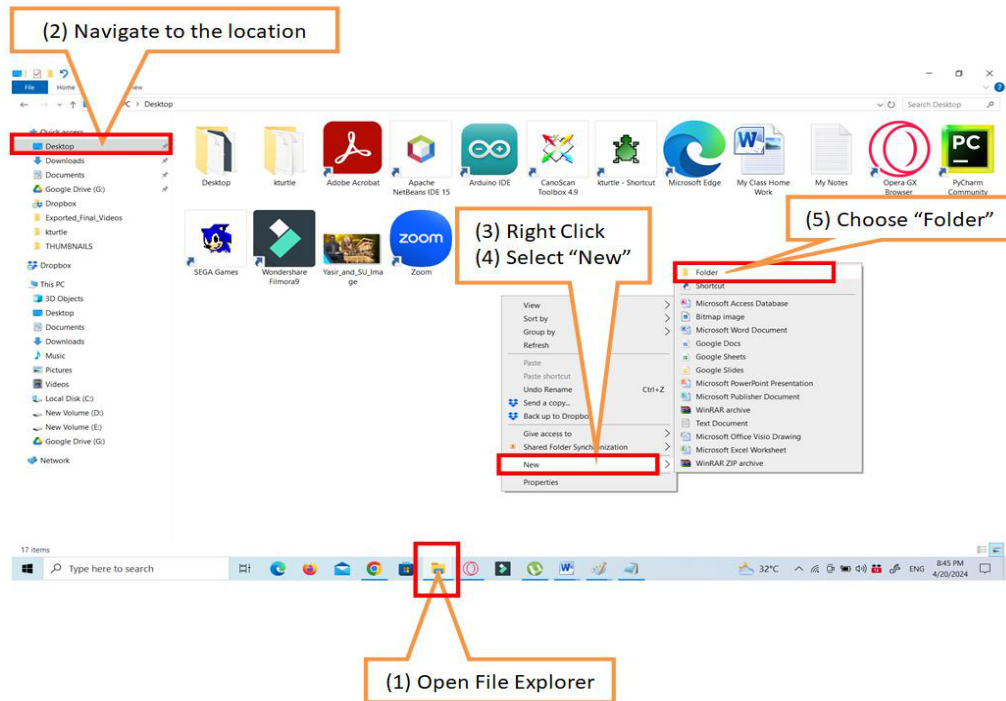


Figure 2.19 Create a new folder in Windows 10 – steps 1 to 5

6. Give name to the newly created folder. The default name is “New Folder”.

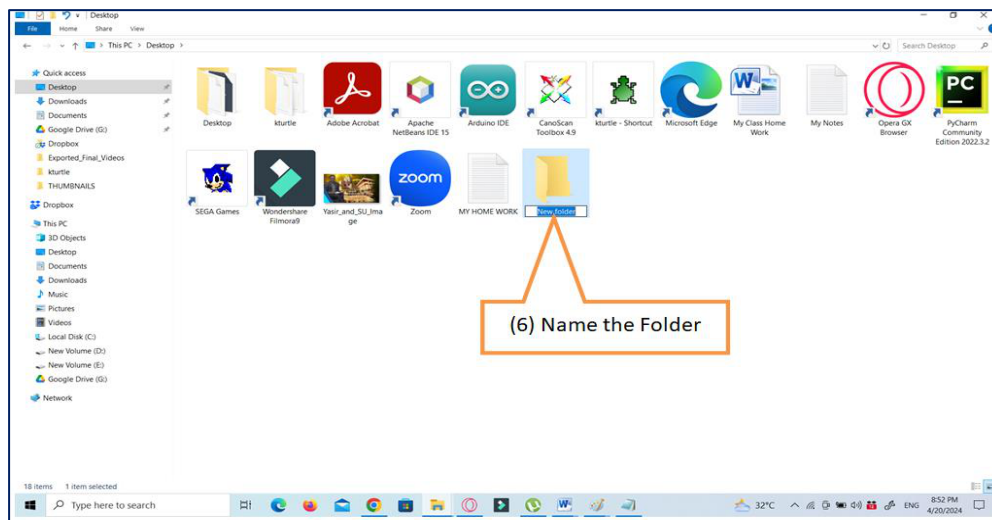


Figure 2.20 Naming newly created folder

7. Double click on the newly created folder to open it. This will show you the contents of the folder as shown in figure 2.21, which is currently empty since you just created it.

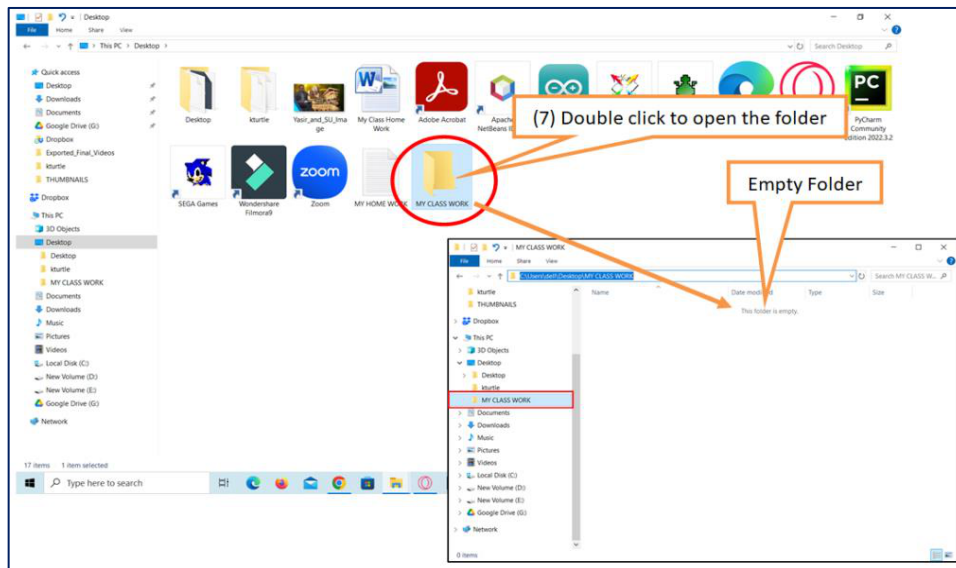


Figure 2.21 Newly created empty folder

2.6.4 Renaming a file or folder

The steps to rename a file or folder in windows 10 are listed below, which are also illustrated in figure 2.22.

1. Open the file explorer
2. Navigate to the desired location where you want to rename a file or folder.
3. Single click on the file or folder that you want to rename to select it, and then right click on it, a pop-up menu will appear.
4. Choose “Rename” option in pop-up menu and left click on it, which will make the file or folder name editable. Change the file or folder name by typing a new name, and then press enter to ensure it is renamed.

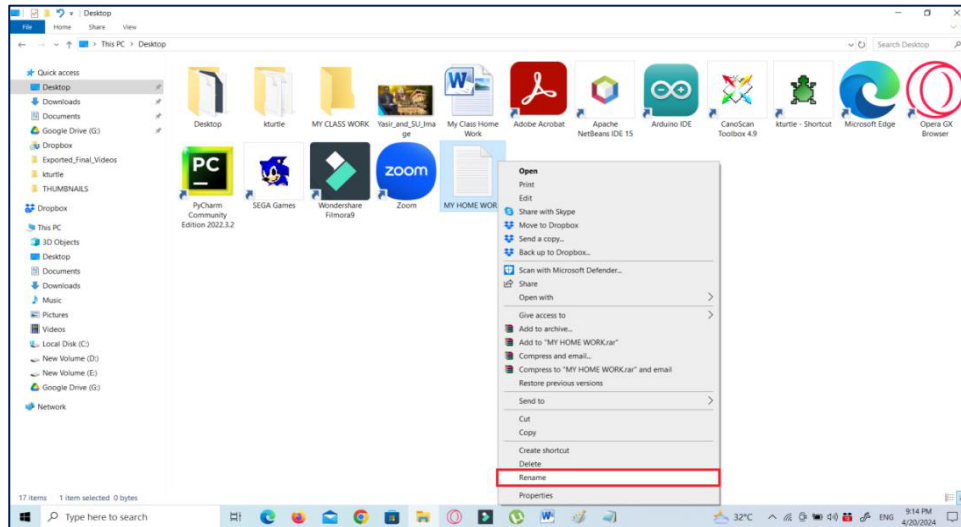


Figure 2.22 Renaming a file (or folder) in Windows 10

2.6.5 Deleting a file or folder

The steps to delete a file or folder in windows 10 are listed below, which are also illustrated in figure 2.23.

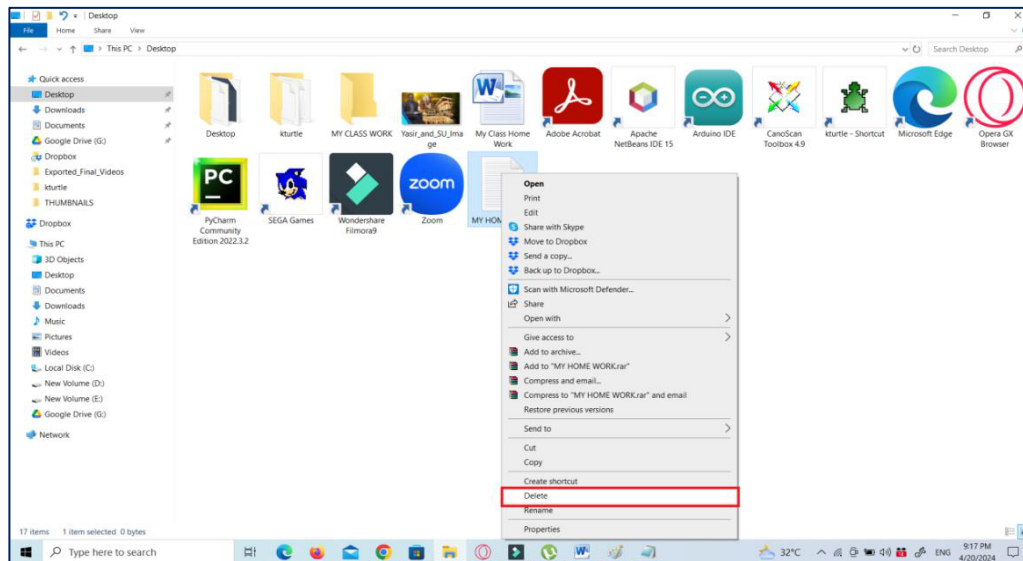


Figure 2.23 Deleting a file (or folder) in Windows 10

1. Open the file explorer and navigate to the desired location from where you want to delete a file or folder.

2. Single click on the file or folder that you want to delete to select it, and then right click on it, a pop-up menu will appear.
3. Choose “Delete” option in pop-up menu and left click on it, which will show you a confirmation dialog box, asking if you are sure to delete the file or folder and move it to the recycle bin. Click on the “Yes” button to confirm that will delete the selected file or folder.



Note

You can also delete any file or folder just by selecting the file or folder and then press the DELETE button on your keyboard.



ACTIVITY

Creating and Managing Files and Folders

Watch and Learn: Your teacher will show you how to create a new file or folder, and how to rename or delete them.

Hands-On Practice: After the demonstration, you will:

- Create a text file and a folder.
- Rename the file to “My Class Work”.
- Delete both the newly created file and folder.

2.6.6 Copying a file or folder from one location to another location

Follow the below steps to copy a file or folder from one location to another location in windows 10. All the steps are illustrated in figures 2.24 and 2.25.

1. Open the file explorer.
2. Navigate to the desired source location from where you want to copy a file or folder.
3. Single click on the file or folder that you want to copy to select it, and then right click on it, a pop-up menu will appear.



Note

You can also copy any file or folder just by selecting the file or folder and then press CTRL+C shortcut key on your keyboard.

4. Choose “Copy” option in pop-up menu and left click on it, which will create its copy in memory.

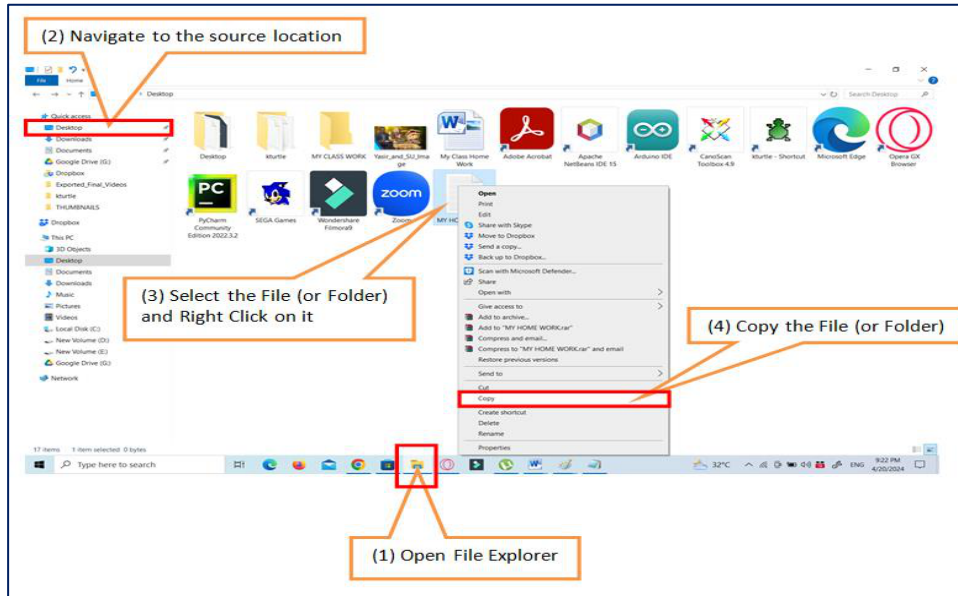


Figure 2.24 Copying a file or folder

5. Navigate to the desired destination location, using the file explorer, where you want to create the copy of a file or folder, and then right click on any empty space in the destination location, a pop-up menu will appear.

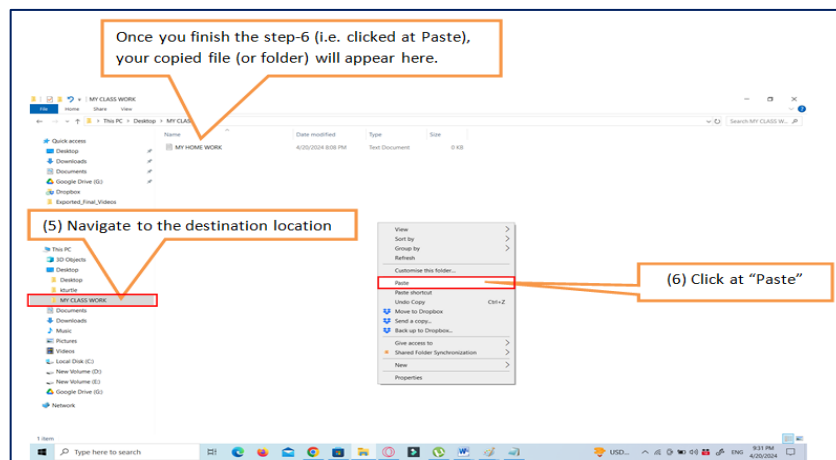


Figure 2.25 Pasting a file or folder

- Choose “Paste” option in pop-up menu and left click on it, which will create a copy of your selected file or folder in this location.

Note

You can also paste any file or folder by pressing **CTRL+V** shortcut key on your keyboard.

2.6.7 Moving file or folder from one location to another using Cut and Paste options

Follow the below steps to move a file or folder from one location to another location in windows 10. All the steps are illustrated in figures 2.26 and 2.27.

- Open the file explorer.
- Navigate to the desired source location from where you want to move a file or folder.
- Single click on the file or folder that you want to move to select it, and then right click on it, a pop-up menu will appear.
- Choose “Cut” option in pop-up menu and left click on it.

Note

You can also cut any file or folder just by selecting the file or folder name and then press **CTRL+X** shortcut key on your keyboard.

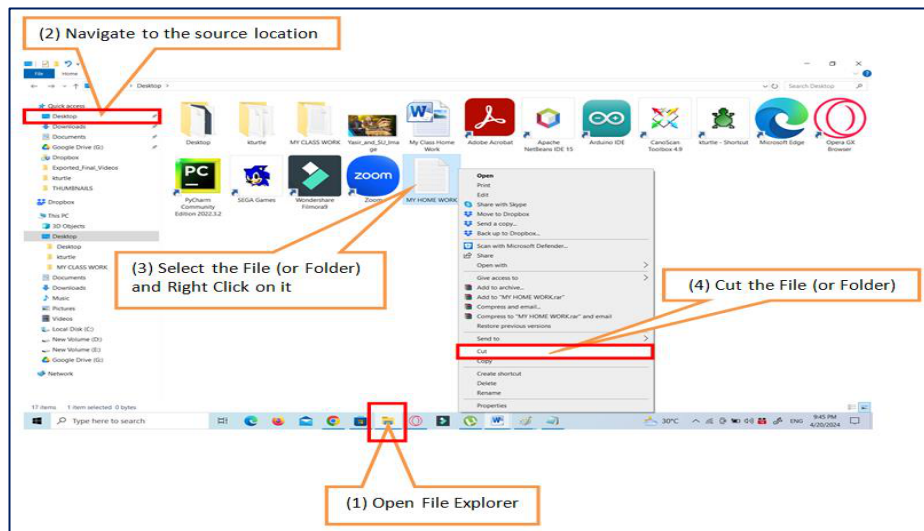


Figure 2.26 Cut a file or folder to move it to another location

5. Navigate to the desired destination location, using the file explorer, where you want to move the file or folder, and then right click on any empty space in the destination location, a pop-up menu will appear.

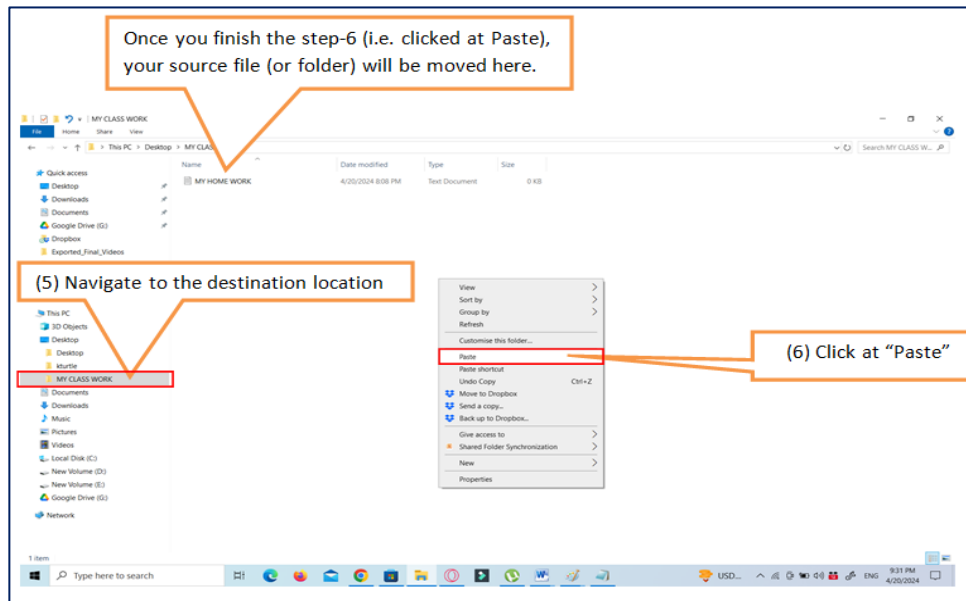


Figure 2.27 Pasting a file or folder to move it in current location

6. Choose "Paste" option in pop-up menu and left click on it, which will move your selected file or folder from source location to this location.

2.6.8 Moving file or folder from one location to another using drag and drop method

Follow the below steps to move a file or folder from one location to another location in windows 10 using a drag and drop method. Open the file explorer.

1. Navigate to the desired source location from where you want to move a file or folder.
2. Single click on the file or folder that you want to move to select it. The selected file or folder will be highlighted.
3. Click and hold the highlighted file or folder, drag it to the desired location, then release the mouse button to drop it. You

will observe that the selected file or folder has been moved from the source location to the destination location.

 **ACTIVITY**

Copying, Cutting, and Pasting Files and Folders

Watch and Learn: Your teacher will show you how to copy, cut, and paste files and folders in Windows 10.

Hands-On Practice: After the demonstration, you will:

- Copy and paste files from one folder to another.
- Move files from one folder to another using the drag and drop method.

2.6.9 Creating a shortcut of file/folder or program

Follow the below steps to create a shortcut of file/folder or program in windows 10. All the steps are illustrated in figures 2.28 to 2.30.

1. Open the file explorer.
2. Navigate to the location of file/folder or program for which you want to create a shortcut, and then single click on it to select it for creating its shortcut.
3. Right click on the selected file or folder, a pop-up menu will appear.
4. Choose "Create Shortcut" from the pop-up menu to create its shortcut in the source location as illustrated in figures 2.28 and 2.29.

OR

To create a shortcut on the desktop, go to the pop-up menu, hover over "Send to" option that will show you another sub-menu. In that sub-menu, click on "Desktop (create shortcut)" option. This will create a shortcut of the selected file/folder or program on Windows 10 desktop. This process is shown in figure 2.30.

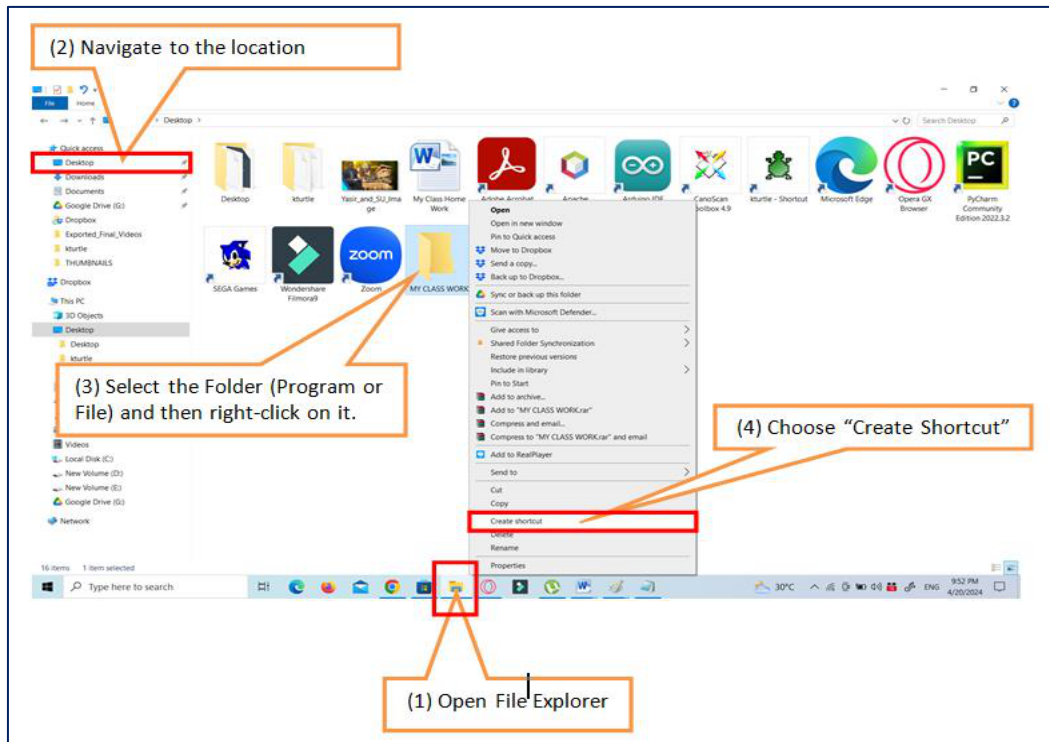


Figure 2.28 Creating shortcut of a file/folder or program

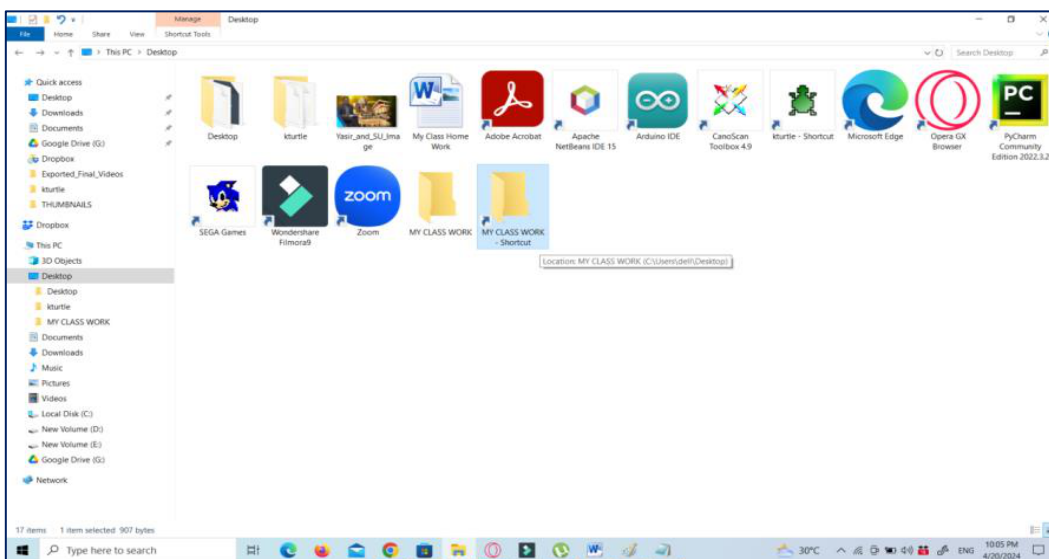


Figure 2.29 Shortcut of selected folder is created in the source location

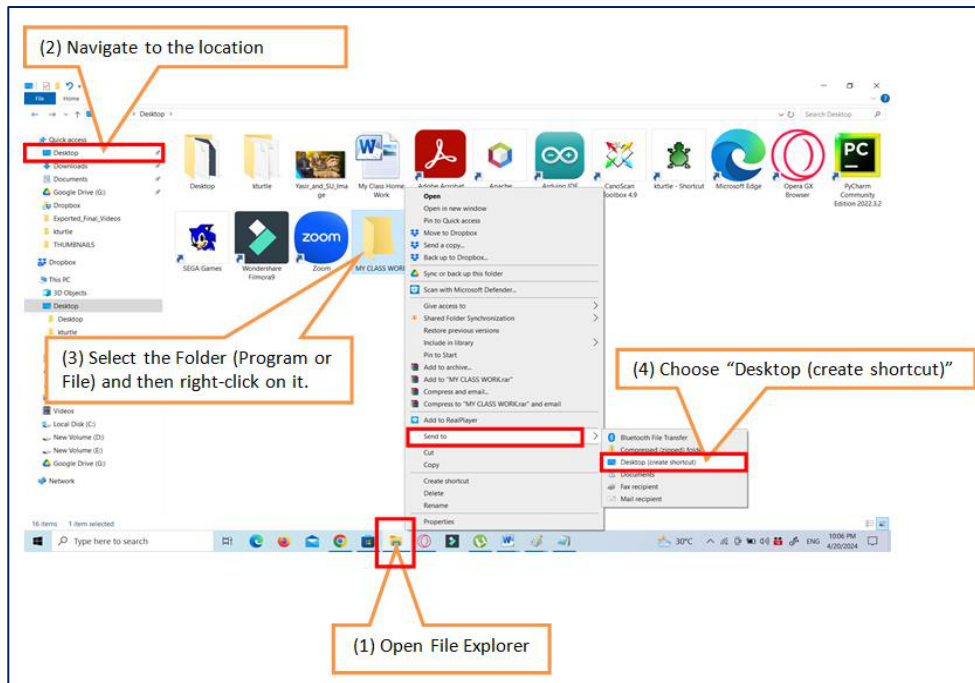


Figure 2.30 Shortcut of selected folder will be created on desktop

ACTIVITY

Creating Shortcuts

Watch and Learn: Your teacher will show you how to create shortcuts for programs on the Windows 10 desktop.

