As per
NEP 2020 and NCF 2023

CURSOR Pro 1

A Textbook of **Computer Science**
for Joyful and Experiential Learning

Based on
Windows 10 and MS Office 2019

By
Editorial Team
Inventant Education

Inventant Education
Present Meets Future
(A Unit of EDULABZ International)

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Introduction

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—Inventant Education

Aligned with NEP 2020 and NCF 2023

FEATURES OF NEP 2020

21st Century Skills

Learning Skills (4Cs)

- ✓ Critical Thinking
- ✓ Creativity
- ✓ Communication
- ✓ Collaboration

Literacy Skills (IMT)

- ✓ Information Literacy
- ✓ Media Literacy
- ✓ Technology Literacy

Life Skills (FLIPS)

- ✓ Flexibility
- ✓ Leadership & Responsibility
- ✓ Initiative
- ✓ Productivity & Accountability
- ✓ Social Interaction

BASED ON NCF 2023

In NCF 2023, **curriculum** means not only what is given in the books, but also how the learners learn in school, the school's environment, and more. To make learning better, we need positive changes in all these areas.

The Six Pramanas

- Inference
- Perception
- Comparison
- Verbal Testimony
- Non- Apprehension
- Postulation

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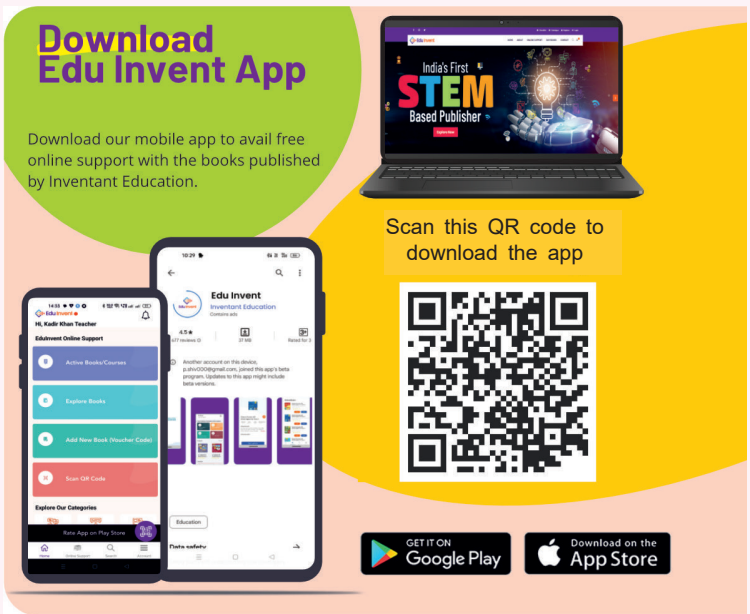
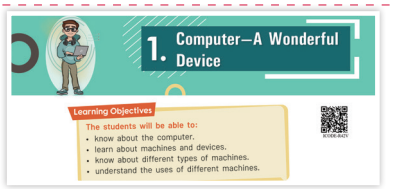


About the Series



Learning Objectives

The goals to be reached by the end of the chapter

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Warm up activities that sparks curiosity and engagement

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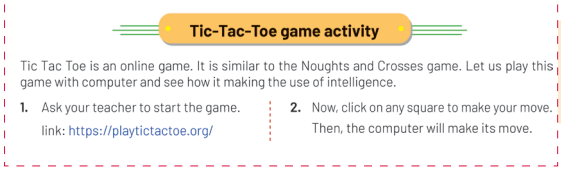
Projects and activities are design with SDG goals to raise awareness

Project Work

In-depth exploration and application of learned concepts

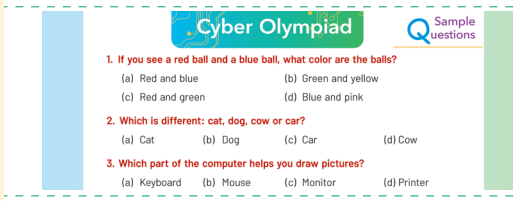


AI Fun Spot

An AI fun lab activity to spark curiosity

Computational Thinking

A question that needs the learners to think and solve analytically

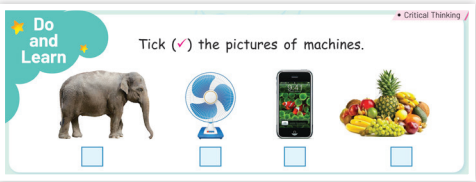


Cyber Olympiad

A competitive exam conducted by SOF for each class in schools to assess the learners

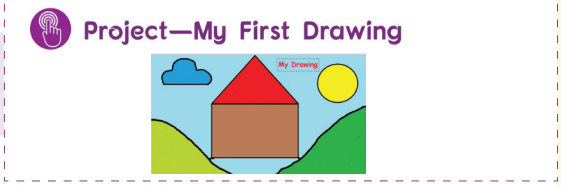
Do and Learn

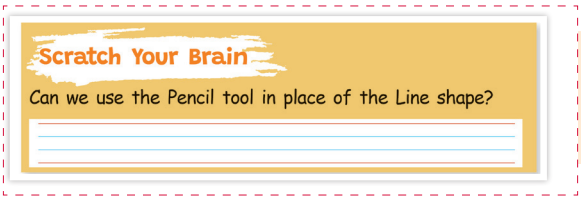
An activity that reinforce learning among the learners



Project-Based Learning

Focuses on enhancing practical knowledge



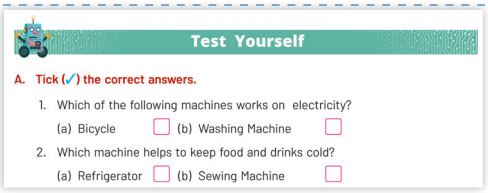


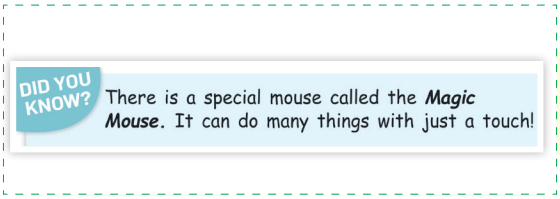
Scratch Your Brain

A hands on exercise that will help the student to get practical knowledge on the topic

Test Yourself

Various kinds of questions to test the gained knowledge





Did You Know

An interesting piece of knowledge

Coding Fun

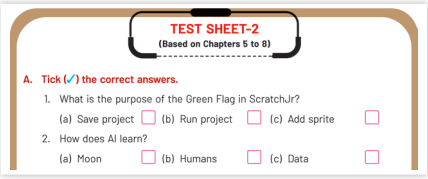
Fun activity to enhance the thinking power

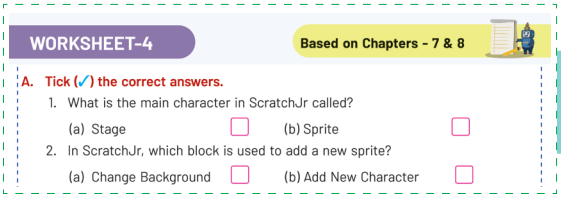
Lab Work

Some activity to be done while in the lab

Test Sheet

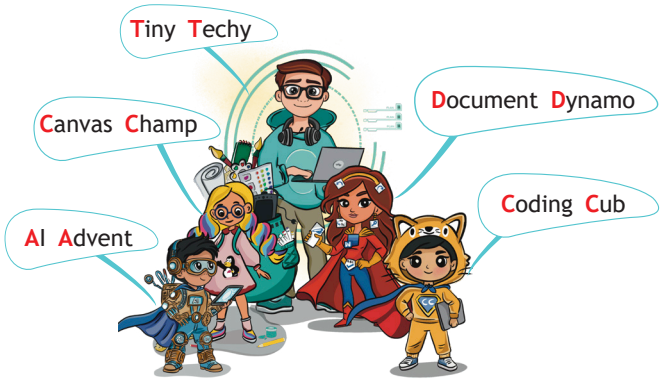
Evaluates the learner's knowledge in a subject





Worksheets

Reinforcing and assessing students understanding



Tech Rangers, a dynamic team of special characters, bring educational content to life, making learning fun and turning every lesson into an exciting adventure.

Contents

1. Computer—A Wonderful Device

Learning Objectives

The students will be able to:

- know about the computer.
- learn about machines and devices.
- know about different types of machines.
- understand the uses of different machines.