Hands-On Practice: After the demonstration, you will create shortcuts for your favorite or most frequently used programs on your desktop.

2.7 WORKING WITH MICROSOFT PAINT

Microsoft (MS) Paint is a drawing and simple image processing tool included in all versions of Microsoft Windows operating system.

To open MS Paint in Windows 10, click the start button at the bottom-left corner of the desktop then select the "Paint" option. Alternatively, type "Paint" in the search box next to the Start button on the task bar and press Enter Key or click the "Paint" icon as (see

figure 2.31). This will search for the MS Paint program on your computer, and open it for you.

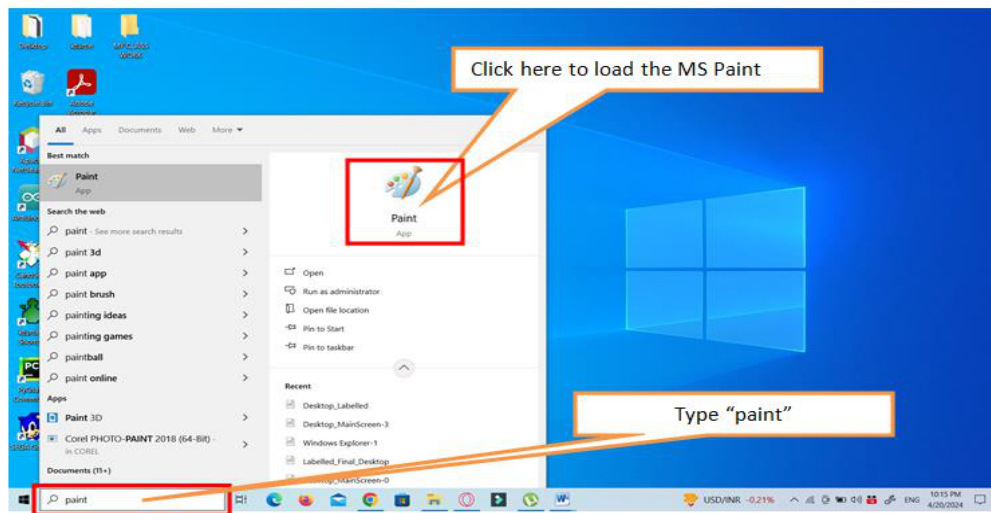


Figure 2.31 Opening MS Paint using the windows search box

2.7.1 MS Paint components and function

Figure 2.32 shows different components of MS Paint program. These components provide you various image processing features like creating freehand drawings, adding shapes, filling colours and adding text to your drawings, etc.

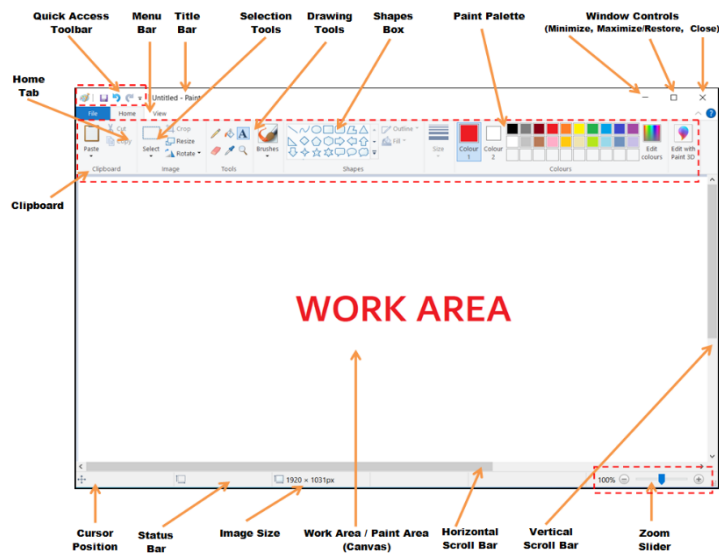


Figure 2.32 Components of MS Paint

Different components of MS Paint program are described below:

Title Bar	Title bar shows the name of the file you are working on and also contains window controls (i.e. minimize, maximize/restore, close buttons) that enables you to adjust the window size of MS Paint as per your needs.
Quick Access Toolbar	Quick Access Toolbar is at the top-left corner of the MS Paint window. It provides quick access to commonly used MS Paint features like Save, Undo, and Print. You can add or remove features of Quick Access Toolbar, because it is customizable toolbar.
Menu Bar	Menu bar gives you access to various menus such as File, Home, and View that ultimately provide you various options and commands for image processing.
Drawing Tools or Tool Palette	Drawing tools or Tool Palette includes drawing and editing tools such as the pencil, brush, eraser, fill, text, colour picker, and magnifier.
Paint Palette	Displays a grid of colours for choosing the drawing and fill colours
Colour Box	Shows the currently selected colour and allows users to pick colours for drawing or filling shapes.
Shapes Box	Contains various drawing tools for creating shapes like lines, squares, circles, rectangles, triangles, polygons, etc.
Paint/Working Area (Canvas)	It is the main area or canvas where you can draw, paint, and edit or process images.
Selection Tools	Selections tools allow you to select and process some particular areas of your drawing/image. You have options for selection tools like rectangular selection, free-form selection, and select all.

Zoom Controls	Zoom Controls are located at the bottom right corner of MS Paint window or can be accessed through the view menu. Zoom controls allow you to zoom in and out of the image for precise and more accurate editing.
Rulers and Gridlines	Rulers and gridlines features can be accessed by clicking at “View” menu item from menu bar. These features assist with aligning and positioning objects in the image accurately.
Status Bar	Located at the bottom of the window, it displays information about the current state of the program, such as the size of the image or the position of the mouse cursor. You can turn it on or off by clicking at “View” menu item from menu bar, and then check or uncheck status bar check box.
Full Screen	You can view your drawing in full screen mode, by clicking at “View” menu item from menu bar, and then click at “Full Screen” option in view tab.

“File” menu of MS Paint contains several submenu items. These items allow you to create new file, open, save, print, and manage images within MS Paint program. Functionality of some of the frequently used items of “File” menu is given below:

Menu Item	Function
New	It allows you to create a new blank image in MS Paint.
Open	It opens an existing image file from the computer's storage in order to view or edit it.
Save	It saves or stores the current image to the computer's storage with its current file name and format.

Save As	In contrast to Save, it allows you to save the current image to the computer's storage with a new file name or format.
Print	It opens the print dialog box in order to print the current image on a connected installed printer.
Set as Desktop Background	It sets the current image as the desktop background wallpaper on your computer.
About Paint	It shows information about MS Paint like version number and copyright details.
Exit	It closes the MS Paint program.

Functionality of various items available by clicking on “Home” tab of MS Paint is given below:

Item/Sub-item Name		Function
Clipboard	Cut	Removes the selected portion of the image and stores it in the clipboard for pasting elsewhere.
	Copy	Copies the selected portion of the image to the clipboard for pasting elsewhere.
	Paste	Inserts the contents of the clipboard into the image at the current cursor position.
Image	Select	Allows users to select a portion of the image for editing, moving, or copying.
	Crop	Cuts out a selected portion of the image, removing everything outside the selection.
	Resize	Resizes the image by adjusting its dimensions, either by percentage or specific measurements.
	Rotate and Flip	Rotates or flips the image horizontally or vertically to change its orientation.

Tools	Pencil	Allows users to draw freehand lines and shapes with a single colour, similar to using a pencil on paper.
	Fill with Colour	Fills a selected area of the image with a chosen colour, allowing for quick colorization.
	Text	Adds text to the image, allowing users to type and customize text directly on the canvas.
	Eraser	Allows users to remove or erase parts of the image by clicking and dragging over them.
	Colour Picker	Enables users to select a colour from the image by clicking on it with the eyedropper tool.
	Magnifier	Opens the Magnifier tool, which magnifies a portion of the image for closer examination and editing.
	Brushes	Offers various brush styles and sizes for freehand drawing and painting on the canvas.
Shapes	Inserts predefined shapes such as lines, rectangles, circles, and polygons into the image.	
Size	It allows users to adjust the thickness or size of the lines or shapes they draw with certain tools, such as the pencil, brush, or line tool.	
Colour1	This box represents the primary colour. When users click on Colour 1, they can choose a colour from the colour palette to set it as the primary colour for their drawing tools. The primary colour is typically used for drawing lines, shapes, and outlines.	
Colour2	This box represents the secondary colour. Users can also choose a colour from the colour palette and set it as the secondary colour. The secondary colour is often used for filling shapes or adding colour accents to the drawing.	
Colours Palette	Enables users to select a colour from the colour palette to use for drawing or filling shapes.	

2.7.2 Creating a new file and saving it in MS Paint

When you open MS Paint in Window 10, it automatically opens a new blank file for you. In case you have already opened MS Paint and now you want to create a new file and save it, then follow the below steps:

1. Click at the "File" menu at the top-left corner of the MS Paint window that will show you a dropdown menu.
2. By clicking on "New" in the dropdown menu, as shown in figure 2.33, a new blank MS Paint file will be created.

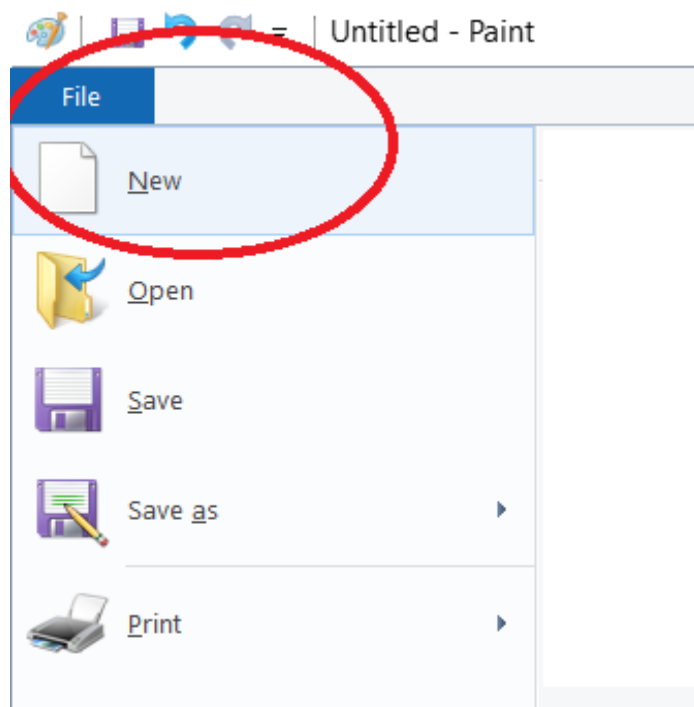


Figure 2.33 Creating a new file in MS Paint for Window 10

3. Once your new file is created, you can start drawing or painting (as shown in figure 2.34) using the various tools and colours available in MS Paint, which are described in previous section.
4. After you have finished creating or editing your drawing, you can save it by clicking on the "File" menu, which will show

you the dropdown menu. Click at “Save” option in dropdown menu as shown in figure 2.35(a), it will show you the save dialog box. Choose your desired location on your computer to save or store the file, and then give it a name and choose image file type as shown in figure 2.35(b). Finally, click at "Save" button in save dialog box.

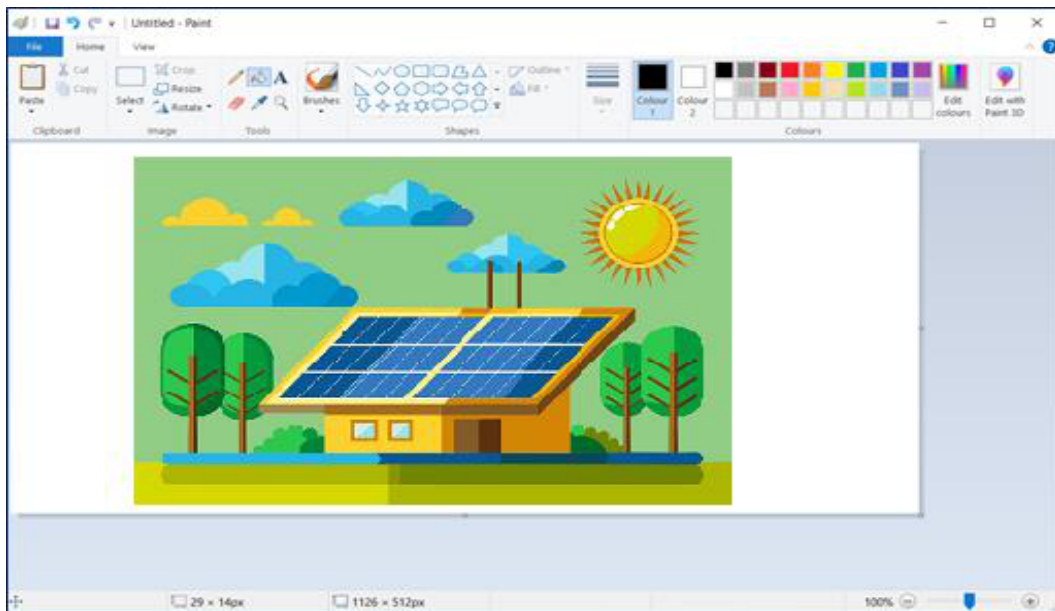


Figure 2.34 Creating a drawing in MS Paint

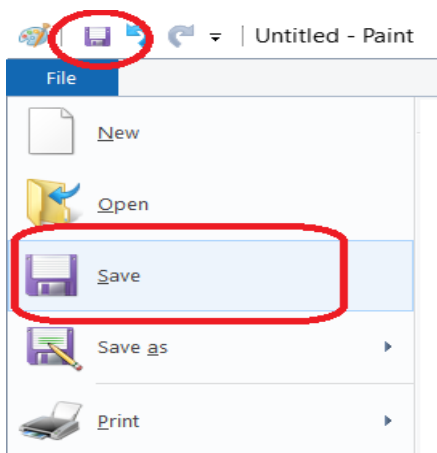


Figure 2.35(a) Saving a file in MS Paint part-1

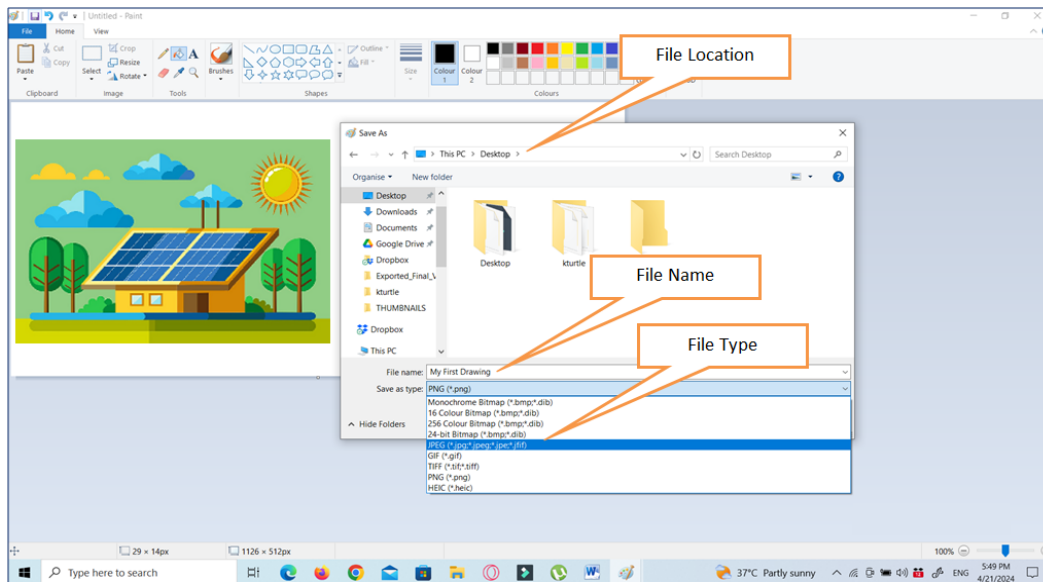


Figure 2.35(b) Saving a file in MS Paint part-2

2.7.3 Opening an existing image file for editing in MS Paint

Follow the below steps to open an existing image file in order to view or modify it in MS Paint:

1. Click at the "File" menu at the top-left corner of the MS Paint window that will show you a dropdown menu.
2. Click on "Open" option in the dropdown menu (as shown in figure 2.36), it will show you the open dialog box. Using the open dialog box, navigate to the location where your desired image file is saved/stored. Once you have found the file, click on its file name and then click at "Open" button (as shown in figure

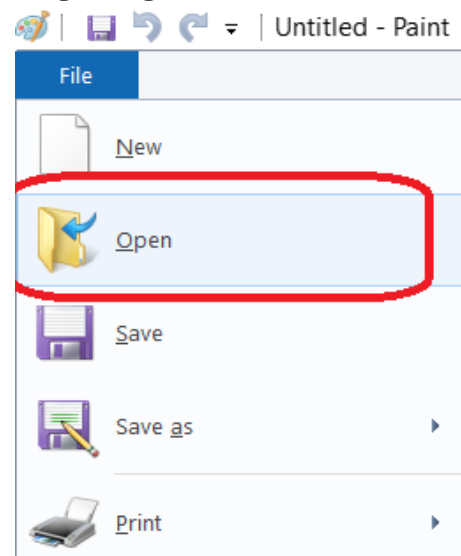


Figure 2.36 Opening an existing image file in MS Paint part-1

2.37) that will open the selected file in MS Paint for viewing and editing purposes.

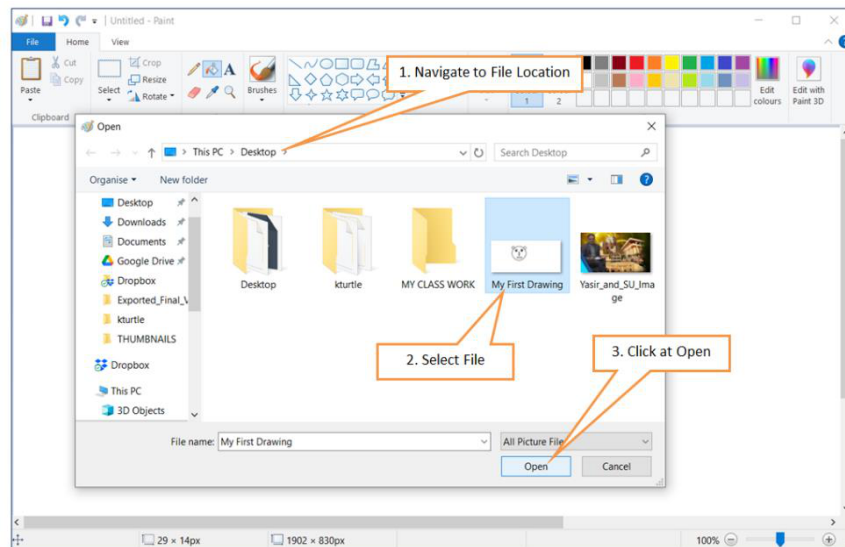


Figure 2.37 Opening an existing image file in MS Paint part-2

Note

You can also double click the file name to open it quickly without clicking at “Open” button.

2.7.4 Creating and editing freehand drawing in MS Paint

Follow the below steps to create and edit freehand drawing in MS Paint:

1. In the toolbox, select the pencil or brush tool by clicking on their icon as per your needs. The figure 2.38 shows a drawing in which pencil tool is used to draw the boat, while water part is drawn using a brush tool.
2. After choosing the pencil or brush tool, select a colour by clicking on one of the colours in the colour palette.
3. Start drawing your desired freehand art in the paint area (canvas). Click and hold the left mouse button, then move the mouse to draw freehand lines on the paint area. Release the mouse button to stop drawing.

4. If you want to adjust the thickness of your lines, you can do so by clicking on the "Size" option located near the colour palette. Choose a size from the dropdown menu that seems appropriate to you for your freehand drawing.
5. If you make a mistake while drawing, you can undo it by clicking on the "Undo" button in the Quick Access Toolbar located at the top-left corner of the window. You can also undo last action by pressing the CTRL + Z shortcut key.
6. To redo something that you have undone, click at "Redo" button in the Quick Access Toolbar located at the top-left corner of the window. You can also reverse/redo the most recent modification made using the "Undo" option by pressing the CTRL + Y shortcut key.
7. If you want to erase part of your drawing, you can select the eraser tool from the toolbox and use it to remove unwanted lines.

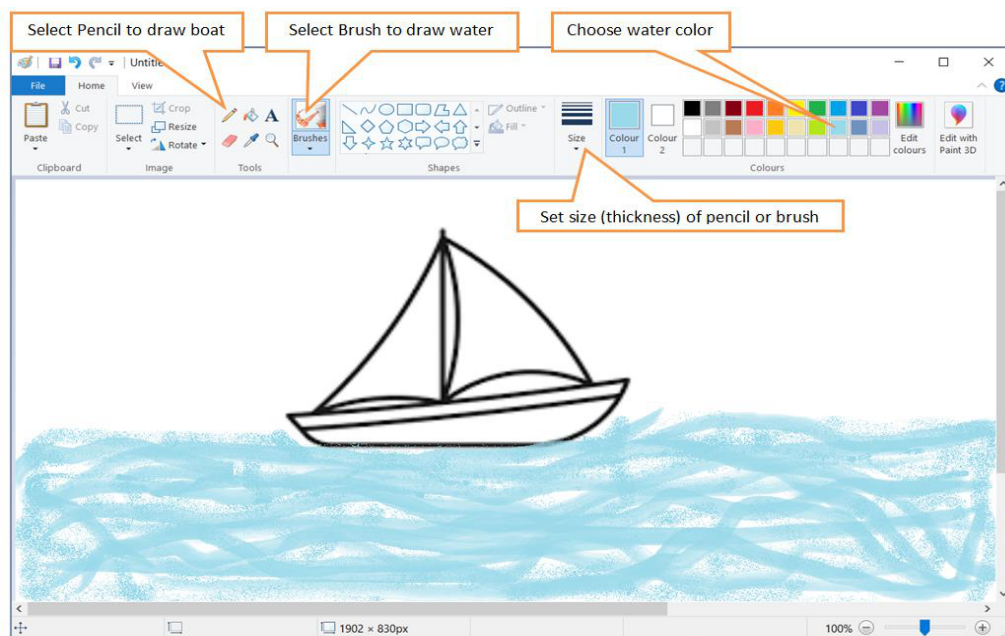


Figure 2.38 Freehand drawing in MS Paint

ACTIVITY

Drawing Your Own Masterpiece

Watch and Learn: Your teacher will show you how to create freehand drawings in MS Paint.

Hands-On Practice: After the demonstration, you will use the skills you've learned to draw the image as shown in figure 2.38 or any other similar image of your own choice.

2.7.5 Adding text to drawings and images

Follow the below steps to add text to your drawings in MS Paint.

1. Click on the "Text" icon in the toolbox to select the text tool for adding text to your drawings in paint area/canvas. After selecting the text tool, move the mouse cursor in paint area at the position where you want to add the text, and click mouse button. This will create a text box for you in which you can type your desired text.
2. Before typing text in the text box, choose the desired font style and text size from the dropdown menu located in the "Font" section of "Text" menu. Also click on the "Colour 1" box located near the colour palette to choose the colour for your text.
3. Once you have set the font style, size and colour, start typing your text using the keyboard as shown in figure 2.39.

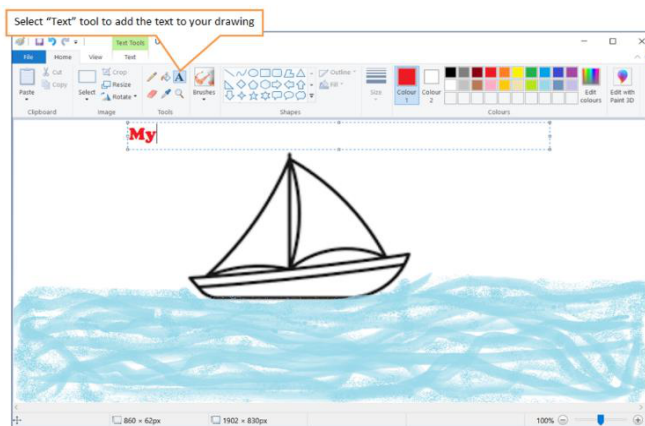


Figure 2.39 Adding text to drawings in MS Paint

4. If you want to change the text size, font, or colour after typing the text, you can do so by selecting the "Text" menu with the

mouse, and then adjust the properties using the available options in the toolbar as shown in figure 2.40.

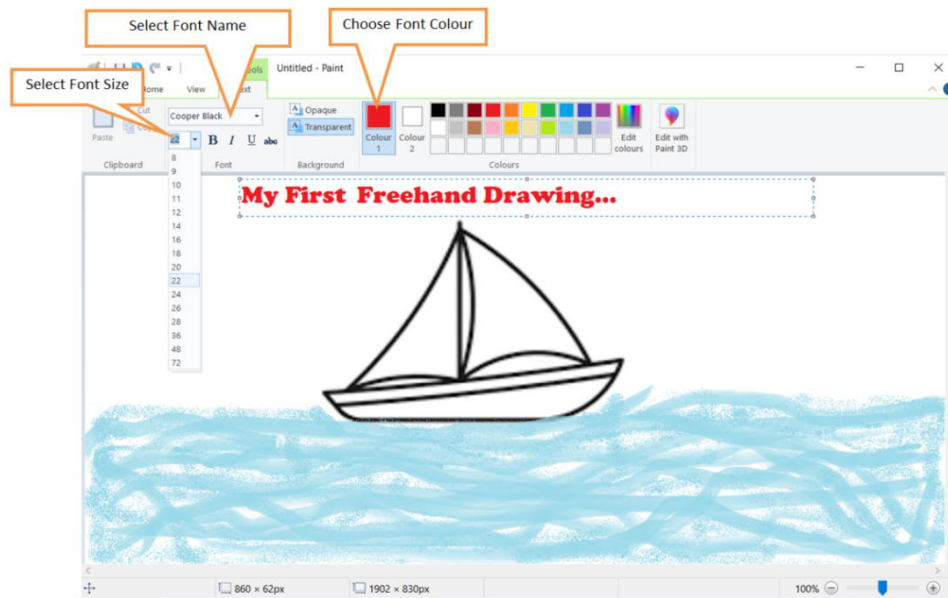


Figure 2.40 Adjusting the properties of text

ACTIVITY

Using Text in Microsoft Paint

Watch and Learn: Your teacher will show you how to add text to drawings and images in Microsoft Paint.

Hands-On Practice: After the demonstration, you will:

- Draw different shapes on the paint canvas.
- Use different colours, font styles, and sizes to add text, like the names and description of the shapes, to each of them.

2.7.6 Move or position the drawings as needed in MS Paint

Follow the below steps to move or position the drawings as per your needs in MS Paint:

1. Click on the image or drawing you want to move to select it. Selection handles (small squares) around the edges of the drawing or image indicates that the image or drawing has been selected.

2. Once the drawing is selected, move your mouse cursor over the drawing until it changes to a cross with four arrows. Click and hold the left mouse button, then drag the drawing to the desired location in the paint area, and release the left mouse button to place it there.



ACTIVITY

Shape Your Imagination

Watch and Learn: Your teacher will show you how to draw shapes, fill them with colour, and use tools like rotate, flip, resize, and skew in Microsoft Paint.

Hands-On Practice: After the demonstration, you will:

- Draw shapes of your choice on the canvas.
- Fill each shape with your favourite colours.
- Experiment with rotating, flipping, resizing, and skewing your shapes to create unique designs.

2.7.7 Steps to outline or fill colours in drawings

Follow the below steps to outline or fill colours in drawings in MS Paint:

1. Click on the shape or drawing you want to outline or fill colour.
2. To outline the drawing, click on the "Shapes" tool in the toolbox. Choose an appropriate shape (e.g. circle, ellipse, rectangle, etc) to outline your drawing.
3. Click and drag on the paint area to draw the shape that will create an outline around the desired drawing.
4. To fill the drawing with colour, click on the "Fill with Colour" tool in the toolbox, and then click inside the drawing to fill it with the currently selected colour from the colour palette.
5. If you want to change the outline colour or fill colour, click on the "Colour 1" or "Colour 2" box near the colour palette to

choose a new colour as per your needs, and then click inside the outline or fill area to apply the new colour.

ACTIVITY

Digital Greeting Cards

Watch and Learn: Your teacher will show you how to design and personalize greeting cards using Microsoft Paint.

Hands-On Practice: After the demonstration, you will:

- Choose an occasion (e.g., birthday, holiday, thank you) for your greeting card.
- Design a custom greeting card with colourful backgrounds, drawings, and text in MS Paint.
- Share your digital greeting cards with your classmates, friends or family members.

2.8 NAVIGATING THE INTERNET

2.8.1 Definition of Network:

Network in computer science (as shown in Figure 2.41) is a group of computers that are connected to each other through wired or wireless medium to share hardware and software resources and exchange data and information among users.



Figure 2.41 Computer Network

2.8.2 Definition of Internet:

The Internet is an international network (also known as global network) consisting of millions of public, private and business networks. It connects people, places, and many other digital resources around the world. Its users can explore, learn and easily connect with other users in order to share information or other interesting things, such as photos, videos, games, tutorials, etc.



Figure 2.42 Scenario of the Internet

2.8.3 Applications of Internet

- **Explore websites:** Visit websites to learn about your favourite topics, play games, watch videos, or read stories.
- **Connect with friends:** Use social media to chat with friends, share photos and videos, or play online games together.
- **Learn something new:** Find information about anything you can imagine, from history and science to cooking and crafts.
- **Online shopping:** You can buy things, such as books, clothes, toys, gadgets, mobile phones, home accessories, grocery items, etc, from online stores without leaving your home.
- **Keep yourself informed/updated:** Watch news channels, read news articles, watch videos on current affairs, or listen to podcasts to stay up-to-date on what's happening in your surroundings and in the world.

2.8.4 Safety precautions while using the Internet

Though the Internet is a very useful and amazing place, but it is essential to stay safe when you are online and using the Internet. You must follow the below guidelines while using the internet to stay safe:

- **Keep your personal data private:** Never share your personal data (such as, your full name, phone number, bank account number, debit/credit card information, address, or passwords) publicly on the internet.
- **Verify web links before you click:** Unknown or non-verifiable web links and downloadable files may contain harmful code, therefore be cautious when clicking on web links or downloading files.
- **Be kind and respectful:** Always treat others online with kindness and respect. This way, others will also treat you nicely and respectfully.
- **Do not be late in talking to a trusted adult:** In case you ever feel uncomfortable while using the internet and interacting with people on social media or gaming platforms or come across something that doesn't seem right online, talk to a parent, teacher, or other trusted adult immediately.

2.8.5 World Wide Web (WWW)






World Wide Web or simply www is a data and information sharing system of interlinked hypertext documents, which are accessed via the internet.

2.8.6 Web Page and Website

A single document shared on the Internet is called a web page, while collection or group of web pages is called a website. These web pages or websites contain information in the form of documents, simple text, images, audio and video files. A web page or website is accessible through the Internet by using a web browser. Every website has its address URL like www.microsoft.com. A website is published and maintained by an organization or an individual.

2.8.7 Web Browser and Their Functionality

A web browser is the software that provides you an interface to access websites on the internet. Currently, different types of web browsers are available to access websites on the internet. Some of the very well-known browsers are listed below:

<p>Microsoft Internet Explorer</p> 	<p>Microsoft Internet Explorer is a web browser developed by Microsoft Corporation. It comes pre-installed with all older versions of Windows operating system.</p>
<p>Microsoft Edge</p> 	<p>Microsoft Edge is a web browser, which is also developed by Microsoft Corporation and it comes pre-installed in Windows 10 and later versions. Microsoft Edge is designed for speed, security, and compatibility with modern web standards.</p>
<p>Google Chrome</p> 	<p>Google Chrome is developed by Google Inc. It is one of the most widely used web browser worldwide. Google chrome is famous for its simplicity, speed, and vast support for web features and standards.</p>
<p>Mozilla Firefox</p> 	<p>Mozilla Firefox is an open-source web browser developed by the Mozilla Foundation. Its main focus is privacy, security, and customization options, which allow users to install add-ons and themes to enhance their browsing experience.</p>
<p>Opera</p> 	<p>Opera is a feature-rich web browser known for its speed, built-in ad blocker, and innovative features such as Opera Turbo, which compresses web pages for faster loading on slow connections, and a free virtual private network (VPN) service, etc.</p>

Safari



Safari is the default web browser for Apple devices that includes iPhones, iPads, and Mac computers.

Safari is recognized for its speed, energy efficiency, and integration with other Apple services and features.

Some of the common functions or activities that can be performed using web browsers are listed below:

- Browsing/surfing websites
- Reading news and articles
- Reading story books
- Research and learning
- Listening to music
- Watching videos and movies
- Online shopping
- Playing games
- Social networking
- Online banking and payments

2.8.8 Opening a website using the web browser

In order to open any website or search engine to search the content of your interest, you need to follow the below steps:

1. Click on the icon of web browser that is available on windows desktop or taskbar (i.e. check it out in pinned apps).
2. Type the complete and correct web address of the website in address bar (e.g. <http://stbb.edu.pk/>) and press enter key.
3. Once you press the enter key, the browser will start searching the website.
4. After a few moments, the home page of the website will be loaded into web browser as illustrated in figure 2.43. You can now explore the website to find out your desired information or services.

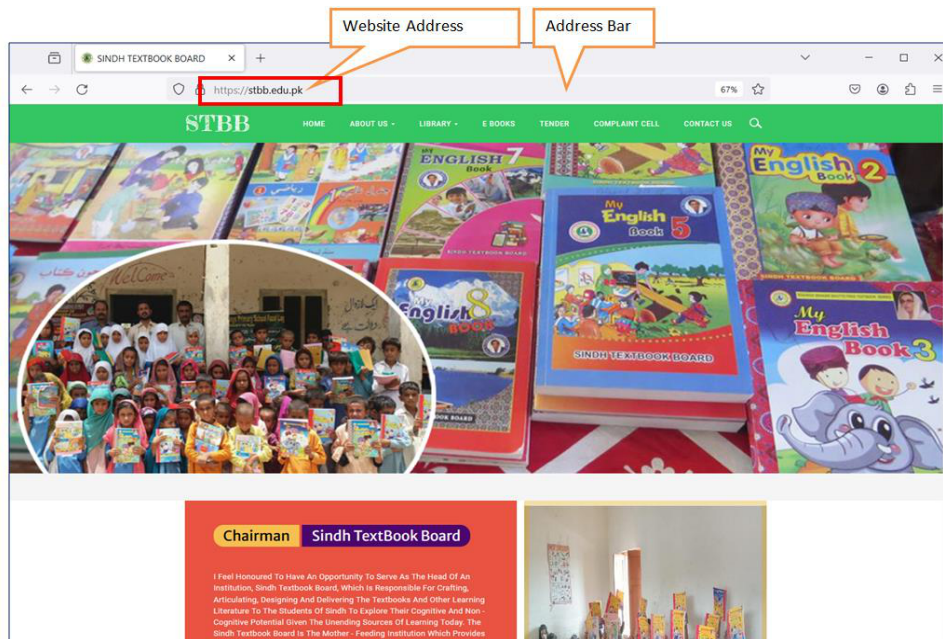


Figure 2.43 Home page of Sindh Text Book Board website

ACTIVITY

Safe Web Browsing

Watch and Learn: Your teacher will show you how to explore websites safely and responsibly.

Hands-On Practice: After the demonstration, you will:

- Browse websites related to your favourite subjects or hobbies.
- Read articles, watch videos, or play interactive games on educational websites.
- Share with the class what you learned or found interesting during web browsing.

2.9 GETTING FAMILIAR WITH SEARCH ENGINES

2.9.1 Search Engine

Search engines are websites that help users to find desired information on the Internet quickly and easily. You just need to type few keywords or simple phrases relevant to the topic or information

you want to search. The search engine intelligently searches the information from other websites based on given keywords or phrases and returns you the list of websites links that contains these keywords or phrases. Some common search engines are shown in figure 2.44.

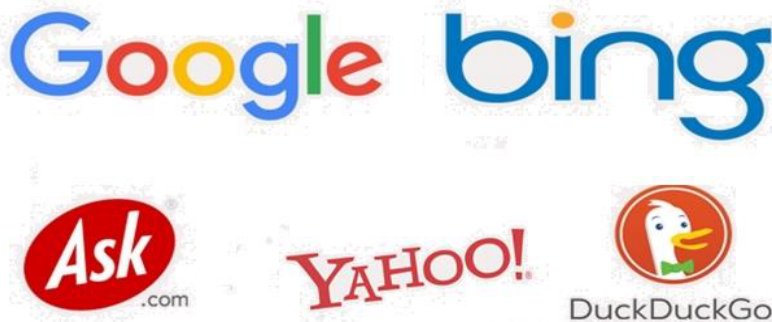


Figure 2.44 Common search engines

2.9.2 Using search engines to look for certain topics

In order to search a topic (in this case “What is Artificial Intelligence”) using a search engine like Google, follow these steps:

1. Open any available Web Browser, such as Microsoft Edge, Fire Fox or Google Chrome.
2. Type the website address of search engine (in our case www.google.com) in address bar of web browser and press Enter Key.
3. Once Google search engine is loaded in web browser, type your search query in the search bar. For example, type “what is artificial intelligence” and press the “Google Search” button as shown in figure 2.45. After few moments, search engine will display list of search results that are relevant to given search query as shown in figure 2.46. Note that most relevant search results are always appear on top of the list. In case you are not satisfied with the initial search results, you can filter them or refine them by changing the search query.

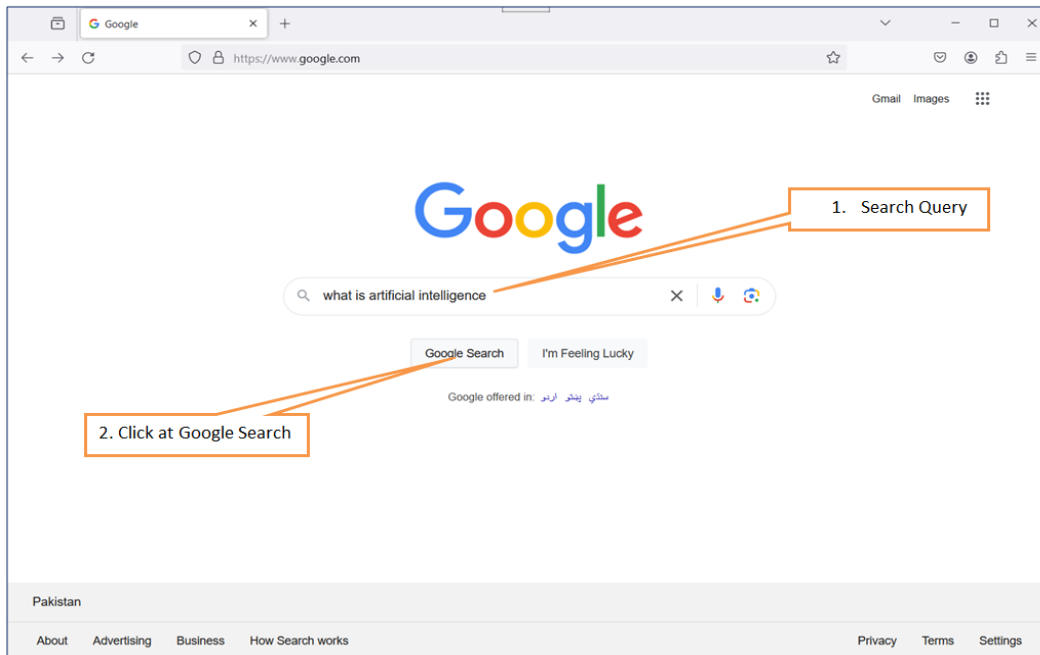


Figure 2.45 Searching for certain topic using Google search engine

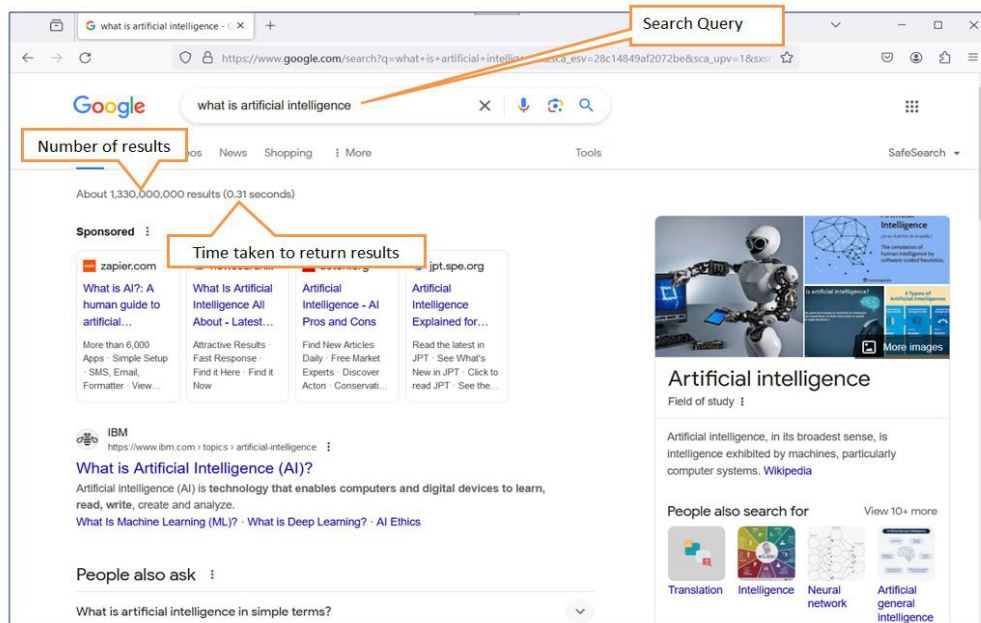


Figure 2.46 Search results returned by Google search engine

 **ACTIVITY**

Using Search Engines

Watch and Learn: Your teacher will show you how to search for answers to questions or topics online using Google or other search engines.

Hands-On Practice: After the demonstration, you will search for answers to questions or topics provided by your teacher. For example:

- Look up information about your favourite personality.
- Look up information about an animal and its habitat.
- Search for a recipe for your favourite dish.

Share what you found with your classmates and talk about interesting things that you discovered using search engines.

Summary

- This unit covered basic concepts of the operating system including the functions and working of Windows 10 operating system, image processing using MS Paint, and internet usage.
- An operating system is the system software that monitors and controls computer hardware and software resources, to make it easy for human to use the computer. Different types of operating systems for computers and mobile phones, such as Windows, Mac OS, Linux, Android, iOS, and Windows 10 Mobile, are explained.
- Windows 10 startup procedure is explained along with step-by-step instructions for performing various common tasks, such as opening files or applications, renaming, deleting, copying, moving files or folders, and creating shortcuts. Additionally, common components of Windows programs, such as title bars, window controls, menu bars, scrollbars, and status bars, are explained in detail.
- Microsoft Paint (MS Paint) is a drawing and image processing tool bundled with Microsoft Windows. To access it in Windows 10,

you can either click on the "Paint" option in the start menu or search for it in the taskbar.

- MS Paint consists of several components such as the title bar, quick access toolbar, menu bar, drawing tools, paint palette, etc. These components offer various functions such as creating freehand drawings, adding shapes, and filling colours, etc.
- The File menu in MS Paint allows creating, opening, saving, printing, and managing images. The Home tab provides tools for clipboard management, image editing and drawing.
- To create and save a new file in MS Paint, you can click on "New" in the File menu, draw using the available tools, and then save using the "Save" option.
- To open an existing image file, you can select "Open" from the File menu and navigate to the desired file and, double click its name/icon.
- MS Paint allows creating and editing freehand drawings by selecting the pencil or brush tool, choosing a color, and drawing on the canvas.
- Text can be added using the Text tool, and drawings can be moved using the selection tools.
- In navigating the Internet, understanding networks and the Internet itself is very important. A network connects computers to share resources, whereas the Internet links millions of networks worldwide, allowing users to explore, learn, and share information like photos, videos, and games.
- While using the Internet, keep personal data private and always verify the web links before opening them.
- The World Wide Web (WWW) is a system of interconnected hypertext documents accessible via the Internet, with web pages forming websites that are accessible through web browsers like

Microsoft Internet Explorer, Google Chrome, Mozilla Firefox, Opera, and Safari.

- Web browsers allow various activities such as browsing websites, reading news, shopping, and social networking. To access a website, you simply enter the website's address in the browser's address bar.
- Search engines like Google help users find information quickly by typing keywords or phrases. For example, searching for “What is Artificial Intelligence” on Google returns relevant search results that users can filter or refine as needed.

Important Terms To Remember

Operating System: Software that helps control and manage computer's hardware/software and makes it easy for the user to use it.

Android: Android operating system is developed by Google Inc. It is the most widely used mobile phones' operating system.

iOS: iOS is developed by Apple Inc., for exclusive use on iPhones, iPads, and iPod Touch devices.

Taskbar: The taskbar is available at the bottom of the Windows desktop. It is an organization tool that organizes and provides quick access to various Windows features ranging from quick search or opening of applications to viewing and setting date and time, etc.

Icon: It is the graphical representation of any file or program.

Recycle Bin: The Recycle bin is a special type of system folder in Windows that temporarily stores all of your deleted files and folders. You can restore or recover all deleted items from the Recycle Bin.

File Explorer: You can browse and manage files and folders on your computer using the File Explorer. It allows you to create, copy, move, rename, and delete files and folders. It also allows you access to various drives and storage locations, like CD disk, USB, etc.

File: A file is an object that stores data and information. It is identified by its given name on a computer. The file can be any text file, document, picture, audio or video, etc

Folder: A folder is a container used to hold different types of files and sub-folders. Folders help in organizing and managing files.

PDF: PDF stands for Portable Document Format. This file format is supported by all operating systems.

Clipboard: It is a temporary memory. When you copy (or cut) anything, it is temporarily stored in the clipboard until pasted in desired location.

Network: A Network in computer science is a group of computers that are connected to each other through wired or wireless media to share their hardware and software resources and to exchange data and information among users.

Internet: The Internet is an international network consisting of millions of public, private and business networks. It connects people, places, and many other digital resources all around the world. Users can explore, learn and may easily connect with other users in order to share information or other interesting things, such as photos, videos, games, tutorials, etc.

WWW: WWW stands for World Wide Web. It is a data and information sharing system of interlinked hypertext documents, which are accessed via the internet.

Web Page: A single document shared on the Internet is called a web page.

Website: Collection or group of web pages is called a website. Websites contain information in form of documents, simple text, images, audio and video files.

Web Browser: A web browser is the software that provides you an interface to access the websites on the internet.

HTML: HTML stands for Hyper Text Markup Language. It is a markup language for creating web pages.

HTTP: HTTP stands for Hyper Text Transfer Protocol. It is the software used by the world wide web.

Search Engine: A search engine is a program that intelligently searches the information from other websites based on given keywords or phrases and returns you the list of websites links that contains these keywords or phrases.

Multi-user Operating System: A multi-user operating system like Unix or Linux is a type of operating system that allows multiple users to access a computer system concurrently.

Multi-tasking Operating System: A multi-tasking operating system, such as Windows, macOS, Unix and Linux, is a type of operating system that allows multiple tasks or programs to run concurrently on a computer.

Exercise

1. Encircle the correct answer

- i. The function of the Taskbar in Microsoft Windows 10 is to:
 - a. Manage computer resources
 - b. Provide user interface to create files and folders
 - c. Organize and provide quick access to various Windows features
 - d. Protect the computer from viruses
- ii. The function of the File Explorer in Windows 10 is to:
 - a. Manage computer resources
 - b. Organize and provide quick access to various Windows features
 - c. Browse and manage files and folders
 - d. Protects the computer from viruses
- iii. The location which temporarily stores the deleted files is called:

a. Windows Taskbar	b. Recycle Bin
c. System Tray	d. Windows Desktop

- iv. The function of the Quick Access Toolbar in MS Paint is to:
 - a. Draw images quickly
 - b. Insert shapes like circles, rectangles, etc
 - c. Draw images and artwork using freehand tool
 - d. Access commonly used features like Save and Undo, etc
- v. The purpose of a search engine on the Internet is to:
 - a. Help users to find information about specific topic
 - b. Help users to create web pages
 - c. Help users to download and watch movies
 - d. Help users to play online games

2. Fill in the blanks with appropriate words given below.






Keywords, CTRL+Z, Create shortcut, Notepad, Colours

- i. You can create a shortcut in Windows 10 by right-clicking on the selected file or folder, and then choose _____ in dropdown menu.
- ii. _____ is the Windows default text editor, which comes with all versions of Windows operating system.
- iii. The _____ palette shows a grid of colours for choosing the drawing lines and fill colours.
- iv. In MS Paint, you can undo the last action by pressing the _____ shortcut key.
- v. On the Internet, search engine helps its users to find required information or data based on given _____ or phrases.

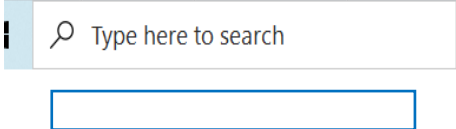


3. Provide the descriptive answers of the following questions.



- i. What is an Operating System?
- ii. What is the function of Taskbar in Windows 10?
- iii. What steps do you follow to outline or fill colours in drawings in Microsoft Paint?
- iv. List and describe some of the safety precautions while using the Internet?
- v. Explain the function of Search Engine.

4. Match the icons in Column A with Name in Column B.

Column A	Column B
	Windows 10 Start Menu / Start Button
	Recycle Bin
	Window Controls
	A Web Browser
	Brushes

5. Write the name of icon in the box provided and briefly describe in the next column.

Icon	Description
	
	
	

 <input data-bbox="334 576 695 615" type="text"/>	
 <input data-bbox="334 776 695 815" type="text"/>	

 **Note for Teachers**

- Involve the students to explore Windows 10 operating system including the Microsoft (MS) Paint program and their main components by engaging them into hands on practice of Windows 10 operating system and MS Paint.
- Engage the students in hands on practice of searching notes and other material from different websites and online libraries.
- Engage the students in hands on practice of Search Engines and assign them the tasks like search for specific given topic using the different types of Search Engines, such as Google, Bing, Ask, etc, and then compare the returned results of each of these Search Engines.
- Engage the students in Task or Project Based Learning by assigning them tasks or projects in groups in order to enhance their team work skills. Assign tasks or projects related to Windows 10 operating system, MS Paint, and web surfing and search engines.
- Engage them to solve the textbook exercises to enhance their work skills.
- Use the hands-on practice strategy to cover the contents of this unit.

UNIT 03

ALGORITHMIC THINKING AND PROBLEM SOLVING



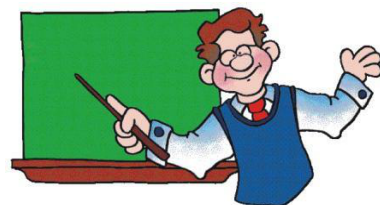
Student Learning Outcomes:

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

- Define and identify a problem and differentiate between simple and complex problems.
- Solve any problem by following the 6 steps problem solving guide.
- Analyze different steps to breakdown a problem.
- List benefits of algorithmic thinking.
- Recognize that algorithms are sequence of precisely described instructions.
- Define conditional/selection statements that decide whether certain instructions should run or not?
- Identify loops and analyze how they allow instructions to be repeated.
- Analyze ways to solve a problem by using a combination of sequence, selection, and repetition.

Introduction to the Unit

In this chapter we are going to learn how to solve problems in a well manner, which is super important for everything we do, like at school and even when we grow up and have jobs. This chapter also introduces the fundamental principles of algorithmic thinking, highlighting its role as a systematic approach to breaking down problems into manageable components and planning step-by-step strategies for solution.



3.1 PROBLEM

A problem is something (event, task, situation) that needs to be solved. It is like a puzzle or question for which a solution must be found. Problems can be big or small, and can be from the real-world or pointed out by someone. They can be anything from real life situations to math problems, for instance.

1. You are walking in the park, and you see a lost puppy, what would you do to help the puppy find its way home.
2. Your favorite toy is broken, what are some ways you can try to fix it?
3. If Aslam has 3 bags of coins, and each bag has 5 coins, how many coins does Aslam have in total?



Figure 3.1 Example of Problems

3.2 SIMPLE AND COMPLEX PROBLEM

3.2.1 Simple Problems

Simple problems are like puzzles that are easy to solve. They usually have a clear question with an answer that you can find using basic steps.