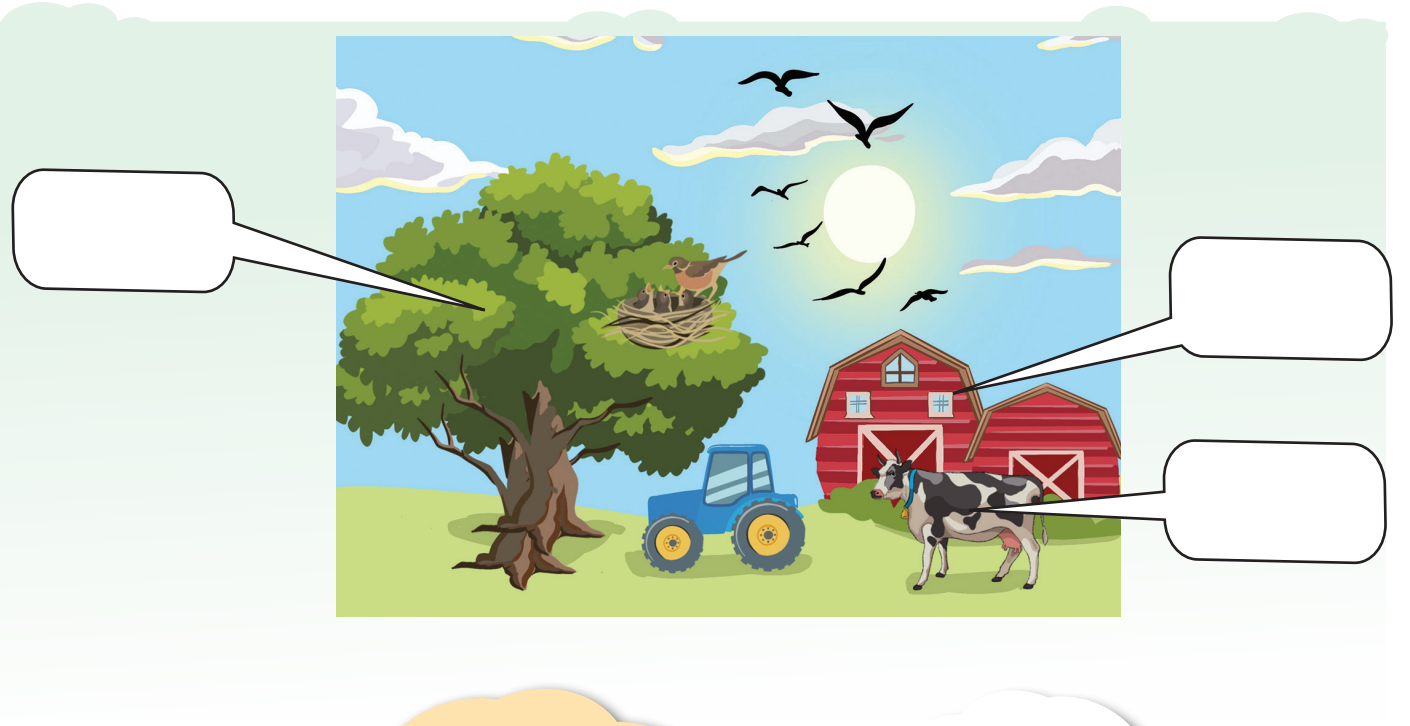
ICODE-R42V

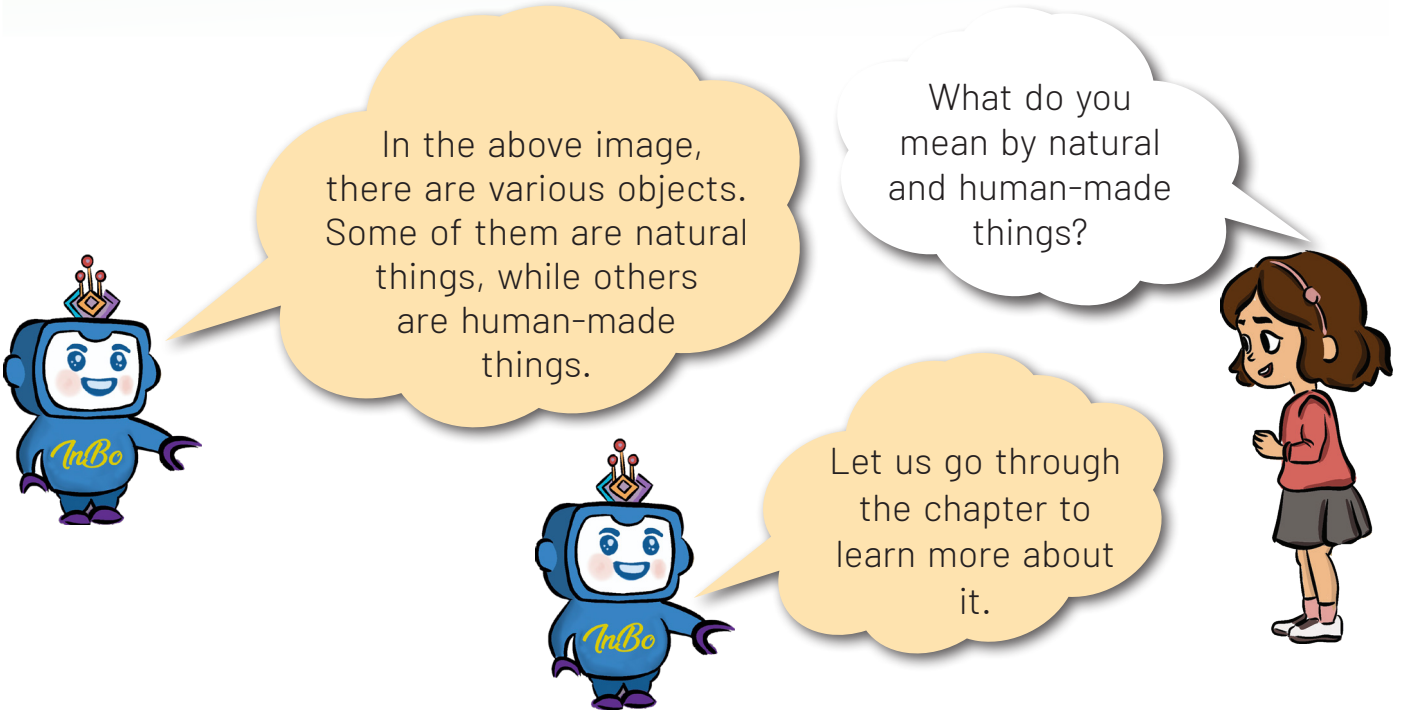
Get Ready

Welcome, Tiny Techy! Are you excited to begin your adventure into the world of computers?

Yes, I am!

Fantastic! But before we dive into that, let's do a fun activity. Let's identify the objects in the picture.





Natural things come from nature. They are not made by people. Some examples of natural things are the sun, moon, stars, trees, and fruits.

Human-made things are made by people. They do not come from nature. Some examples of human-made things are scissors, combs, televisions, bicycles, and computers.

What are Machines?

Machines are special tools made by people. They help us do our work more easily and save our time.

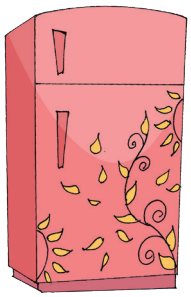
Some machines use **Electricity**, some use **Human power**, and some use **Fuel**.

Machines that work on Electricity

Television

You use a television to watch cartoons and movies.

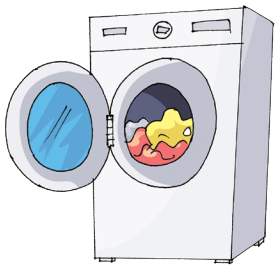
Television



Refrigerator

Refrigerator

You use a refrigerator to keep food and drinks cold and fresh.



Washing Machine

Washing Machine

A washing machine is used to wash dirty clothes.

DID YOU KNOW? A traffic light uses electricity to control traffic.

Machines that work on Fuel

Aeroplane

An aeroplane flies in the air. It carries passengers from one place to another.

Aeroplane

Train

Train

A train runs on tracks. It carries passengers and goods to different places.

Machines that work with Human Power

Bicycle

Bicycle

Children use it for riding and playing outside.

Boat

Boat

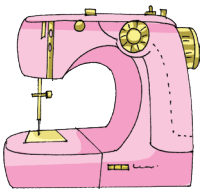
A boat is a small watercraft used for crossing rivers and lakes.

Scratch Your Brain

Name any one machine that runs on fuel.

Sewing Machine

A sewing machine helps us make and repair clothes.