For example,

Bake a cake or cook instant noodles for lunch.

- Simple problems can be solved by simply following the recipes.
- No expertise is required to solve simple problems.

How to Cook Instant Noodles

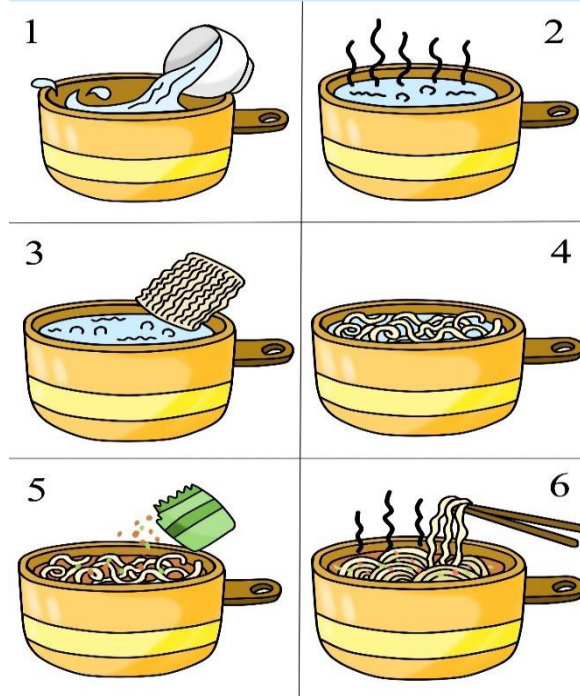


Figure 3.2 Steps to Cook Instant Noodles

3.2.2 Complex Problems

Complex problems are like larger puzzles that need more thinking. They might have many steps or need different ways to solve them.

For example,

- Calculating the Least Common Multiple (LCM)
- Determining if the number is prime or not.
- A book costs 500 Rs, more than twice the cost of a pen. If the total cost of the book and the pen is 800 Rs, how much does each item cost?

These types of problems can be solved by breaking them into many simple problems.

2	10 , 18 , 20
2	5 , 9 , 10
3	5 , 9 , 5
3	5 , 3 , 5
5	5 , 1 , 5
	1 , 1 , 1

$$\text{LCM} = 2 \times 2 \times 3 \times 3 \times 5$$

$$\text{LCM} = 180$$

Figure 3.3 Calculating the LCM of 10,18 and 20

ACTIVITY

Teacher will present different problems and ask students if each one of the problems is simple or complex.

3.3 PROBLEM SOLVING

We solve various problems every day and every problem is unique in nature. Some problems are difficult and require more attention to find the solution. Problem solving is a process of identifying and finding the most effective solution to a problem. The skill of problem solving can be mastered by following a systematic and well-organized approach as shown in figure 3.4.

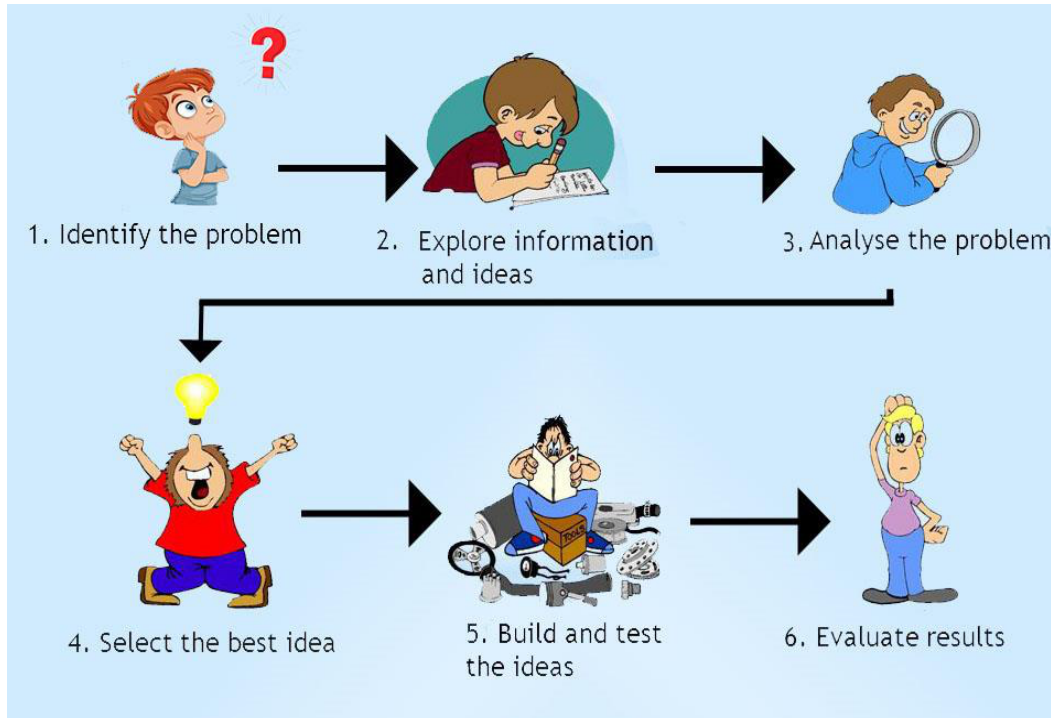


Figure 3.4 The six-step problem solving approach

3.3.1 Six step guide to help you solve problems

(I) Step 1: Identify the problem

- State what the problem is. For example: “Manahil wants to buy a birthday gift for her friend Moomal”.
- Be clear about when, where, and why it is problem, for example: “Manahil wants to buy a birthday gift that Moomal will like, and which will make their friendship stronger.”



Figure 3.5 Birthday gift surprise

(II) Step 2: Explore information and ideas

- Write down all the ideas you can think of, even if they seem wrong or not good.
- Use your imagination to think of some cool ideas you would not have thought of before.

In this case, Manahil can think of the following possible solutions.

1. A book that her friend mentioned that she wants.
2. A board game, they can play together.
3. A gift card to their favorite store.
4. A personalized photo album of their memories together.



Figure 3.6 Birthday gift ideas, a gift card, a book, a board game

(III) Step 3: Analyze the problem and evaluate alternatives

- We look for ideas we don't like as much and say bye-bye to them.
- We put the ideas we like the most on a special list.
- We think about good and not so good things about each idea to decide which one is best.

For example, Manahil came to the following conclusion for each possible solution that she can think of.

1. The book might be a good choice because her friend loves reading but buying a book can be expensive.
2. The board game could be fun for them to enjoy together but what if she already has the game you buy.
3. A gift card gives her friend the option to choose what she wants to buy but Manahil does not know her friend's likes or dislikes.
4. The photo album would be a sentimental and thoughtful gift.

(IV) Step 4: Select the best idea

- Say who is going to do something about it, like, "Manahil will prepare a personalized photo album for her friend".
- Say how you are going to fix it. For example, "Manahil will collect photos of her friend and create a beautiful photo album".
- Say when you do it, "Manahil will start collecting the photos from today and must complete the album before her friend's birthday."

(V) Step 5: Build and test the ideas

- Do what you decided, "Manahil starts collecting the photos of her friend from various sources such as friends and family and creates a beautiful photo album."

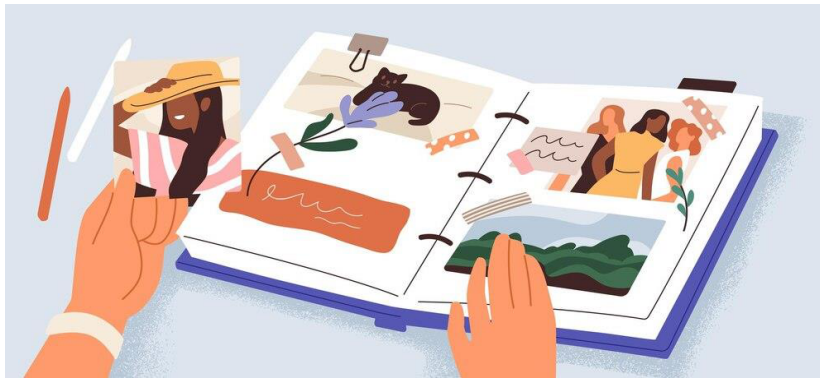


Figure 3.7 Personalized photo album

(VI) Step 6: Evaluate results

- Think if the plan worked, Like, “Did Manahil’s friend loves the gift and feels touched by the memories captured in the album.?”
- Decide if you need to change the plan or make a new one to fix the problem.
- If you are not happy with what happened, note this for the future and start again from step 2, pick a new plan, or change the old one etc.

Example # 1: Dealing with bullying at School

- **Identify and define the problem:** Aslam is being bullied at school and needs to find a way to handle the situation.



Figure 3.8 Student being bullied

- **Explore information and ideas**
 - Tell a grown up you trust such as a teacher, counselor, guardian or parent.
 - Face the bully with courage and tell them to stop bothering you
 - Ask friends or classmates for support and help.
 - Be part of groups at school that stop bullying.
- **Analyze the problem and evaluate alternatives**
 - Telling a grown up for help and support can stop the bully.
 - If you face the bully with courage, they might stop bullying you.
 - Your friends can help you feel better and strong, but your friends may also start bullying you.
 - Becoming parts of anti-bullying groups may help you stop bullying but it also diverts your attention from studies.
- **Select the best idea:** Aslam decides to talk to his teacher about bullying.
- **Test the idea:** He met with his teacher, explains the situation, and asks for help.



Figure 3.9 Student seeking help from teacher

- **Evaluate results:** Aslam receives support from the school, the bullying stops, and he feels safer and happier at school.

ACTIVITY

Example of real-life problem

Watch and Learn: Teacher must give an example of a real-life problem he/she has faced and discuss how he/she has solved it.

Hands-on Practice: After teachers' demonstration, each student should think of a real-life problem he/she has faced and follow the six steps problem solving guidelines to prepare a solution of that problem

3.4 PROBLEM DECOMPOSITION

Sometimes the problem is too large to solve all at once. Therefore, we decompose or divide problems into smaller sub problems. This technique is known as “Problem decomposition”. The decomposition of any problem can be done by dividing the problems into facts, input, outputs and instructions.

3.4.1 Facts

Facts are things we know that are true or real. They are like the building blocks of problem-solving process. For example, if we are baking bread, some facts could be that we need flour, yeast, oil, warm water, and salt.

3.4.2 Input

Inputs are the things we start with, like the ingredients for our bread (if that is the problem).

3.4.3 Output

Outputs are the cool things we get at the end, like fresh yummy bread! They are what we make or get after we put everything together.

3.4.4 Instructions

We combine facts, inputs, and outputs to create a list of steps (**instructions**) that guide us in solving the problem. There could be two different types of instructions:

(I) Specific instructions

Specific instructions give clear, detailed steps on how to do something.

For example, imagine you are baking a cake, a specific instruction would be

“Bake the cake for 40 minutes at 200 degrees Celsius”

(II) Non-specific instructions

Non-specific instructions are more general and less detailed. In the cake baking scenario, a non-specific instruction would be

“Mix all the ingredients then cover it and let it sit”

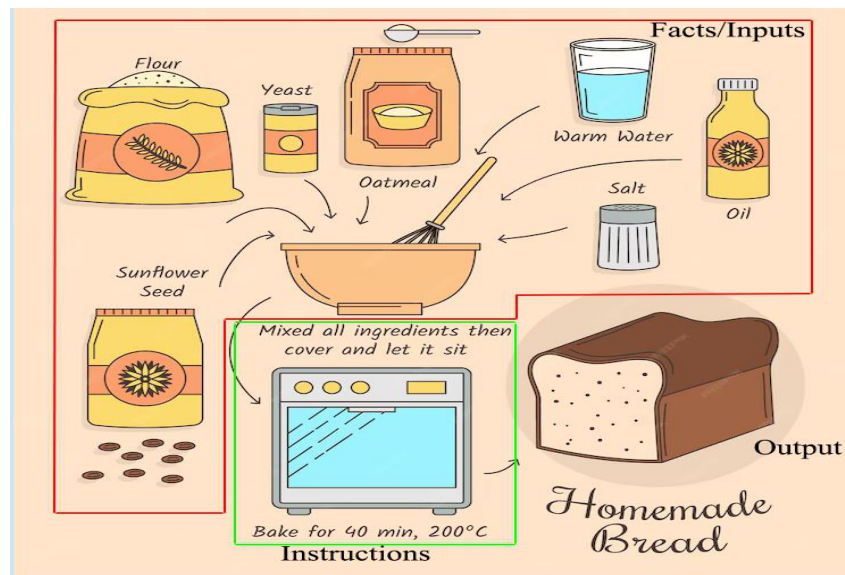


Figure 3.10 Baking bread ingredients and tools

Example # 1: Building a LEGO castle

- **Facts:** we need LEGO bricks of different colors and sizes and may be some special pieces like windows and doors.



Figure 3.11 LEGO blocks of different colors and shapes

- **Input:** A blank canvas or an empty space where we want to build the castle.
- **Output:** How we like our castle to look like, say we want a tall castle with towers, windows, a big gate, and maybe even a drawbridge.
- **Pulling it together (Instructions)**
 - We have LEGO bricks of different colors and sizes.
 - We start with an empty space or a blank canvas.
 - We want a castle with towers, windows, a gate, and a drawbridge.



Figure 3.12 LEGO Castle

ACTIVITY

Watch and Learn: Teacher must give an example of a complex problem he/she has faced and demonstrate students how this problem can be decomposed to find solution.

Hands-On-Practice: Each student should identify a complex problem that they have faced and prepare solution of this problem by decomposing the problem.

3.5 Algorithmic Thinking

Algorithmic thinking is a way of solving problems by producing algorithms. It is a method for solving problems based on a clear definition of the steps; logically and repeatedly.

3.5.1 Algorithm

- An algorithm is an ordered clear sequence of steps to solve a problem or accomplish a task.
- An algorithm is a plan that tells you how to do a task.
- We use algorithms all the time. for example, consider the steps that you take to
 - Prepare a pancake mix
 - Make a cup of tea
 - Convert temperature readings from Celsius to Fahrenheit



Figure 3.13 Making of a cup of tea

To develop an algorithm, we need to represent the instructions in some way that is understandable to a person who is trying to figure out the steps involved.

Two commonly used representations for an algorithm are by using.

- pseudocode,
- flow charts.

3.5.2 Pseudocode

Pseudocode is a description of algorithms using everyday language, similar to English, but structured to resemble a simplified programming language.

Consider the example of adding two numbers.

Pseudocode for adding two numbers

(Addition of two numbers) This algorithm performs addition of two numbers. The variable **A** and **B** will store the two numbers, while the variable **Sum** stores the sum of these two variables.

Step 1: Start

Step 2: Input two numbers A and B

Step 3: $\text{Sum} = A + B$

Step 4: Print the value of Sum.

Step 5: Stop

3.5.3 Flowchart

Flowcharts are diagrammatic representations that show a sequence of actions and the order in which they occur. For example, consider the example of adding two numbers.

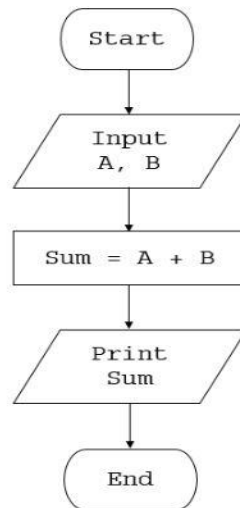
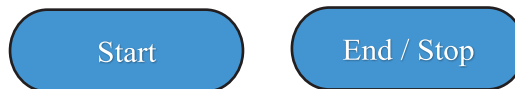


Figure 3.14 The flow chart of adding two numbers

3.5.4 Symbols used in Flow Charts

The following shapes and symbols are used in flowcharts:

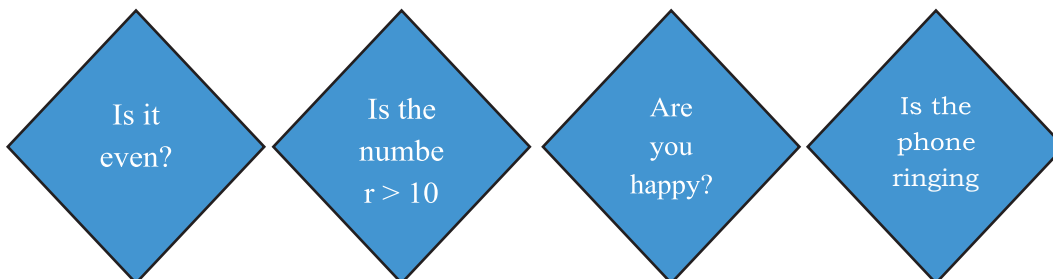
1. **Ovals** are used to show the beginning and end.



2. **Rectangles** are used to show actions.



3. **Diamonds** are used to indicate decisions that need to be made. Think of them as questions.



4. **Parallelograms** are used to indicate the input or output operations in your flowchart.



5. **Arrows** indicate the direction in which the process is flowing from one step to the next.



3.5.5 Guidelines for developing flowcharts.

- Flowcharts can only have one start and stop symbol.
- The general flow of processes (Arrows) is top to bottom or left to right.
- Arrows should not cross each other.
- In case of loops, the flow of process could be from bottom to top.

Example # 1: Calculating the cube of a given number

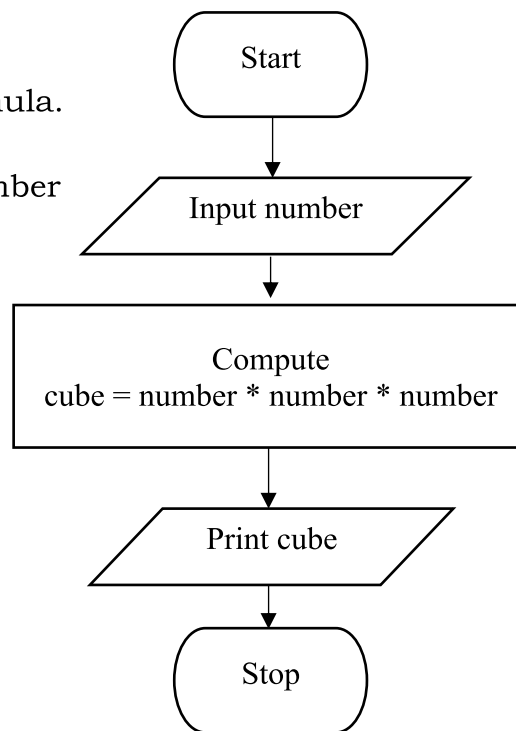
Pseudocode of finding cube of a given number

(Finding cube of a number) This algorithm takes a number as input from the user and then calculates its cube. The variable number stores the input number, and the cube stores the cube value calculated in the algorithm.

- Step 1: Start
- Step 2: Input number
- Step 3: Compute cube using formula.

$$\text{cube} = \text{number} * \text{number} * \text{number}$$

- Step 3: Print cube
- Step 4: Stop



3.5.6 Algorithm building blocks

An algorithm is made up of three building blocks.

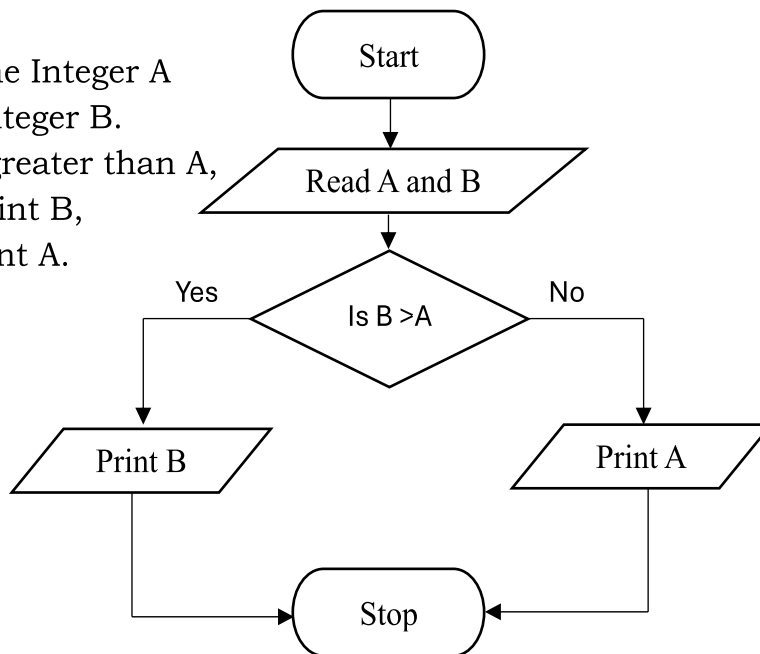
- (I) **Sequencing:** The process must be executed in the same written order. [See Previous examples].
- (II) **Selection / Conditional:** The process executes different sets of steps based on a, conditional statement. Steps are executed if the condition is true otherwise the next step is executed. For example, determining the largest number among all the entered numbers.

Pseudocode for finding the largest number between two given numbers

(Finding the largest number between two numbers). This algorithm will print the largest number between the two numbers

entered by the user. The variables A and B store the given numbers.

- Step 1: Start
- Step 2: Read the Integer A
- Step 3: Read Integer B.
- Step 4: If B is greater than A, then print B, else print A.
- Step 5: Stop



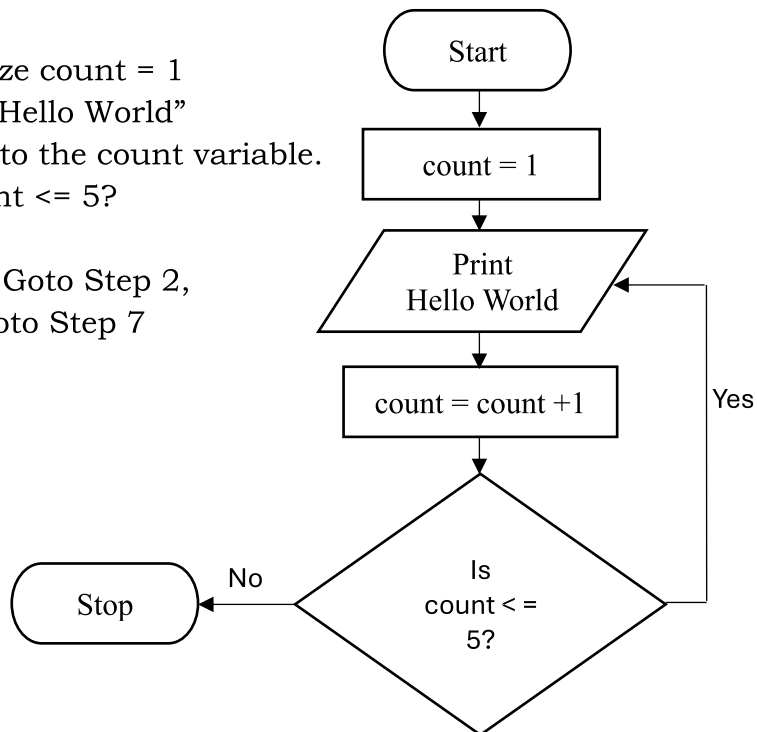
(III) **Repetitive / Iterative:** Repetitive flow, also referred to as iterative flow, is a process in which a statement or a set of statements is executed repeatedly till a certain condition remains true.

For example, Print “Hello World” five times. Here, we want to print the same sentence repeatedly, therefore iterative / repetitive process will be used here. A counter variable is needed to keep track of the repetition.

Pseudocode for printing Hello World on screen five times

This algorithm will print a simple message such as “Hello World” five times. The variable **count** acts as the counter variable.

- Step 1: Start
 Step 2: Initialize count = 1
 Step 3: Print "Hello World"
 Step 4: Add 1 to the count variable.
 Step 5: Is count <= 5?
 Step 6: If Yes
 then Goto Step 2,
 else Goto Step 7
 Step 7: Stop



ACTIVITY

Teacher will engage the students to practice creating pseudocode and flowcharts for various problems such as:

1. Designing an algorithm for getting ready for school.
2. Designing an algorithm for planting a flower in the pot.
3. Designing an algorithm to determine if the given number is even or odd.
4. Designing an algorithm to find sum and average of three numbers.
5. Designing an algorithm for multiplying any two given numbers.
6. Designing an algorithm that take a number for user, it will print Car if the number is 1 otherwise print Bus.

Summary

- Problems are like challenges that make our brain grow stronger.
- Simple problems are like small puzzles waiting to be solved.

Algorithmic Thinking And Problem Solving

- Complex problems are like big adventures that needed more steps to solve.
- Decomposing a problem helps us understand the problem better.
- When solving problems,
 - First, we think about what we know (our facts), like ingredients of a recipe.
 - Next, we look what we start with (our inputs), like the tools for making a craft.
 - Then, we imagine what we want in the end (our output), such as finished drawing or solved puzzle.
- When faced with a problem, we need a plan to solve the problem known as algorithm.
- Algorithms are step by step recipes for solving problems.
- Algorithmic thinking is like having the superpower to solve problems.
- Flow charts are like visual map showing the steps of an algorithm.
- Flowcharts use symbols and arrows to guide us through the process.
- Pseudocode is a simple way to write down algorithms using everyday language just like writing a recipe in words before making a dish.

Important Terms to Remember

Problem	A problem is something (event, task, situation) that needs to be solved. It is like a puzzle or question for which a solution must be found.
Problem solving	The process of finding solutions to challenges or puzzles using logical thinking and creativity.
Problem decomposition	A problem-solving methodology that involves breaking down large problems into smaller, more manageable parts.
Iteration	Iteration in algorithms refers to the repetition of a process or set of instructions until a certain condition is met or a desired result is achieved.
Condition	A condition in algorithms is a logical statement or expression that determines the execution or repetition of certain instructions based on whether it evaluates to true or false.

Exercise

1. Encircle the correct answer

- i. The problem is a:
 - a. Toy
 - b. Challenge waiting to be solved.
 - c. Storybook
 - d. Game

- ii. The example of a simple problem is:
 - a. Building a robot
 - b. Tying your shoes
 - c. Creating a video game
 - d. Baking a cake

- iii. To create a problem-solving plan, we need:
 - a. Ingredients
 - b. Facts, Inputs, Outputs
 - c. Tools
 - d. details
- iv. Decomposing a problem means:
 - a. Making it bigger
 - b. Breaking it into smaller parts
 - c. Solving it quickly
 - d. Ignoring it
- v. Algorithmic thinking is like:
 - a. Being a detective solving a mystery
 - b. Being lost in a maze
 - c. Watching TV
 - d. Playing video games

2. Fill in the blanks with appropriate words given below.

Plan, language, part, small, process.

- (i) Simple problems are like _____ puzzles.
- (ii) Decomposing a problem helps us understand each _____ better.
- (iii) An algorithm is a step-by-step _____ for solving a problem.
- (iv) Pseudo code is a simple way to write down algorithms using every day _____.
- (v) Flow charts use symbols and arrows to guide us through a _____.

3. Provide descriptive answers to the following questions.

- (i). Give an example of a simple problem you've faced and how you solved it.
- (ii). Why is it important to break down a problem into smaller parts?
- (iii). List down the benefits of step-by-step process of problem solving.
- (iv). Can you think of a real-life situation where you might use an algorithm, like a step-by-step plan?
- (v). How does planning a solution reduce the risk of failure?

4. Class Activities

- (i). Solve the given scenario by following six step problem solving guideline. “Ali is having severe headache. He must consult a doctor for treatment.”
- (ii). Apply the concept of problem decomposition and write down the sub-problems for the following scenario.

“Your mother asks you for grocery shopping and you need to go to the grocery shop”.

The problem identified here is “How to do grocery shopping”.

- (iii). Write an algorithm that allows the person to enter a number, algorithm will print table of that number up to 10.

(iv). Write an algorithm that determines whether a student has passed the exam or not. The algorithm takes grades of four subjects as input and then the algorithm calculates the percentage obtained by the student. If the percentage of marks obtained by the student is greater than 60 % then the student has passed the exam otherwise student has failed the exam.

Hint. Simple decision making is needed to solve this problem.

(v). Write an algorithm that calculates the sum of the first 5 numbers i.e. the sum of 1,2,3,4 and 5.

Hint: Repetitive/iterative flow statements are needed to solve this problem.

Note for Teachers

- Teachers must provide real-world problem-solving scenarios and challenge students to apply the techniques of problem solving they have learned.
- Teachers must explore practical applications of algorithmic thinking and problem-solving skills in various fields, such as computer science, engineering, mathematics, and everyday life.
- Engage students in discussions about the importance of breaking down complex problems into smaller, more manageable steps.
- Introduce the concept of algorithmic thinking. Explain that algorithms are step-by-step procedures used to solve problems.
- Use real-life examples to illustrate algorithms, such as recipes, instructions for assembling furniture, or navigating a route on a map.
- Use interactive demonstrations or group activities to reinforce these concepts.
- Teachers must teach students how to design algorithms by breaking down problems into smaller steps, identifying patterns, and developing clear and concise instructions.
- Guide students through the process of refining and improving their algorithms through testing and iteration.



PROGRAMMING SCRATCH

Student Learning Outcomes:

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

- What is Computer Program
- Program & Programming
- Programming Languages
- Importance of Programming language
- Basic Programming concept
- Differentiate between Algorithm and Program
- Getting Starting with Scratch programming
- Setup Scratch Software
- The Scratch Editor
- Programming Sprite
- Fundamentals Of Scratch Constructs
- Design your first Scratch Program
- Running a program
- Debugging a program



Introduction to the Unit

In this chapter, we will learn about the fundamentals of computer programming. We will analyze and apply basic constructs (e.g, sequence, selection, repetition, variables, inputs/events) by creating short programs using a visual programming tool.

4.1 Program Concept

4.1.1 Program

A computer program is like a set of instructions that tells a computer what to do. It is a series of steps or commands written in a language that the computer can



Fig 4.1

understand. These instructions guide the computer to perform tasks efficiently.

4.1.2 Programming

Computer programming is the process of creating and writing a computer program. Programming is like giving instructions to a computer so it can do things for you. It is a bit like writing a recipe for a cake: you tell the computer what steps to follow, and it does them to achieve the required outcome.

4.1.3 Programming Language

Programs are written in programming languages, which provide the facility to write a program in text-based editor or in visual mode. Programming languages are classified into different types which are as under.



Figure 4.2

Do You Know?

ENIAC was the first electronic computer that could run programs, but programmable computers like we have today, the Manchester Baby, built in 1948, is regarded as the first one.

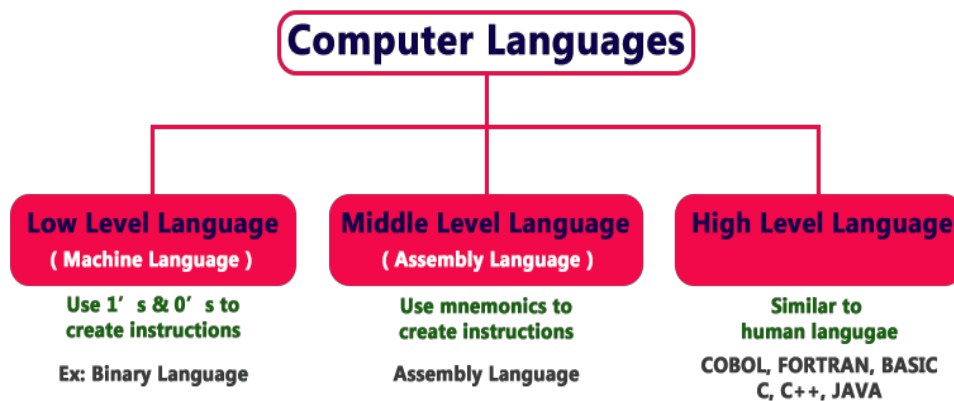

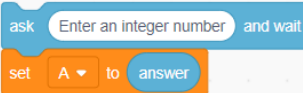
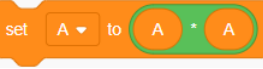
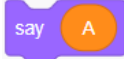


Figure 4.3

- | | |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> • High level plan or strategy for solving a problem. • Describe in simple human language or with diagram. | <ul style="list-style-type: none"> • It uses syntax and features of programming language. • It is actual code that translates algorithm into instructions a computer can understand and execute. |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

4.3.1 Converting An Algorithm Into Program

Algorithm is created in the view of the problem under consideration. Therefore, we simply code the steps of algorithm in programming language like Scratch.

Steps of Algorithm	Steps in Scratch Program
<p>Problem statement: <u>find the square of the given number.</u></p> <p>Input A A=5 Multiply A with A Result 25</p>	<p>Step 1: </p> <p>Step 2: </p> <p>Step 3: </p> <p>Step 4: </p>

You can try running this program in the “**Scratch editor**” by dragging these code blocks and clicking on the green flag to see how it works?

4.4 Introduction to Scratch Programming



Scratch is a block-based visual programming language and online community that provides an interface to create interactive stories, animations, and games. Instead of typing, users can use colorful blocks like puzzle pieces to build their creations. Scratch is free for anyone to use and share. When students create

Programming Scratch

programs, they learn important mathematical and computer concepts, which help them think creatively, solve problems, and develop logical reasoning. Scratch allows students to share their creations online, enabling them to show case their work and team up with others from around the world.



Figure 4.6

Note for Teachers

Teacher's Tip:

Teacher should explain the scratch online community to the students and how to join the scratch community.

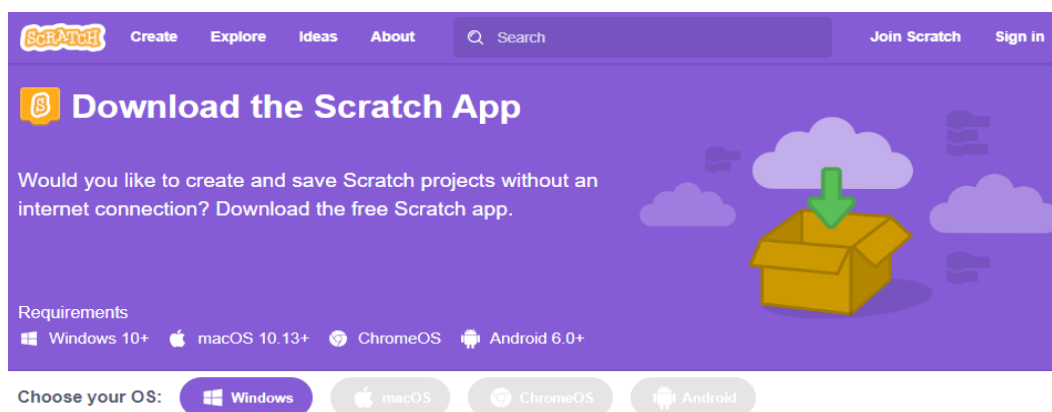


4.4.1 Downloading And Installing the Scratch Software

Step 1: Open Google Chrome or any other browser that you have in your PC and type the following URL

<https://scratch.mit.edu/download>

Step 2: Select **Direct Download** option as shown in the figure.



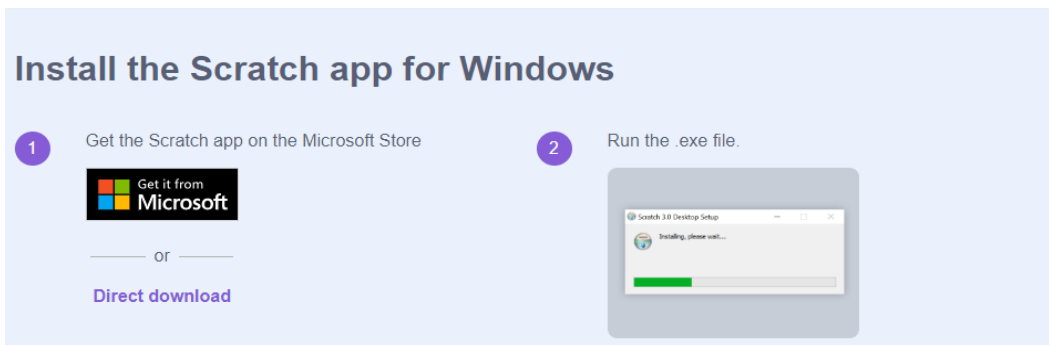


Figure 4.7

Step 3: After downloading the software, proceed with the installation steps.

Step 4: After successful installation process the Scratch icon appears on the desktop of your computer as shown in the figure. Click on the icon to start your Scratch software.



4.4.2 Using Scratch Online

You can also use Scratch online by accessing its editor through your web browser. Simply enter the following URL.
<https://scratch.mit.edu/projects/editor/>

Once you've opened the URL, Scratch will work just like the offline/downloaded version. You can also create an account on Scratch website to save your projects online.

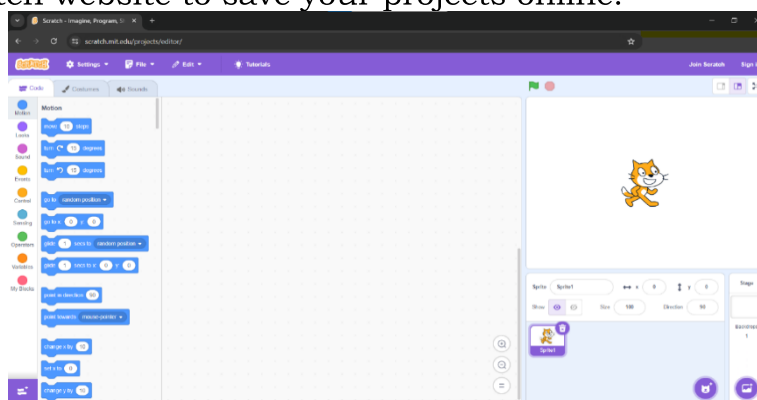



Figure 4.8

4.5 Working with Scratch

 To start working with Scratch, double-click on the Scratch icon available on your computer desktop after installation. Once the software is opened you can see a Scratch editor screen.

4.5.1 Scratch Editor

The Scratch editor provides a platform where you can drag and drop snap code blocks to create games and animations. On the Scratch editor platform, we can find many options like the following.

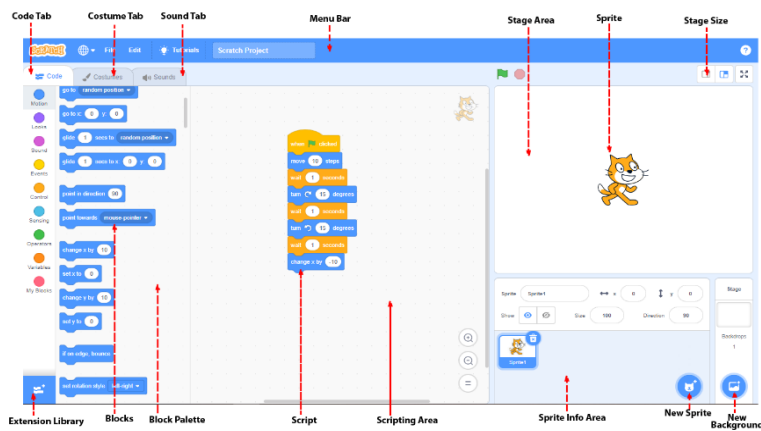


Figure 4.9 Scratch Editor

ACTIVITY

Teacher guide the students to open the Scratch software and explains all the options available in Scratch editor.

4.5.1.1 Costume Tab

It enables users to alter the appearance of a sprite to generate many effects, including animation. You can also choose a different costume by clicking the bottom-left button labeled “Choose a Costume”.

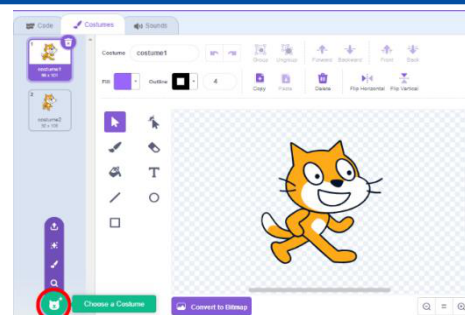


Figure 4.10

4.5.1.2 Sound Tab

This tab is used to record, import, or edit sounds. You can choose the sound from Scratch library, record your own sound, select a surprise sound or import a sound file from your computer.

Common Ribbon

Menu Control



Upload: you can take a picture from your computer.

Surprise: Any random image will automatically select.

Paint: you can paint or drawn your creation.

Choose from library: you can select any image from available library.

These are the common menu items for Sprite, Sprite costume, Backdrop and Sound.

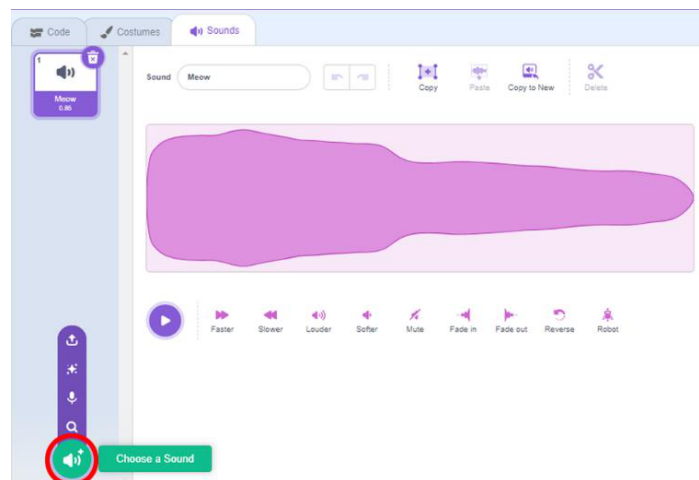


Figure 4.11

4.5.1.3 Code Tab



Code Tab contains block Palette which have Control blocks used to control sprites. Programming a sprite always begins with a control block (orange or yellow category).

There are 9 block palettes available on the Code Tab.

1. **Motion:** When you click on the motion button, you'll find blue blocks to make your sprite move in different ways.
2. **Looks:** This purple block palette allows to change the color, size and costumes of your sprite.
3. **Sound:** This orchid color block palette allows you to add the sound in your program from the available sound library, record sound, or upload it from your computer.
4. **Events:** Event triggers specific code at a particular time or action. Such as clicking on green flag. These blocks are “starting blocks” means they must be placed at the beginning of each new code segment and found in yellow color.
5. **Control:** As the name control it used to control the scripts. It provides option to wait, use loops and conditional statements in your program.
6. **Sensing:** This block helps your program to detects things. They can find out where the mouse pointer is, how far apart sprites are, and if one sprite is touching another.
7. **Operators:** The operators block use to compare variables and values, do calculations with numbers, and work with strings(text).

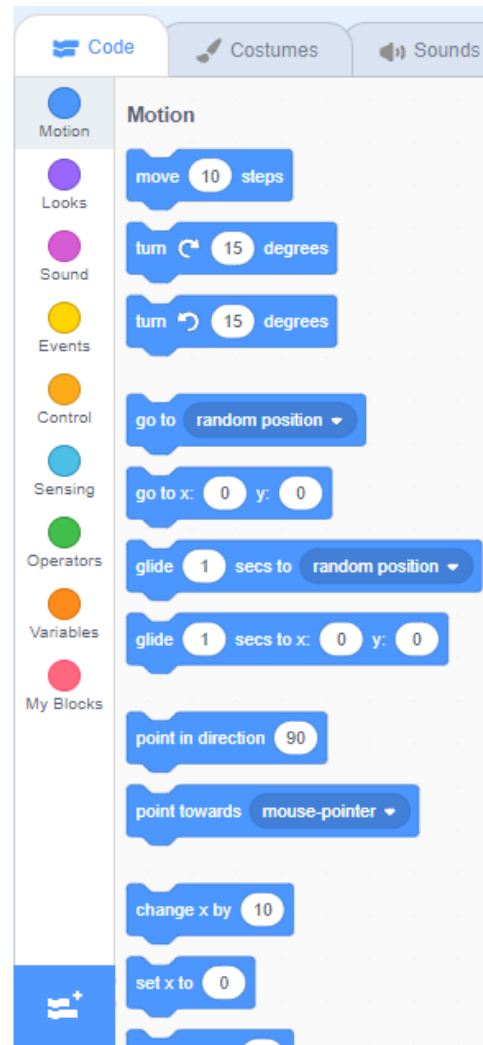


Figure 4.12 Code Blocks

8. **Variables:** The variable blocks are used to save the values that are used in the program.
9. **My Blocks:** This will allow to create new blocks for a sprite. You give the name and then define what the new block does using other Scratch blocks.

ACTIVITY

Teacher guide the students to open the Scratch software and explain each block one by one, providing examples for better understanding.

4.5.2 Elements Of Scratch

Scratch has four main parts: the **Stage**, **Sprites**, **Scripts**, and **Programming Palette**. We can think of them as the different roles and props in a play.

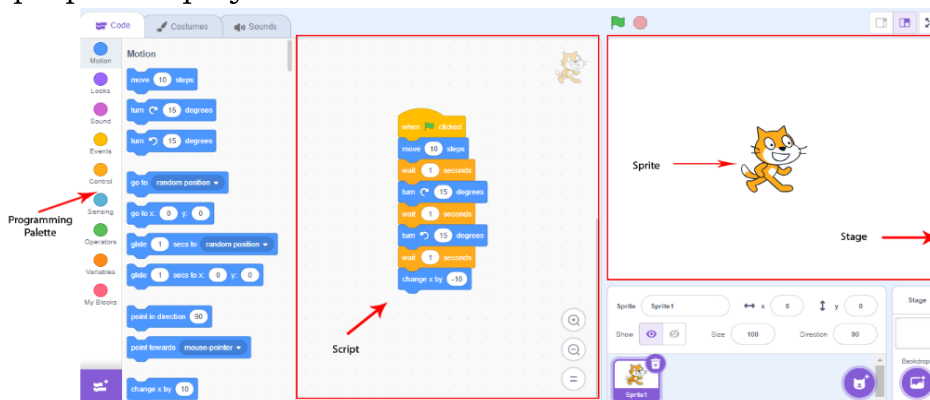


Figure 4.13

Sprite

They are the basic object in Scratch which are the actors or main characters of the project. Sprites are programmed to do something in Scratch. The default sprite in scratch is orange cat.

Stage

It is similar to the stage in a play. It is the main area where the action of your program takes place.

Programming Scratch

Script

It tells the actors what to say or do. Each sprite is programmed with a script.

Programming Palette

Elements used to program the sprite to do or say something. Sprites must be programmed to carry out every function you want them to perform.

4.6 Programming a Sprite

Programming a sprite means choosing a character or object, changing its appearance, position, background, and foreground colors and telling it what to do by giving it instructions in the form of block code which looks like a puzzle that you simply drag and drop from Block Palette.

4.6.1 Choose Sprite

The default sprite is an orange cat. You can choose or draw a different sprite from the **Choose a Sprite** option located at the bottom of **Sprite Info Area**. You can select any sprite from the library or draw your own or upload from your computer.

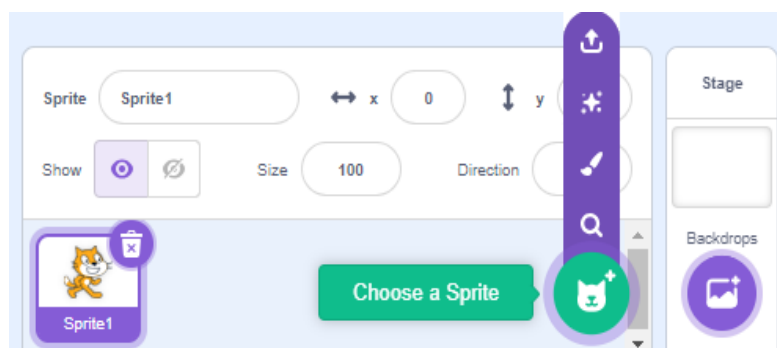


Figure 4.14

ACTIVITY

In the Scratch editor, replace the default sprite with a new one that you like.

4.6.2 Choose a Backdrop

A backdrop is like a background of your stage. The **Choose a Backdrop** option is available at the bottom right corner next to the **Choose Sprite** button. You can choose backdrop from library, you can paint on your own using Scratch paint editor, surprise option will select random backdrop from the library and upload option allows to upload an image from your computer.

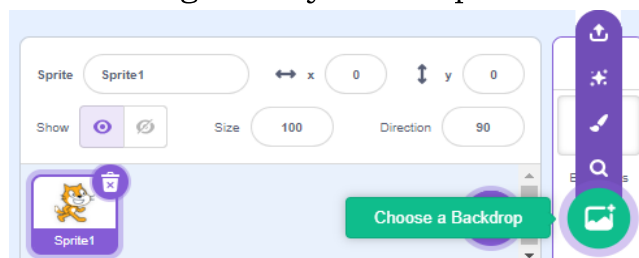


Figure 4.15

ACTIVITY

Upload a new background from your computer in the Scratch stage area.

4.6.3 Stage Area

The Stage Area is the main area where all the fun activities happens. It is where characters move perform actions, and follow the instructions you give them. The stage acts as the background of your project. Coordinates in Scratch are based on the grid image below.



Figure 4.16

Note

Coordinates are like addresses that tell you exactly where something is located. They're used to pinpoint a specific position on a map, grid, or other surface.

Programming Scratch

X and Y coordinates are like the address of a point on a graph. The X coordinate tells you how far to go horizontally (sideways), and the Y coordinate tells you how far to go vertically (up or down).

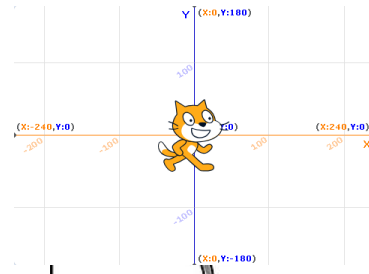


Figure 4.17

Stage Adjustment:

1. Small stage - decrease the stage windows and increase the script area.
2. Regular size - increase the stage windows and decrease the script area.
3. Full screen mode - switch the stage window to full-screen.

4.7 Fundamentals of Scratch Constructs

Programming constructs are simple building blocks that help you control how your program works.

There are five main types of programming constructs in scratch.

1. SEQUENCE

In programming, a sequence means a list of steps that tell the computer what to do, one after the other. In Scratch, if you have two characters, each can have its own list of steps to follow and do something.

2. EVENTS

An event is something the program knows about and reacts to, like pressing a key, clicking a mouse, or

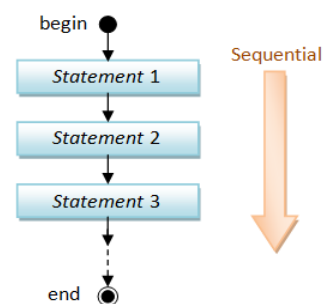


Figure 4.18

tapping a phone screen. In Scratch, events are shown in yellow color.



Figure 4.20

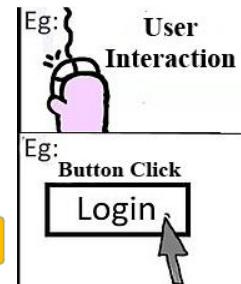


Figure 4.19

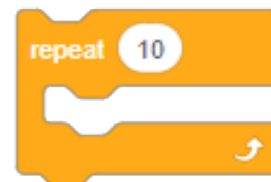
3. LOOPS

Loops are like a magic trick in coding that make action repeat again and again without needing to write the code multiple times. In the control section of block code, you'll find three types of loops, each with its own special job.



repeat (number n) Block

The "repeat" block is a type of control block. It lets you repeat a set of commands 'n' times. The number 'n' can be any positive whole number.



repeat until Block

The "repeat until" block is a type of iteration block. It runs a set of commands until a certain condition remains true. The condition you put inside "until" decides when the loop stops.



forever Block







The "forever" block is a type of iteration block. It runs a set of commands continuously without stopping. There's no stopping



Programming Scratch

condition in the forever block. It is used when you want something to keep happening forever, like a never-ending point.

Examples of Loops

Type	Code Block	Program Script	Description
Repeat x Number of times			When the space bar on the keyboard is pressed, the Sprite will say "Hello" every 2 seconds and repeat it 10 times.
Repeat Until			When you click on Sprite it will say "Hassan is Cool" and repeat it every 2 second until the space bar on keyboard is pressed.
Forever			When Green Flag is clicked Sprite will turn 15 degree clockwise forever.

ACTIVITY

How many times does these loops repeat the block inside?



4. SELECTION/ CONDITION

A condition is like a rule in a program that tells it what to do next. It is similar to a yes-or-no question. If the answer is "yes" (true), the program does one action. If the answer is "no" (false), it does something else. Conditional statements are like everyday choices. Computers use them to decide what to do next based on whether something is true or false. You'll see them in control blocks of code tab.

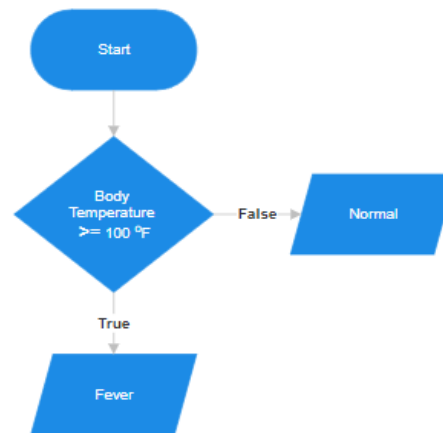


Figure 4.21

If then Block

It is a control block. This block works on the condition's value. This block decides what to do depending on a condition. If the condition is true, it runs some code. If not, nothing happens. For example, as shown in **Fig 4.22**, if the user types "a", then the sprite must glide for 1 second.

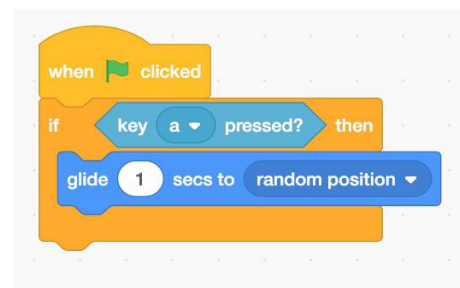


Figure 4.22

If then else Block

It is a control block. This block is an extension of the if-then value. If condition is true, then a set of lines specified in “If” body gets executed. And a condition is false, then set of lines specified in “else” part is executed. For example, if the user types “a”, then the sprite must glide for 1 second or else must say “hello”.

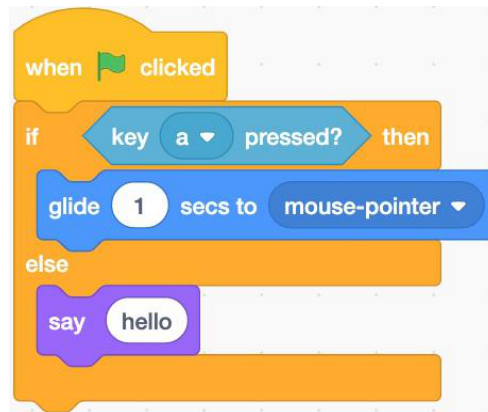


Figure 4.23

5. VARIABLES

Variables are like containers that hold values. Imagine a box with a number inside it. A variable is a named computer's memory location where we can store data. It can only hold one piece of information at a time. Variables store data of different types (like name, number/digits etc.). Once the variable is created, we can use it in different parts of a program.

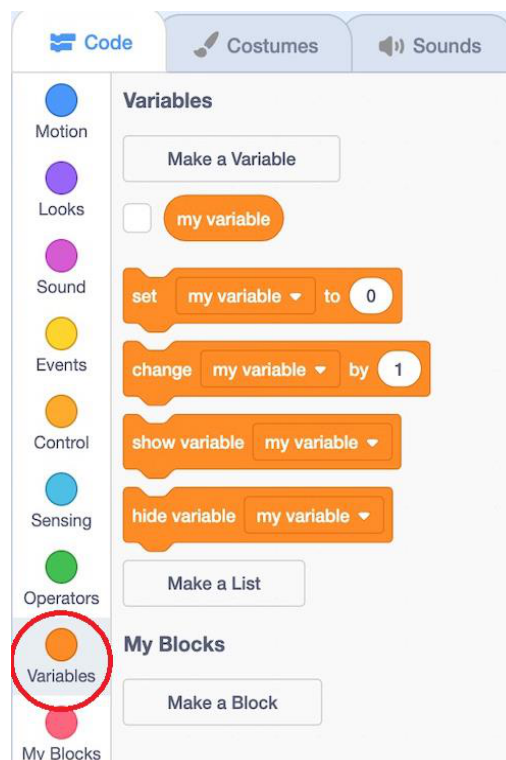


Figure 4.24

4.8 Create and Run First Program in Scratch

Now it is time to create the first simple program in Scratch by using different code blocks. In this program, our default sprite will interact by asking question and showing a greeting message. Let's begin with following steps.

4.8.1 Creating First Program

Open Scratch software's editor

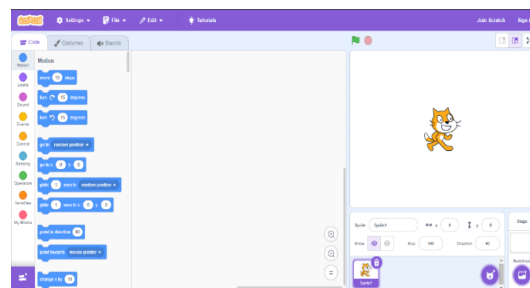
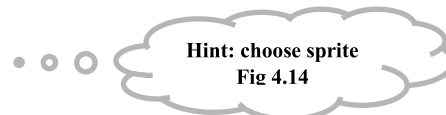



Figure 4.25

1. Select your default sprite or you can change the sprite.
2. Go to **Events** block palette and



drag  “**when Green flag Clicked**” block in scripting area.

3. Go to **Sensing** block palette and drag “**ask what's your name? and wait**”  block in scripting area.

Programming Scratch

Here you will see that both blocks fit into one another like puzzle or Lego pieces.

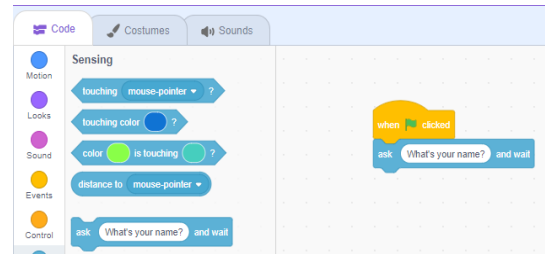
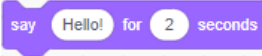


Figure 4.26

4. Go to the **Looks** blocks palette (purple) color and drag  “**say Hello! for 2 seconds**” and snap it right below of the previous block.

4.8.2 Saving First Program

To save your program, go to the File menu and click on Save to Your Computer.

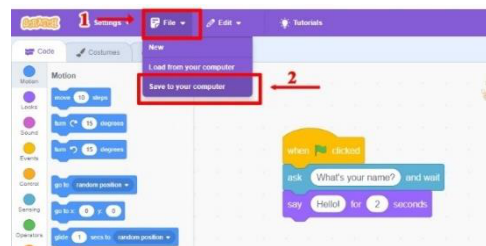


Figure 4.27

4.8.3 Running First Program

To run the first program, follow the steps:

1. Click on the green flag button present on the top side of **stage Area**.

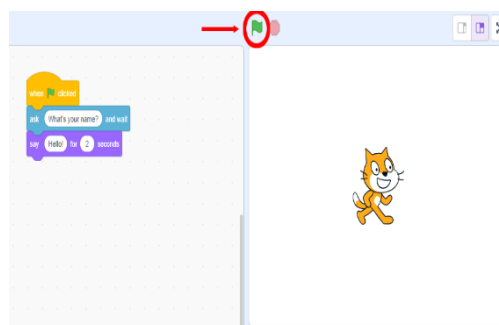


Figure 4.28

2. The Sprite will ask for the name by prompting “What’s your name?”.

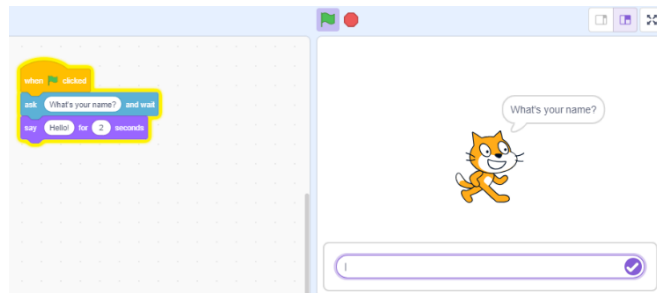


Figure 4.29

3. Type your name in purple highlighted text box and press Enter from your keyboard.

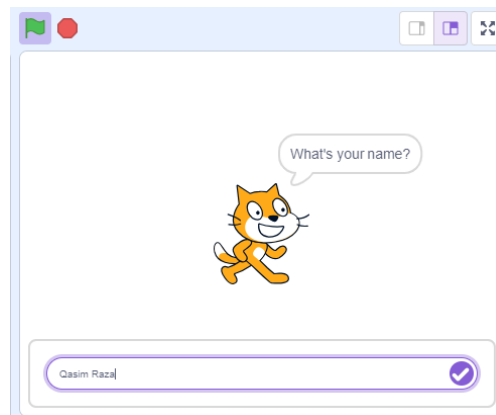


Figure 4.30

4. The cat will say hello and after two seconds the bubble disappears.

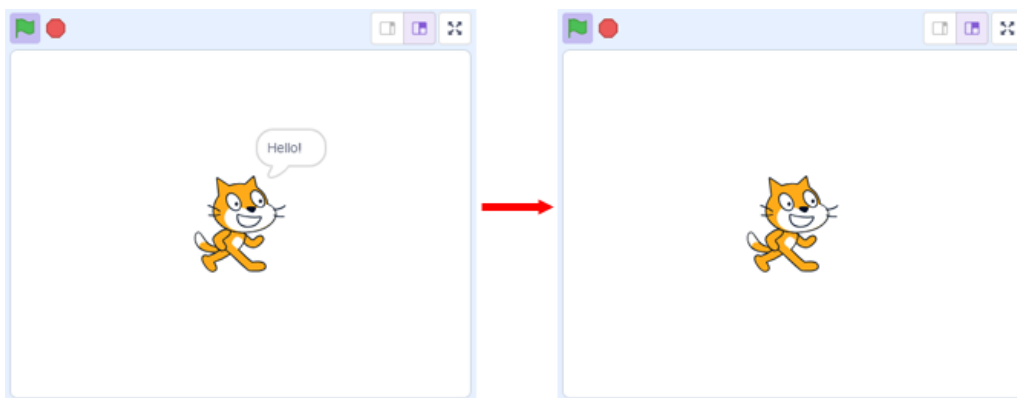


Figure 4.31

Programming Scratch

This is our first program which says the following when the green flag is clicked the cat (sprite) will ask for the name and then wait after we input our name the cat will say hello for two second. This is how code works these code blocks are executed one after another.

4.8.4 Make First Program Smarter

Now the sprite will do something a little bit smarter this time, so let's go to **Sensing** code block palette which is in light blue color.

1. Open your first program from your computer. Go to file menu and click "Load from your Computer".

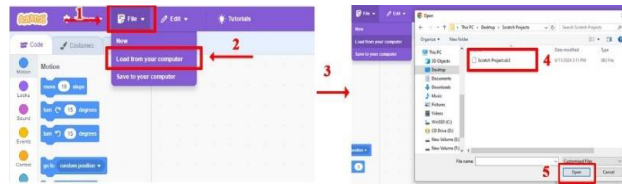


Figure 4.32

2. Your first saved scratch program is now open into your editor.

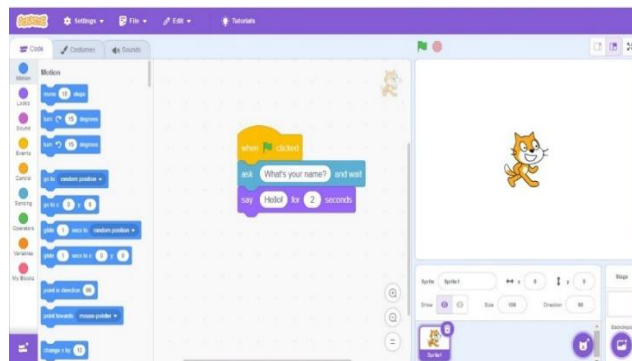



Figure 4.33

3. Drag **answer**  block and snap it into “**say Hello! for 2 seconds**” block where “Hello” is showing.

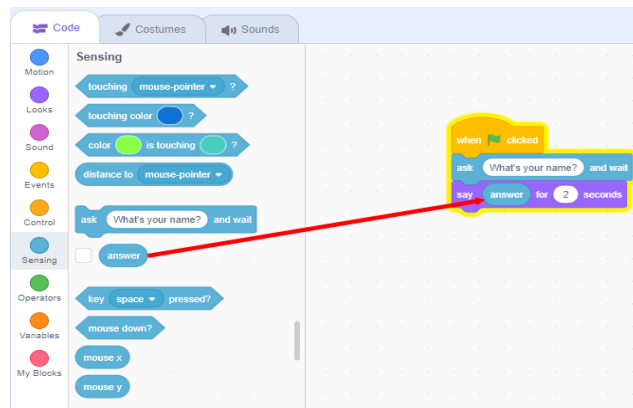


Figure 4.34

4. Now cat/sprite instead of saying hello it is going to say the answer whatever you type in the text box in previous step **fig 4.8.3 3**.

5. Run the program, typing the name and now sprite will say the name.

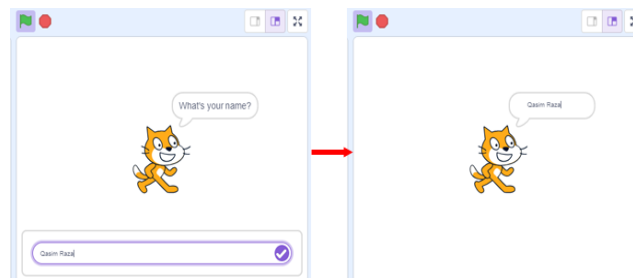



Figure 4.35

By doing such code our sprite will echo back whatever we typed. Let's make the sprite do a proper greeting by saying “Hello Qasim Raza” instead of saying “Qasim Raza”. For this we use **Operators** code block palette.

6. Go to **Operators** block palette (green) and drag the **join**  block code into scripting area.

7. Take out the answer

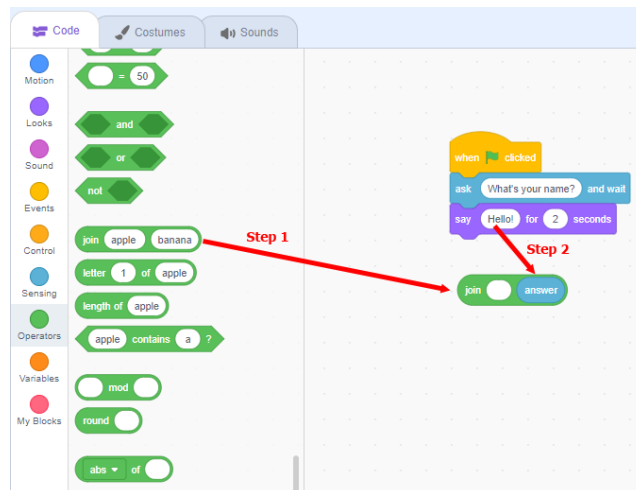
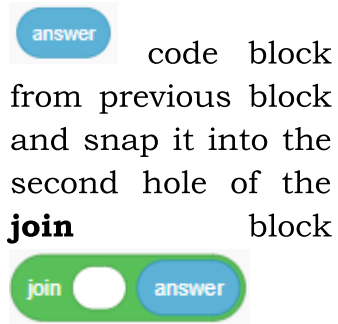


Figure 4.36

8. In first hole of **join** block type some greetings word like hello and snap this join block to the previous “say” block.

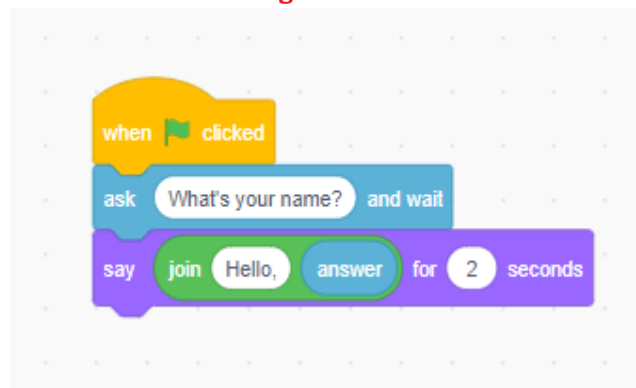


Figure 4.37

Congratulations, at this point your first code is smarter than previous one. Now run your program and see the results.

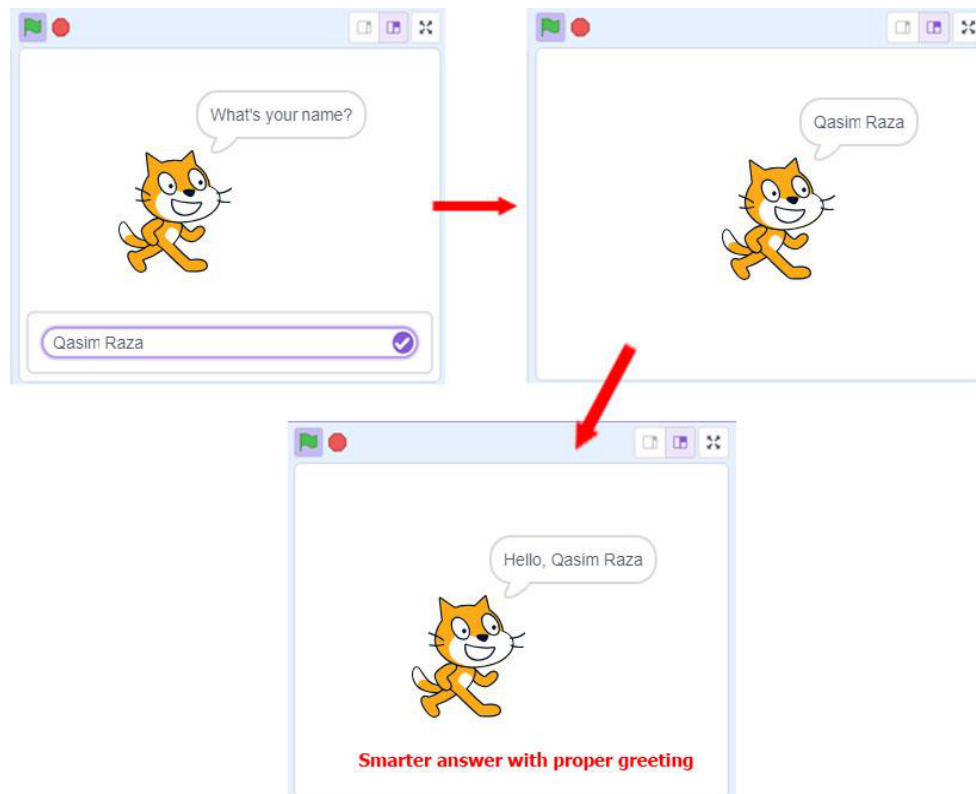


Figure 4.38

4.9 Debug A Program

Bugs are errors or mistakes in writing a program. Debugging a program means finding and fixing mistakes or problems in it, so that program will run smoothly. It is like solving puzzles to make sure the program works correctly. Following is the debugging cycle through which we can fix the bugs.

- Run the program.
- Understand the problem that causes program to run abnormally.
- Examine the code to identify where things might be going wrong.
- Fix the issue in the code.
- Run the program again to make sure the problem is fixed.

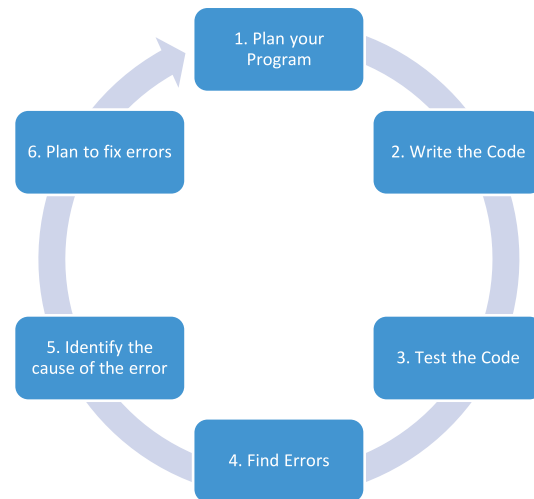


Figure 4.39

4.10 Creating And Running Another Program

We are creating another program in which Sprite will move from left to right and right to left.

- Open Scratch Software.
- Select the favorite sprite.

Select your desired sprite by clicking on the "**Choose Sprite**" button. A sprite selection window will appear. Select your favorite sprite, and it will be added to the sprite area. Once your sprite is added, a small cross icon (x) will appear next to the default sprite, allowing you to delete it.

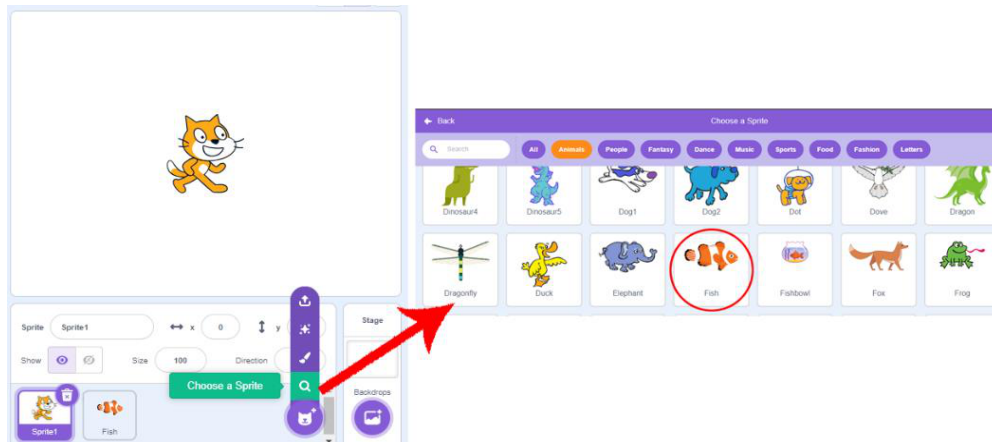


Figure 4.40

If you want to change the color of your sprite, you can go to the costume tab and change the color, use any available costume of your sprite, or design your own.

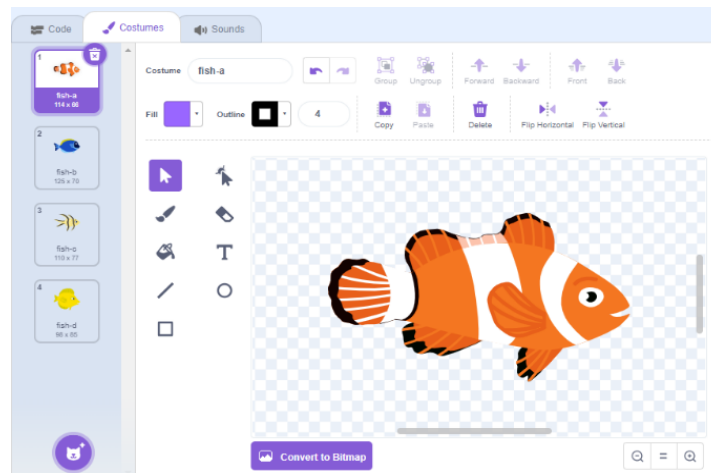


Figure 4.41

- Select any suitable backdrop (if you want)



Select the new backdrop from choose a backdrop option.

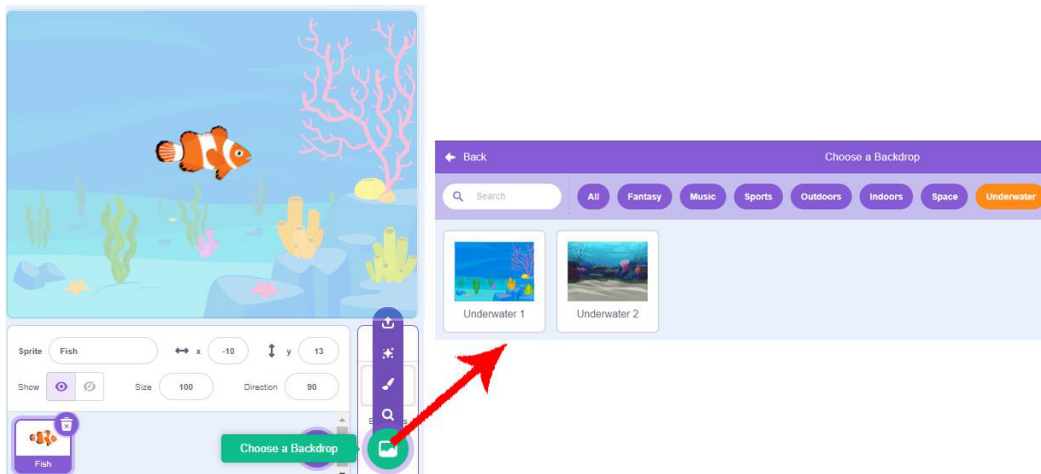

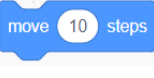


Figure 4.42

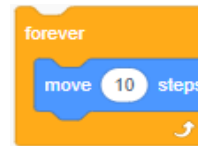
All the basic steps are done now it is time to program some code.

Click on the sprite to write its script so the sprite should move. Follow these below steps.

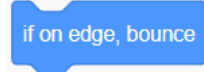
- go to Events block palette and drag  “when Green flag clicked” code block in scripting area.
- go to Motion block palette drag  ”Move 10 Steps” code block to make your sprite move 10 steps.

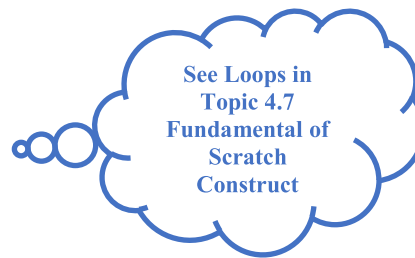
By writing above code, sprite will only move 10 steps and then stop. To make the sprite move continuously use a forever loop.

- drag the **forever loop**  block from **Control** block palette and snap “**move 10 steps**” block into the **forever loop** block.



Here, you can see that because of the “**forever**” loop block, the sprite will continuously move and may move outside the stage area. So, you have to use the “**if on edge, bounce**” block

 from **Motion** block palette to bounce back the sprite in the stage area.



When your sprite is back on the stage, it appears vertically and horizontally flipped, as shown in the figure.

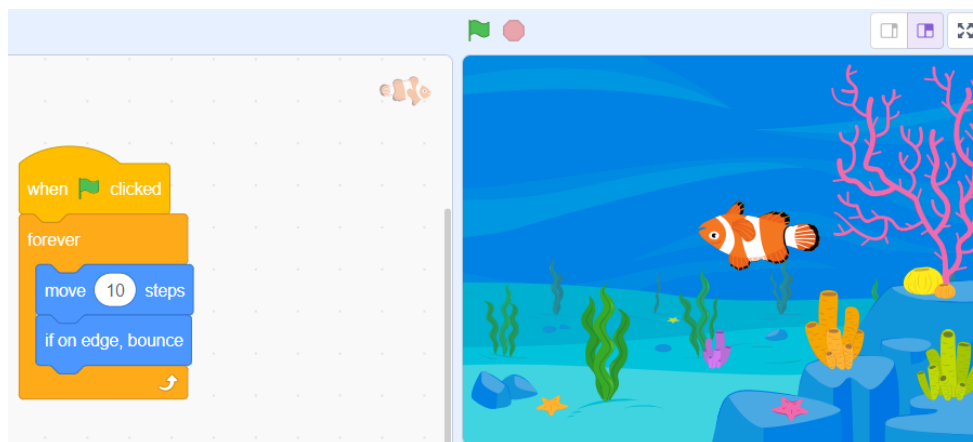


Figure 4.43

To set the sprite orientation after it bounces back from the edge.

- Drag the “**set rotation style, left right**”  block from **Motion** block palette.

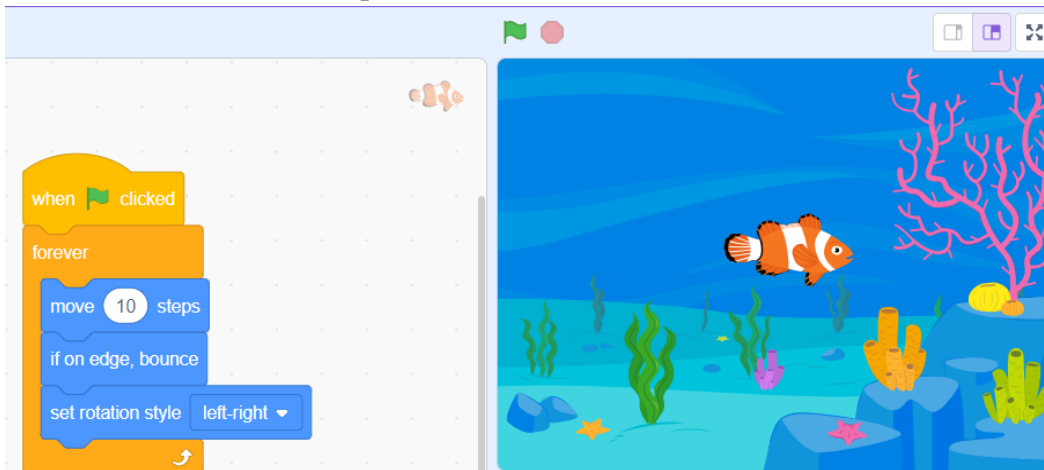


Figure 4.44

You will see the sprite move from right to left and back again. You can control the speed of sprite by adding

- The “**wait**” block  from **Control** palette and set the desired time in second instead of 1.

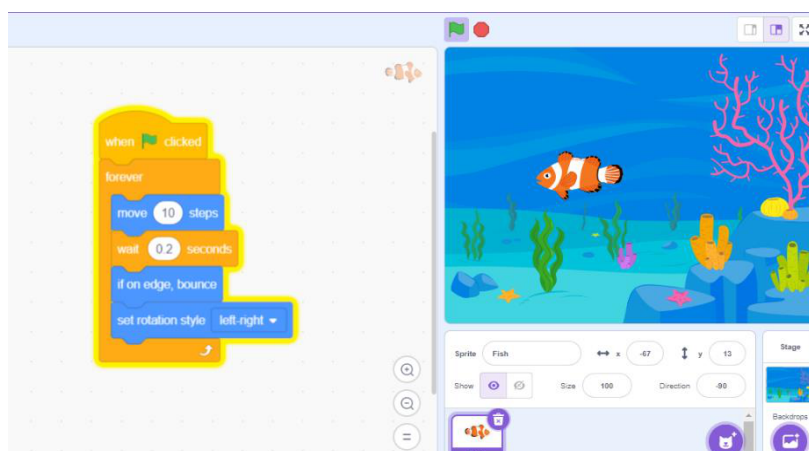


Figure 4.45



We can make this program more interactive by adding additional blocks based on the situation. For example, when the sprite bounces back from the edge, its costume changes. Additionally, before bouncing off the edge, the sprite can say "Bye," and after bouncing back, it can say "Hello."

- Use the **Sensing** block and **Control** block to detect the edges of the stage and apply condition if-else block.

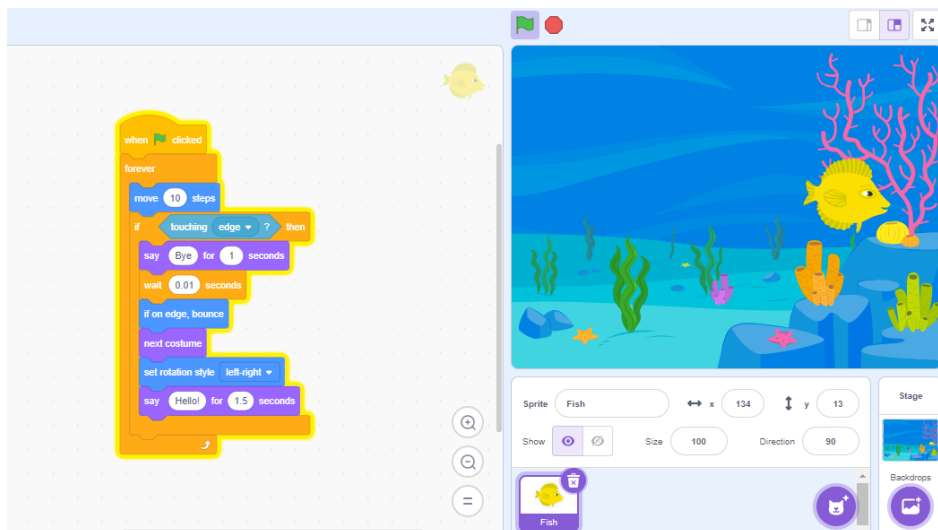
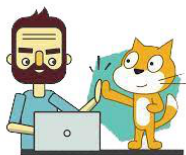


Figure 4.46



Update your code as shown in the above picture and click on the green button to run the program.

Congratulation! You have created your first animated Scratch program.

Summary



- ✓ Scratch programming is an engaging way for kids and beginners to create their own stories, games, and animations.
- ✓ The main purpose of Scratch is to help young learners learn basic coding concepts without getting into the difficulties of textual coding. Here are some benefits of coding with Scratch.
 - Enhances analytical and problem-solving skills
 - Makes it easier to learn coding
 - Makes learning fun and interesting
 - Explains programming logic visually
- ✓ An **Event** is like a signal that makes something happen. Like pressing button to start the game.
- ✓ A **Sequence** is a list of actions performed one by one, in a specific order. Computers follow these actions exactly as they're written.
- ✓ A **Loop** repeats a set of instructions until a specific stopping condition is met. It is a way to do something over and over again without having to manually do it each time.
- ✓ A **Variable** is like a container where we keep some information/data, which we call its value.
- ✓ An **Error** results in incorrect execution or behavior of a program.
- ✓ **Debugging** is the process of finding errors or bugs in a program and fixing them so that the program can execute smoothly.
- ✓ A **conditional statement** asks a question to figure out which path to take next.

Important Terms to Remember

Online Community: An online community is like a big group of people who talk and share stuff on the Internet. It is like a virtual version of a neighborhood or club where people with similar interests or goals come together to chat and help each other out.

MIDI: Musical Instrument Digital Interface

URL: Uniform Resource Locator

Program: Set of instructions

Repetition/Iteration: Act of doing one thing again and again

Add-on: An add-on is a small program or tool that adds extra features to existing software, enhancing its functionality.

Dragging: Pull (something) along forcefully

Constructs: to make or form by combining or arranging parts or elements

Extension Library: An extension is an add-on that adds extra features and functions to a program or software. It improves the original capabilities, allowing users to do more with the software.

Exercise

1. Encircle the correct answers.

- i) VPL is the:
 - a. Graphical Programming Language
 - b. Set of instruction
 - c. Visual Programming Language
 - d. A Background
- ii) Scripts in programming are the:
 - a. List of sprites
 - b. List of background
 - c. A set of instructions blocks connected with one another used for programming.
 - d. None of the above
- iii) The types of code blocks in Scratch are the:
 - a. 3
 - b. 5
 - c. 7
 - d. 9
- iv) The blocks which we use to start the program:
 - a. Control block
 - b. Event Block
 - c. Motion Block
 - d. Looks Blocks
- v) The actual working space where you can drag and drop Code blocks to be executed is:
 - a. Block palette
 - b. Backdrop
 - c. Script Area
 - d. Stage

2. Fill in the blanks with appropriate words given below.

Repeat, Wait, if – else, Use the move block, Use the if block

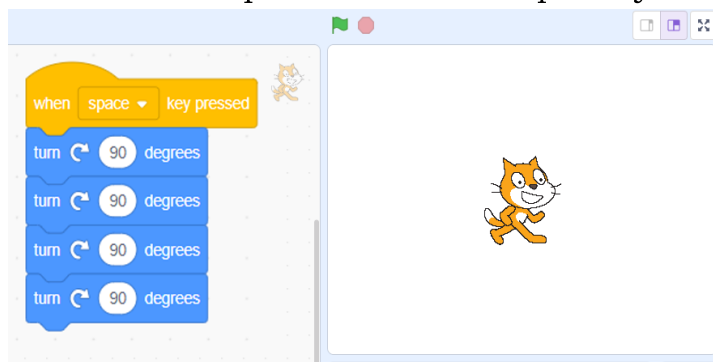
- i. The block used to create a loop in Scratch is _____.
- ii. The construct used for creating a wait time in Scratch is _____.
- iii. We check if a certain condition is true in Scratch using _____.
- iv. The construct used for making decisions in Scratch is _____.
- v. To move a sprite in Scratch, we _____.

3. Provide descriptive answers to the following questions.

- i. What is programming?
- ii. Differentiate between Algorithm and Program.
- iii. Explain Sprite, Script and Stage.
- iv. Define 9 available options in block palettes.
- v. What is control block used for?
- vi. In what situations are conditional statements used?
- vii. How do we change the backdrop in Scratch?

4. ACTIVITY

- i. Get the Scratch Software on your lab computers by following the instructions in the software download section and install it.
- ii. Write a code that makes the sprite moves 10 steps only and make this sprite move in the direction for 10 times, what code block should be added to the code?

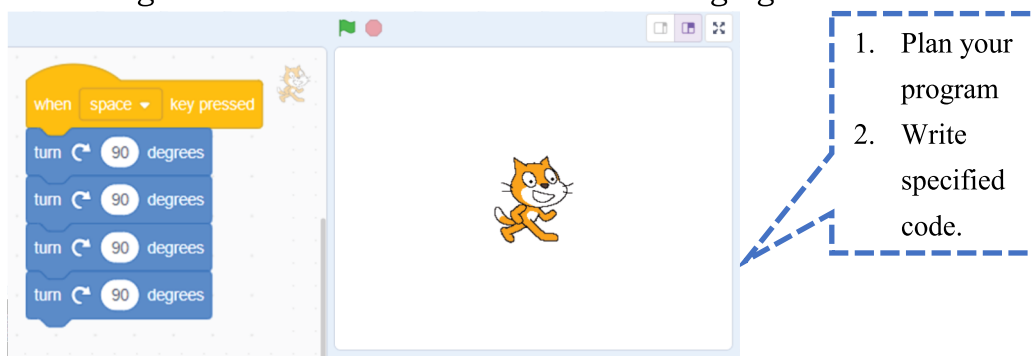


- iii. Design a game which using cursor key to move the sprite on the stage from left to right and right to left.
- iv. Teacher should guide students how to fixing the bug in the code by apply debugging process

APPLYING DEBUGGING PROCESS

Open your scratch editor

Drag code block as shown in the following figure



Run your code and see the results.

Nothing will happen


The block codes run at a same time one after another in micro seconds.

Use **Control** block palette and

drag **wait**  code block.

The block codes run at a same time one after another in micro seconds.

Use **Control** block palette and

drag **wait**  code block.

1. Plan your program
2. Write specified code.

3. Test the code

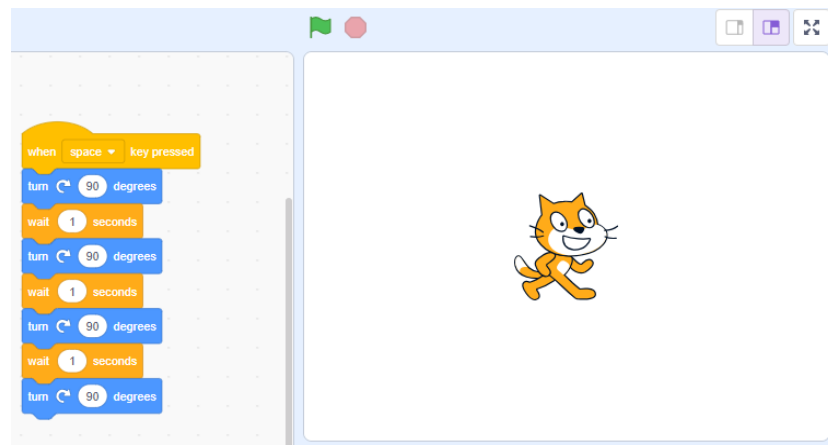
5. Identify the cause of error.

6. Plan to fix errors.

7. Identify the cause of error.

8. Plan to fix errors.

Programming Scratch



Note for Teachers

- Teachers should motivate students to explore various resources and continue learning independently.
- Divide the class into group of 2 or 3 students.
- Open all the code block option from each block palette and discuss with groups about the working of each and every block by placing the blocks in the Scratch script area.
- Make a sample program in which two Sprites talk with each other. Try making few jokes.

USEFUL LINKS

- <https://scratch.mit.edu>
- <https://scratch.mit.edu/download>
- <https://scratch.mit.edu/projects/editor/>
- <https://scratch.mit.edu/ideas>
- <https://scratch.mit.edu/explore/projects/tutorials/>

UNIT 05

DIGITAL CITIZENSHIP



Student Learning Outcomes:

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

- Understand the essentials of a good digital citizen.
- Define copyright, plagiarism, and piracy
- Understand ethical issues that arise in ICT while surfing online.
- Identify the health-related issues of using ICT Devices.



Introduction to the Unit:

This unit will cover important aspects of digital citizenship. Our purpose is to prepare students for the global technology demand of the future. This unit also defines terms like copyright, plagiarism, and piracy. Here we also discuss health-related issues while using ICT devices.

5.1 Citizen and citizenship

A citizen is a person who belongs to a country or nation. Citizenship means being a member of a country. When you are a citizen, you belong to a place like you are citizens of Pakistan. It gives you rights, like the right to vote and the right to be protected by the laws of your country. Citizenship also comes with responsibilities such as obeying rules, helping others and being a good member of your community.



Figure 5.1 Citizens of Pakistan and Other Countries

5.2 Digital citizenship

Digital citizenship is the ability to be involved with the Internet or technology in a meaningful and safe way. If you are playing online games using social media or applying online for a passport through the NADRA website, then you are a digital citizen.



5.2.1 Good Digital Citizens Use ICT Devices with Care and Responsibility

A good digital citizen has the knowledge and skill to use ICT devices with care and responsibility. Here are some tips to be a good digital citizen and stay safe and responsible while using the Internet.



Figure 5.2 Good Digital Citizen

I. Stay Private

Never share your personal information online like your parent's name, phone number, date of birth, password, ATM PIN or home address etc. with any website or person.



II. Strangers are not your friend

Never befriend strangers online, this can be dangerous for your safety. People may not be who they claim online.



III. Use a strong password

Never use your name or date of birth as your password these types of passwords are easy to guess. Use combination alphabet, digits and special characters (*, ?, !, @, #, \$..) as password.



IV. Ask permission

It's always good to ask your parent or teacher if you can use the Internet or ICT devices. It is a good idea to ask for recommended websites to help you stay safe. Never take a picture of someone without permission.



Take permission from your parents before using ICT Device

V. Be kind

Treat people the way you would like to be treated on social media or during online classes never use inappropriate language or make rude comments online, always communicate kindly on social media and talk kindly.



VI. Tell your elder

If you see or experience something that is not right (such as online bullying or trolling), tell your parents or teacher to get support.



Note for Teachers

Digital footprint is the record of your data while using the internet or social media it also includes your search history which can be seen by your parents or teachers.



Note

ONLINE TROLLING OR BULLYING

When someone intentionally tries to insult, cause trouble or directly attack people by posting harsh comments on social media

A friendly-looking robot with a white head and body, blue joints, and red accents. It is holding a red pencil. The background is a dark blue space with floating keys and a large padlock.

ACTIVITY

The teacher involves the students in an activity where they learn to develop a strong password for their E-mail account. Each student creates a strong password by using these rules.

1. The password should be 8 characters long.
2. The first character must be the 1st alphabet (uppercase) of the student's favorite fruit.
3. The next three characters must be their choice.
4. After digits use any special character of the student's choice.
5. The last three characters will be lowercase alphabets taken one letter from the student's father's name, one alphabet from the student's mother's name and one alphabet from the student's name



Tip to remember

Never use the same password for all of your accounts

5.3 ICT Ethics

ICT ethics is suitable behavior while using the internet and computer devices



Figure 5.3 ICT Ethics

Note

The main characteristic of computer ethics is to use ICT devices and the Internet without harming people's privacy and obeying the laws related to copyright and software piracy and plagiarism.

5.3.1 Copyright Law

Copyright law is a protection given by the government to creators and developers to prevent unauthorized use of their work without their permission. This includes music, videos, images and documents.



Figure 5.4 Copyright Law

To use copyrighted material, you must get permission from the owner. Let's suppose you write a poem for your teacher and one of your friends uses your poem in his essay without telling/asking you, this is a violation of copyright law. Every country has its copyright laws and one can get fined and imprisoned if he/she does not obey these laws.

5.3.2 Plagiarism

Plagiarism is the use or copying of another person’s ideas, words, drawings, art, music, etc., and presenting it as one's own without acknowledging the author or obtaining their permission.

Let’s suppose a student copies their friend’s drawing and claims it as their own in front of the class; this is plagiarism.



Figure 5.5 Plagiarism

5.3.3 Piracy

The term piracy comes from the word “pirates”. Piracy involves downloading, selling, and using copyrighted games, music, movies, TV shows, photographs, and software without paying the price. For example, If you want to play a computer game online that requires payment and you do not pay and play the same computer game through pirated websites. It is piracy.



Figure 5.6 Piracy

 **Note**



The word Pirates belong to thieves in old times they stole from people traveling through the sea .

Stay Safe Online / Good Digital Citizen	
DO ✓	Don't ✗

5.4 Ethical Issues of ICT while Surfing Online

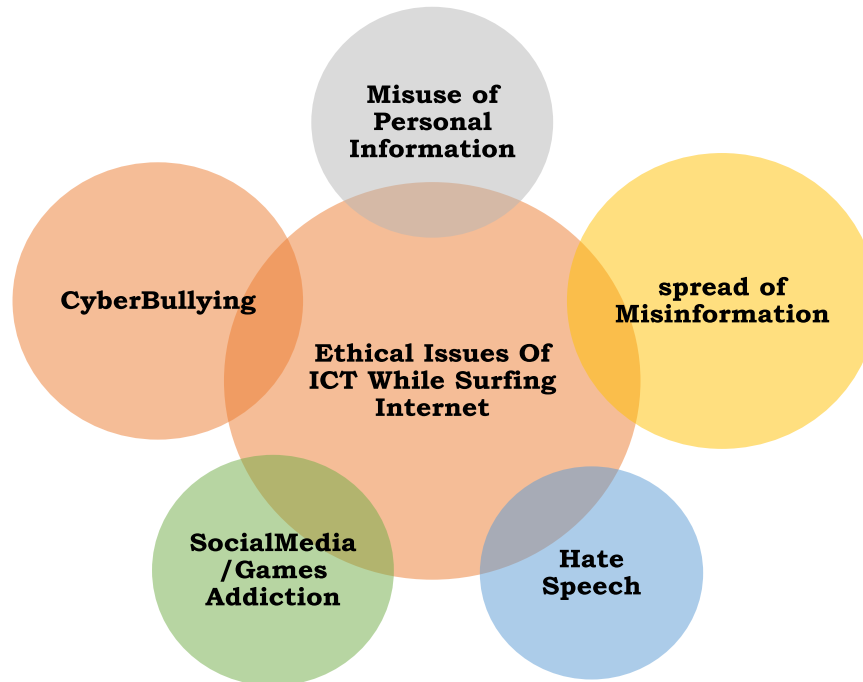


Figure 5.7 Ethical issue of ICT while surfing the Internet

The use of ICT devices and the Internet raises many ethical issues some of which are given below.

I. Misuse of personal data

We should be careful about sharing personal information online. If malicious individuals have your name, photo, DOB, etc., they can create your fake account using your details and try to deceive your friends, family anyone. If someone uses your personal information, you should tell your parents or teacher so they can help you to stay safe.



Figure 5.7 (a) Misuse of personal information

II. Spread of misinformation

Misinformation is defined as inaccurate or misleading information that is shared online without the aim of misleading others. It is by mistake shared online by a person or group that shares the information and thinks it to be true.



Figure 5.7 (b) Spread of misinformation

III. Hate Speech

Hate speech means posting bad or harsh comments, pictures, or videos on the internet about people because of their race, religion and gender. If we encounter hate speech online, it's important to inform our parents so they can help us address it. For example, posting harsh comments to target ethnic minorities.



Figure 5.7 (c) Hate speech

IV. Social media/Games addiction

Games and social media are designed to attract people to them, and children can easily become addicted because they are not mature enough to handle it. Parents and teachers are responsible for teaching them how to manage their time wisely. If you skip your meals to play computer games then you are addicted to them.



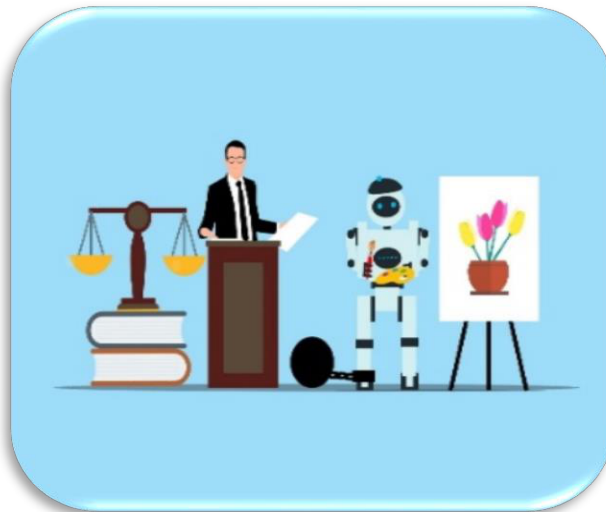
Figure 5.7 (d) social Media/Games addiction

V. Cyberbullying

Cyberbullying is repeatedly making hurtful or harsh comments about another person online, starting rumors or uploading embarrassing images or videos online. Cyberbullying can occur via email, online games, texting, and social media. For example, whenever you post your picture on Facebook one of your friends always posts harsh comments on it. This is cyberbullying.



Figure 5.7 (e) Cyber bullying



Cyber Crime

Note

Cyber Crime is any illegal activity done by using an ICT device on the internet for example Cyberbullying, or software piracy. Every country has its cyber laws to counter cybercrimes.

5.5 Health-Related Issues While Using ICT Devices

Spending too much time on ICT devices can damage our health and make us feel tired or sad. Health-related issues for children using ICT devices include

I. Eye Stress

Continuous use of ICT devices can cause eye strain. To reduce eye strain, we should follow the 20-20-20 rule which is, while working on the computer after every 20 minutes, look at something 20 feet away for 20 seconds.



Figure 5.8 Eye stress

II. Poor Posture

Sitting on one side or dropping your head toward the computer stresses your body and leads to poor posture as shown in Figure 5.9.



Figure 5.9 Poor posture vs Proper posture

III. Physical Inactivity and Obesity

If we spend too much time sitting using ICT devices then we will become physically inactive and this will lead to obesity and health issues. To avoid these issues we should limit our screen time.



Figure 5.10 Physical inactivity due to excess screen time can lead to obesity

IV. Sleep Disorders

The blue light emitted by ICT devices can upset our body's normal sleep-wake cycle. To avoid this sleep disorder we should have a bedtime rule which is to turn off ICT devices at least one hour before sleeping.



Figure 5.11 The blue light produced by ICT devices can disturb your sleep

V. Exposure To Radiation

All electronic devices, including laptops and mobile phones use radiofrequency energy (a form of electromagnetic radiation). These radiations are not harmful unless you are on your computer less than four hours a day. Limiting screen time can help reduce potential risks.



Figure 5.12 Excessive use of ICT devices exposes you to the danger of radiation

VI. Mental Health Problems

If children spend most of their time in front of ICT devices, they may develop mental health problems like tension, anxiety, and depression. Positive mental health can be achieved by limiting the usage of ICT devices and supporting good activities



Figure 5.13 Mental health Problems

ACTIVITY

The teacher guides students to fill out the below table about their daily usage of ICT devices and social media and calculate and their daily screen time.

Online activity	Time (in minutes)
Watching movies online	
Listening music	
Playing Games online	
Studying online	
Using social media	
Total screen time	



5.6 Keeping Proper Posture

Keeping proper posture while using a computer helps prevent discomfort and reduce the risk of health issues such as muscle pain. Below are a few guidelines for maintaining good posture when using a computer.

I. Use a back support chair

Always use a chair with proper support to keep your back in shape. Make sure that your feet are on the floor.



Figure 5.14 Use a back support

II. Always sit up straight while using ICT devices

Sit up straight while using ICT devices. Avoid slouching or leaning forward.



Figure 5.15 Sit up straight while using ICT

III. Put your arms parallel to the floor

Keep your arms parallel to the floor. Use armrests, if available, to support your arms and shoulders.



Figure 5.16 Put your arms parallel to the floor while using ICT

IV. Set the monitor at eye level

The upper edge of your computer monitor should be at or a little below eye level. Computer screen should be 18 to 25 inches away from you.



Figure 5.17 Keep your monitor at eye

V. Position the keyboard and mouse properly

Place the keyboard and mouse near and at a height that allows your elbows to bend at about a 90-degree angle.



Figure 5.18 Keep mouse and keyboard within reach of your hands

VI. Position the keyboard and mouse properly

While using the computer for more than one hour, you should take a break by getting up from your computer walk for a few minutes.



Figure 5.19 Give yourself a break

5.7 Computer Lab Rules For Students

1. Ask your teacher for permission before going in or out of the lab.
2. Get your teacher's permission before printing or downloading files.

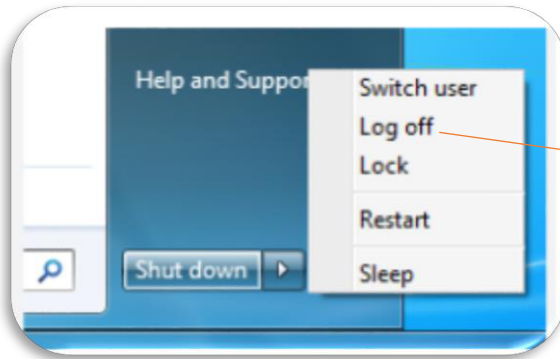


3. Browse through websites that your parents and instructor have recommended.
4. Use the computer in the computer lab that is assigned to you by your teacher.



Digital Citizenship

5. Save your files, log out of your account, and shut down your computer completely before you leave the lab.



Log off from your account and shut down the computer before leaving Computer Lab

6. The computer lab should be neat and tidy.



Keep computer Lab net and clean

7. Do not touch electric switches or move devices.



Never touch electric switches

8. Arrange your chair before leaving the lab.



I arrange my chair before leaving computer lab

Summary

- A person who legally belongs to a country and has the rights and protection of that country is called a citizen of that country.
- A digital citizen is a person who develops the skills and knowledge to efficiently use the internet and ICT.
- Digital citizenship is the ability to use ICT responsibly, safely and respectfully.
- A good digital citizen protects their personal information and treats others with respect.
- Copyright is a law that stops you from using other people's work without their permission
- Plagiarism refers to the act of using another's work as your own.
- Piracy is the unauthorized use, copying or distribution of copyrighted software.
- Working at a computer with improper posture causes back, neck and shoulder pains, headaches, eye strain and other injuries to the arms and hands.

Important Terms to Remember

Cybercrime: Cybercrime covers illegal activities conducted using ICT devices and the internet, including hacking, fraud, identity theft and online harassment.

Cyber Law: Cyber law is the legal area that regulates and governs the use of the internet and issues such as online privacy, cybersecurity, electronic commerce and digital rights.

Social Media: Social media refers to online platforms that allow users to create, share content and interact with other users

Unauthorized: Unauthorized refers to accessing something without proper authority or right.

Surfing the Internet: It means the act of browsing and exploring the World Wide Web.

Exercise

1. Encircle the correct answer.

- i. The unauthorized copying or distribution of copyrighted software is called
 - a. Piracy
 - b. Copyright
 - c. Eye strain
 - d. Plagiarism
- ii. Digital literacy refers to the skills and knowledge needed to assess, use, and create content.
 - a. Online
 - b. On notebook
 - c. On paper
 - d. On sketchbook
- iii. Committing any unlawful activity by using ICT devices and the internet is known as
 - a. Internet crime
 - b. Cybercrime
 - c. Internet law
 - d. Cyber law

- iv. Before leaving the lab, students should
 - a. Log off from their accounts.
 - b. Monitor
 - c. Shut down the assigned computers properly.
 - d. All of the above
- v. The top of your computer monitor should be at or
 - a. Slightly below eye level
 - b. Slightly above eye level
 - c. Slightly vertical to eye level
 - d. None of the above

2. Fill in the blanks with appropriate words given below.

Network switch, Output devices, System software, Application software, Router.

- i. A good digital citizen has the _____ and skill to use information properly.
- ii. _____ is a law that stops you from using other people's work without their permission.
- iii. Your arms should be _____ to the floor and relaxed at your sides.
- iv. A _____ is a person who belongs to a country or nation.
- v. Spending too much time on screens can be bad for our health and make us feel _____ or sad.

3. Provide the descriptive answers of the following questions.

- i. Explain the significance of digital citizenship.
- ii. How should you behave online as a good citizen?
- iii. Discuss in detail the ethical issues of ICT while surfing online.
- iv. Write down health-related issues associated with children using ICT devices.
- v. Define the below given terms.
 - a. Digital Foot Print
 - b. Cyber Crime
 - c. Copy Right Law
 - d. Citizenship
 - d. Cyberbullying

4. Class activity

- i. Divide the class into four groups, each group will give a presentation on one health-related issue of using ICT devices and also give their suggestion on how to minimize the risk related to that particular health issue.

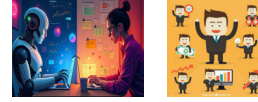
Plagiarism, Piracy and Copyright laws these three terms are very closely related to each other the teacher arranges an activity in class where students enlist different actions done online that can fall into the above categories. So they can understand these terms properly.

Instructions for Teachers

- Involve students in making colorful charts that describe good digital citizen characteristics.
- Engage the student to practice digital citizenship in their daily online lives.
- Throw a group discussion in class about internet ethics and why they should behave ethically online.
- Demonstrate proper posture and poor posture while using ICT devices in the computer lab.
- Make a PowerPoint presentation on cybercrime related to children and show it to your students in the computer lab so they can have awareness about cybercrime-related children.

UNIT 06

ENTREPRENEURSHIP IN DIGITAL AGE



Student Learning Outcomes:

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

- Define the term “Entrepreneurship”.
- Discuss different types of entrepreneurs.
- Distinguish between Digital and Traditional Entrepreneurship.
- Describe the Entrepreneurship process.
- Identify the use of technology in entrepreneurship.



Introduction to the Unit:

This unit covers the basic concept of entrepreneurship. It also explores different types of entrepreneurs gives a brief overview of traditional and digital entrepreneurship, and provides details of the entrepreneurship process.

6.1 Entrepreneurship

Entrepreneurship is the process of encouraging people to develop new ideas, create products or services, and take the necessary steps to start their businesses. For example, opening a tuck shop near your home.



Figure 6.1 Entrepreneurship is to start a new business

In simple words, it is the process of starting a new business to make a profit. Let's say you love samosas, so you come up with a recipe for super delicious samosas. You think other people might want to buy them too. So, you start making samosas at home and selling them to your friends and neighbors. As more people buy your tasty samosas you start selling them at local markets and maybe you will open your shop. This is entrepreneurship turning your idea into a business. There are two types of entrepreneurships which are Traditional entrepreneurship, and digital entrepreneurship.

6.1.1 Traditional Entrepreneurship:

Traditional entrepreneurship is starting and running your businesses through Street stalls and shops as shown in figure 6.1.1. Here are some characteristics of traditional entrepreneurship.



Figure 6.2 Example of Traditional Entrepreneurship (local market shop)

I. Physical Presence

Traditional entrepreneurship typically involves physical existence such as offices and shops.

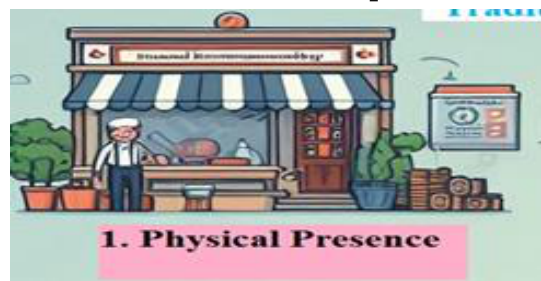


Figure 6.2(a) shows a traditional store

II. Local Market Focus

Traditional entrepreneurs normally focus on the local market but some may increase their business nationally or internationally over time.



Figure 6.2 (b) Shows various

III. Traditional Marketing Methods

Traditional entrepreneurs rely on conventional marketing methods, such as printed posters, newspaper ads, radio and TV commercials.



III, Traditional marketing methods

Figure 6.2 (c) Traditional advertising methods

IV. Direct Sales Methods

Traditional entrepreneurs sell products through their stores, direct sales or distribution systems.



IV. Direct Sales Methods

Figure 6.2 (d) Food stall directly selling to the customers

V. Face-To-Face Interaction

In traditional entrepreneurship, Face-to-face interaction with customers is common.



5. Customer Interaction

Figure 6.2 (e) shows Face to Face interaction with customer

6.1.2 Digital Entrepreneurship

Digital entrepreneurship or modern entrepreneurship refers to starting and managing a business with the help of the Internet and ICT devices. Online shopping websites and online education websites are examples of digital entrepreneurship. Here are some characteristics of digital entrepreneurship.



Figure 6.3 Digital Entrepreneurship

- I. **Online Presence:** Digital entrepreneurship operates through online platforms, websites, and digital marketplaces.



Figure 6.3 (a) online presnce

- II. **Global Reach:** Digital entrepreneurs can reach a global audience as they start because of the worldwide reach of the internet.



Figure 6.3 (b) Internet provides global reach to business

- III. **Digital Marketing:** Digital entrepreneurs use digital marketing methods such as social media, search engine optimization (SEO) tools, content marketing, email marketing and online advertising.



Figure 6.3 (c) Digital Marketing

- IV. **E-commerce:** Digital entrepreneurs often sell products or services online through e-commerce platforms, digital storefronts or subscription models.



Figure 6.3 (d) E-commerce

- V. **Virtual Interaction:** Customer interaction in digital entrepreneurship is conducted through using digital communication mediums such as chat support, social media messaging and, e-mails.



Figure 6.3 (e) Virtual Interaction

6.1.3 Difference between Traditional and digital entrepreneurship

Local markets and physical interaction are the main features of traditional entrepreneurship. In contrast, digital entrepreneurship uses digital technologies for marketing, sales and customer interaction. The table below shows the difference between some of the characteristics of traditional and digital entrepreneurship



Figure 6.4 (a) Digital Entrepreneurship

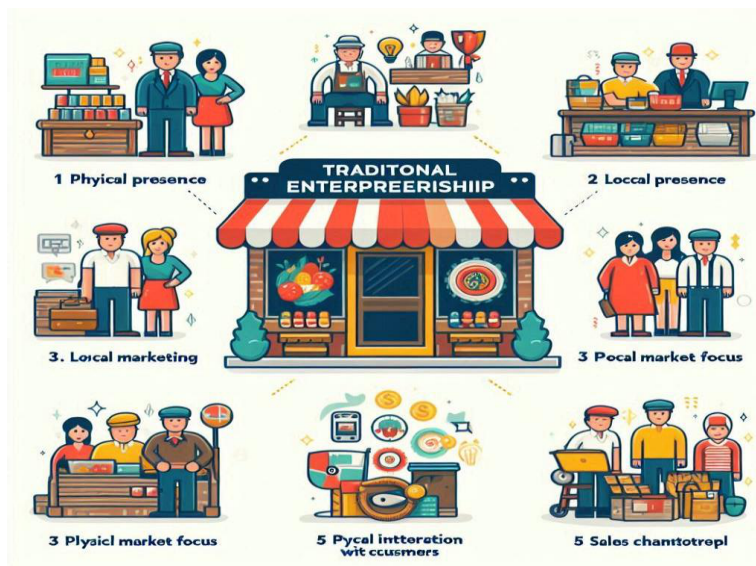


Figure 6.4 (b) Traditional Entrepreneurship

Characteristics	Traditional Entrepreneurship	Digital Entrepreneurship
Location	Selling products in your locality	Selling things(products) online to people around the world
Business example	Selling from a stall or stand (e.g, Samosa stand).	Selling digital things like games, stories, or art online
Customer dealings	Talking to customers face-to-face	Chatting customers online
Marketing	Traditional methods like print, radio and TV advertising	Digital marketing approaches such as SEO, PPC, social media

ACTIVITY

The teacher will divide the class into groups and assign each group to open a food stall of different snacks on the school playground e.g. samosa stand, channa chat stand or salad stand with a budget of Rs 1000. The teacher guides them to fill below table where students write details of all the expenses they do to open their stalls.

Expenses	Amount in Rs



6.2 Entrepreneur

An entrepreneur is someone who begins a business and is prepared to take a loss or profit. He/she is a leader who goes through challenges and opportunities to bring his/her ideas to life.

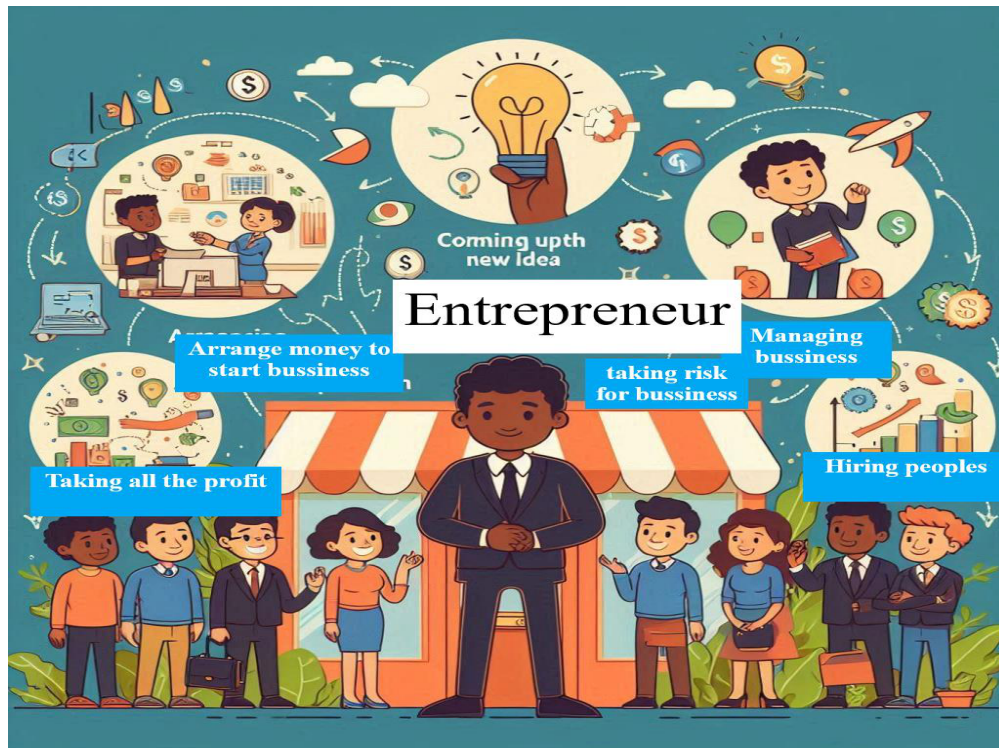


Figure 6.5 Characteristics of Entrepreneur

An entrepreneur starts a new business and creates employment possibilities while coming up with different concepts, goods, and services that can improve people's lives. They hire more workers as their business grows. Both local and global economies improve as entrepreneurs achieve success.

6.2.1 Types of Entrepreneurs

There are many types of entrepreneurs with special characteristics and approaches to business. Here are some common types of entrepreneurs.



Figure 6.6 Types of Entrepreneurs

I. Innovator

An innovator entrepreneur is a person who comes up with new ideas and creates things that have never been made before. Thomas Edison was one of the greatest innovative entrepreneurs in history, who invented the light bulb. Another example of an innovator is Graham Bell who invented the Telephone.



Figure 6.6 (a) Innovator

Characteristics of Innovator	
Creativity	Always come up with a new idea.
Risk Taker	Willing to take risks for their business
Customer Focus	They put customer satisfaction comes first.

II. Hustler

Hustler entrepreneurs are people who grab opportunities. They can overcome challenges and disappointments and are uncompromising in their search for openings in business.



Figure 6.6(b) Shows characteristics of Husler

A famous hustler entrepreneur from Pakistan is Arshad Khan, commonly known as the "Chaiwala" (tea seller). When a picture of him serving tea at a local stall went viral on social media, he became popular. Taking advantage of his popularity, he opened his teashop in Islamabad. His successful business journey shows a true hustler characteristic which is to identify and grab opportunities to be successful.

Characteristics of Hustler	
Strong-minded	They dream big and work hard to achieve it.
Grab Opportunity	Whenever they sense any opportunity, they work hard to use it.
Hard Worker	They work very hard to be successful.

III. Imitator

Imitator entrepreneurs take any proven business ideas and use the same idea in new markets or industries. Instead of developing new products or services, imitators focus on replication, alteration and modernization. For example, Bykea car and bike ride-booking app adopted the same idea as another online car ride booking app Uber.

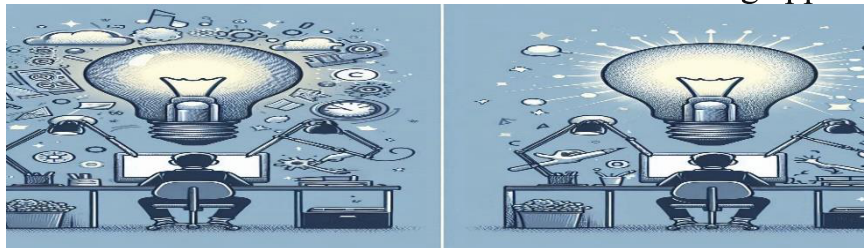


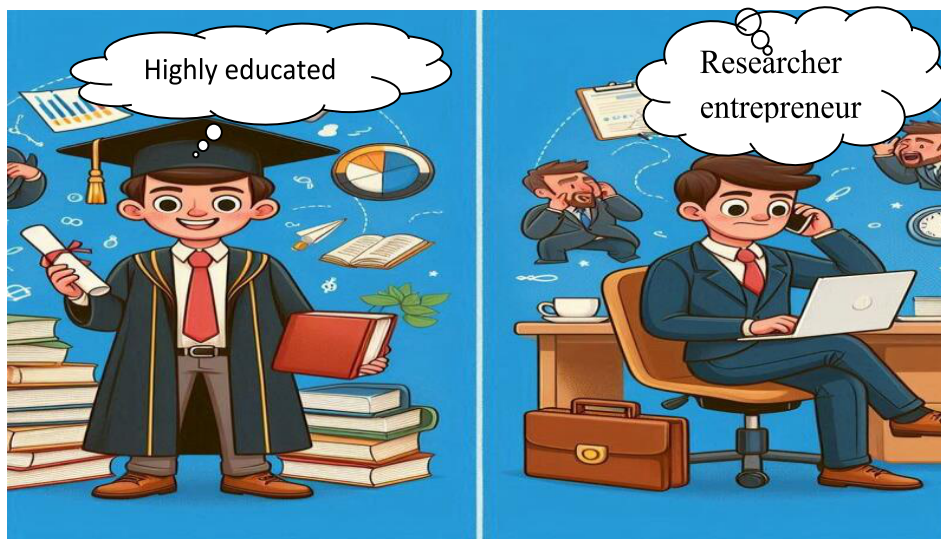
Figure 6.6(c) shows an Imitator

Characteristic Of Imitator	
Ability to Refine ideas	Improve a business idea rather than coming up with new ideas.
Good learner	Learn from other business mistakes and avoid these mistakes when doing the same business.
Analysis Skill	Do an accurate analysis that the copied idea will work in the new market

IV. Researcher

The researcher entrepreneur is a science genius with curiosity and the craving to invent. Often highly educated with advanced degrees. One outstanding researcher entrepreneur from Pakistan is Dr. Atta-ur-Rahman. Dr. Rahman is a renowned scientist and scholar who has made significant contributions to the field of chemistry and pharmaceutical research.

Figure 6.6(d) Researcher Entrepreneur



Characteristics of Entrepreneur	
Highly educated	They are highly educated with advanced degrees like PhD.
Curiosity	They ask questions and want to learn and create new things
Communication skill	They are very good at explaining their ideas to their team and customers.

V. Buyers

The buyers' entrepreneurs search to buy a running business and drive it to new heights. They have prior expertise in that particular business which gives them confidence in anticipating profit. A famous example of a buyer entrepreneur from Pakistan is Malik Riaz Hussain. He is the founder and chairman of Bahria Town, one of the largest real estate development companies in Asia.



Figure 6.6 (e) Shows the characteristics of Buyers entrepreneur

Characteristics of Buyer	
Experienced	They have previous know-how in that particular business
Rich	They have the right amount of money to buy.
Confident	Have a sense that purchased business will give them profit.

6.2.2 Some of the Entrepreneurs of Pakistan

I. Salim Ghauri

Salim Ghauri is known as “Bill Gates of Pakistan” He is the founder and CEO of NetSol Technologies one of the biggest IT firms in Pakistan. He shares his entrepreneurship journey in his book named “From Nothing To Everything”.

II. Monis Rehman

Monis Rehman is an engineer with a keen interest in technology. His career started with several leading tech companies in the USA. After returning to Pakistan, he co-founded Naseed Networks, Inc. and rozee.com the leading job marketplace in Pakistan.

III. Hakim Muhammad Saeed

Hakim Muhammad Saeed, a notable figure in Pakistan, was renowned for his entrepreneurial journey, primarily in traditional medicine and education. He is the Founder of the Hamdard Foundation and Hamdard University Karachi.

IV. Sidra Qasim

Sidra Qasim is the founder of Markhor, a Pakistani startup that produces handcrafted leather shoes. Markhor gained international recognition for its unique business model and high-quality products.

6.3 Entrepreneurship Process

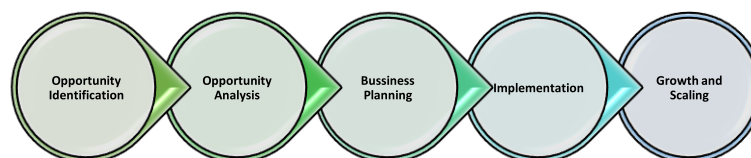


Figure 6.7 Entrepreneurship Process

The entrepreneurship process is the process needed to start your business. This process typically involves five phases as given below

I. Opportunity Identification

In this step, entrepreneurs find an opportunity/idea to start a new business. To do so they need analysis, investigation, and a creative mind to come up with an idea.

II. Opportunity Analysis

After finding an opportunity/idea, we will write down all the requirements. This includes estimating market demand, competition, risks, and the money required to implement the idea. This phase helps entrepreneurs determine whether the idea is profitable and whether they have the skills and funds to succeed.

III. Business Planning

Here entrepreneurs develop and write down a detailed business plan that recaps their idea, aims, target market, advertising strategy, money needed and working plan.

IV. Implementation

With a solid business plan in place, entrepreneurs implement their ideas by using funds, developing products or services, starting promotion campaigns and starting operations.

V. Growth and Scaling

As the business becomes successful, entrepreneurs focus on expanding into new markets and making it big.

These five phases provide an outline for understanding the entrepreneurship process. However, it's important to note that entrepreneurship is a never-ending and repetitive process and also the actual process may differ based on market environments, diverse situations and trade dynamics.

6.4 Use of Technology in Entrepreneurship

Technology made entrepreneurship easy in many ways because of technology entrepreneurs can reach customers around the globe. Technology makes it easier to run your own business. Here are some uses of technology in entrepreneurship.

I. Digital Marketing & E-commerce

Through digital marketing, businesses promote their products and services to capture customer attention and through E-commerce platforms sell their products.

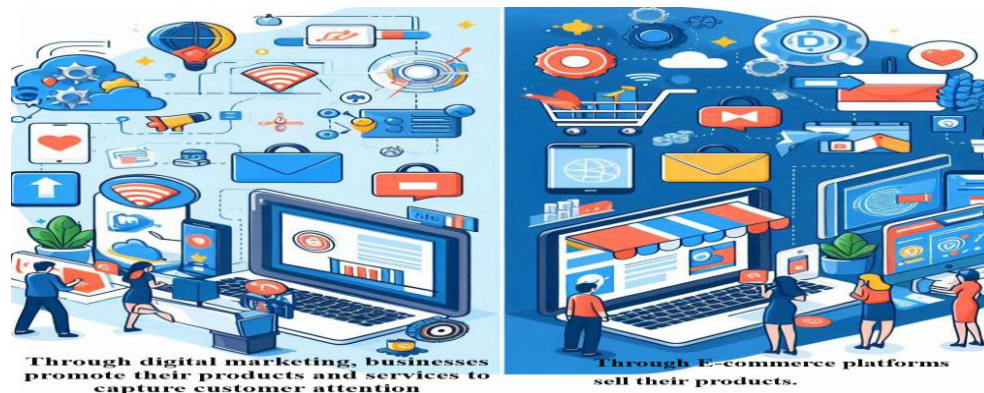


Figure 6.8 (a) Shows Digital Marketing and E-Commerce

II. Mobile Applications

As the usage of mobile phones increases nowadays, developing a mobile can help your business build a stronger brand. A mobile app serves as an always-on brand ambassador.



Figure 6.8 (b) shows the reach of Mobile phone apps to customers.

III. Artificial Intelligence (AI)

AI helps entrepreneurship in many ways through AI you can generate logos for your business or can improve user interaction with customers through chat boat (an application of AI).



Figure 6.8 (c) shows the use of AI in designing logs and in Chat boat

IV. Collaboration Tools

Entrepreneurship requires consistent communication between teams and collaboration tools make it possible to connect to your team anywhere around the world-famous collaboration tools are Slack, Zoom or Microsoft Teams.



Figure 6.8 (d) Online collaboration Tools

ACTIVITY

To introduce the concept of digital marketing to student's teacher guides students in designing posters for publicity of their food stall (Previous activity) and the teacher helps them to post these posters on the school's Facebook page or on the school's WhatsApp group.



Summary

- The process of starting a business is called entrepreneurship.
- The person who starts a business and takes all the risk and profits is called an entrepreneur.
- There are different types of entrepreneurs like hustlers, innovators, Researchers and imitators.
- In traditional entrepreneurship works on physical interaction with clients and digital entrepreneurship works on digital interaction with the customer.
- The entrepreneurship process is nonstop and helps in developing a business.

Important Terms to Remember

- AI** Using computers to do things that traditionally require human intelligence is called artificial intelligence (AI)
- E-Commerce** E-commerce (electronic commerce) means selling things and services on the Internet.
- ICT** Information and Communication Technology.
- SEO** SEO (search engine optimization) is the method of improving your website to increase its visibility in Google, Microsoft Bing, and other search engines whenever people search for the products you sell. Services you provide.

Exercise

1. Encircle the correct answer

- i. The role of an entrepreneur is to:
 - a. Play sports
 - b. Starts and runs their own business.
 - c. Works for other people.
 - d. Try new things.
- ii. A business plan is a:
 - a. Recipe for cupcakes.
 - b. Roadmap for a business.
 - c. List of favorite toys.
 - a. Type of puzzle.
- iii. An innovation means:
 - a. Doing the same thing every day.
 - b. Coming up with new and better ideas.
 - c. Watching TV all day.
 - d. Ignoring problems.

- iv. An entrepreneur can learn from failure:
 - a. By giving up.
 - b. By trying again and learning from mistakes.
 - c. By blaming others.
 - d. By never trying new things again.
- v. Entrepreneurs who want to start a business should:
 - a. Wait for someone else to do it.
 - b. Try different ideas.
 - c. Watch TV all day.
 - d. Ask others to do it for you.

2. Fill in the blanks with appropriate given words

Opportunity, Identification, Profit, Technology, Buyers,
Entrepreneur

- i. Entrepreneurship is the process of starting a new business to generate _____.
- ii. _____ Phases involve research, analysis, and creative thinking to uncover opportunities for innovation.
- iii. _____ lead to economic growth by creating new markets and expanding existing ones.
- iv. The entrepreneurship process is _____ and helps in developing a business.
- v. _____ helps entrepreneurs use cool tools and gadgets to make their businesses better.

3. Provide descriptive answers of the following questions.

- i. What do you think a business plan is?
- ii. How do entrepreneurs sell their products or services?
- iii. What do you think opportunity identification means in entrepreneurship?
- iv. What do you think would be the most important characteristic of a successful entrepreneur?

- v. Write the differences between digital entrepreneurship and traditional entrepreneurship.

4. Class Activity

- i. As all of us live in different cities and every city has its special craft teacher engages students in an activity where students use their creativity and social media platforms like Facebook or WhatsApp to introduce the world to their native town crafts and help locals to sell these craft to the world.

Hint (for example Hyderabad is famous for Glass bangles, Nawabshah is famous for Sindhi embroidery)

- ii. The teacher divides the class into two groups of students one group will give a presentation on any famous Pakistani Traditional entrepreneur's journey to success and the other group will deliver presentations on any Pakistani Digital entrepreneur's journey

Note for Teachers

Teaching entrepreneurship to children is very challenging but if you give them real-life examples it will become easy to understand

- Encourage children to come up with their business ideas and help them develop a business plan.
- Let them work in teams by which they learn to do collaborative entrepreneurial projects.
- Tell your students stories of real entrepreneurs who have started successful businesses.
- Help them recognize the value of money and how to make wise financial decisions.