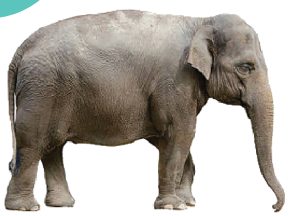


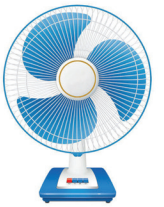
Sewing Machine

• Critical Thinking

Do and Learn

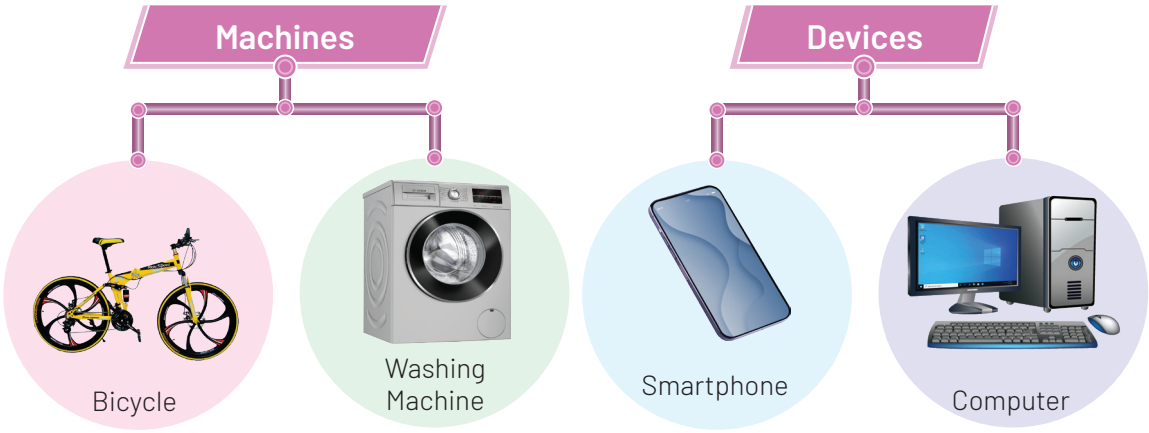
Tick (✓) the pictures of machines.





What is a device?

A device is a special kind of a machine that helps to do a particular job. For example, a microphone is a recording device.



Computer—A Smart Device

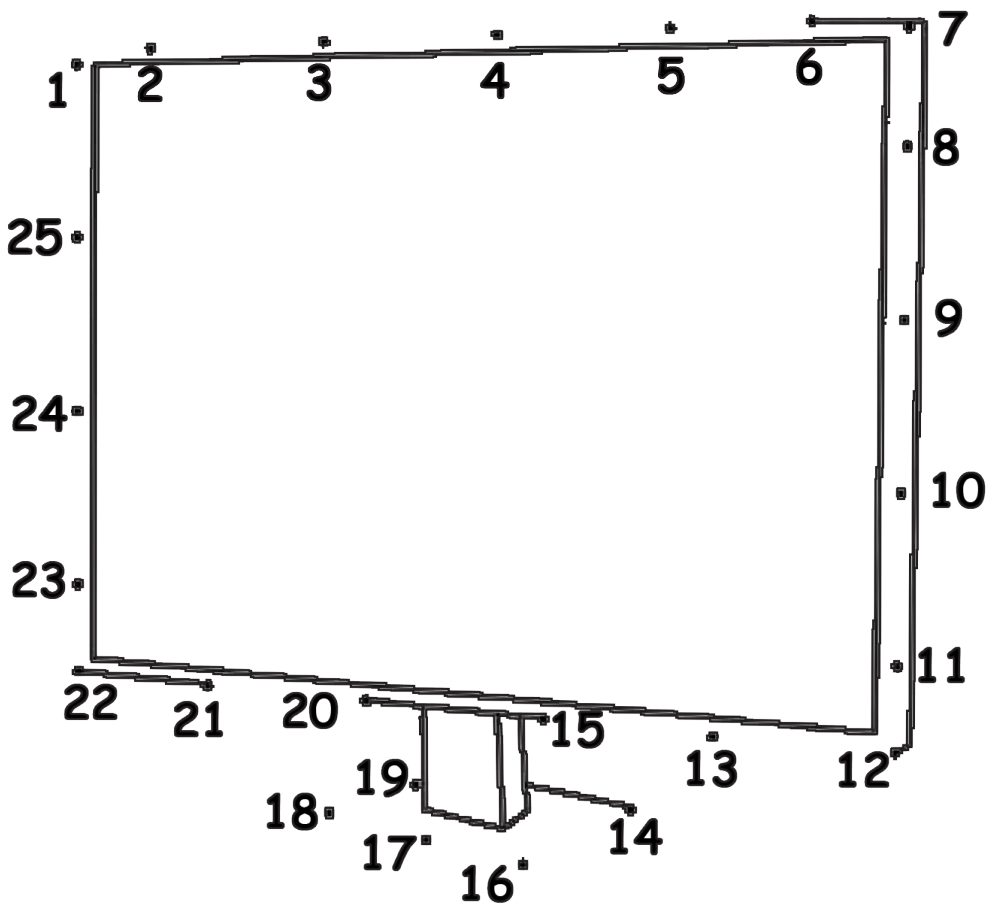
A computer is a human-made device. It runs on electricity. It can do many things, like helping us learn new things, play fun games, solve sums, create drawing and many more.

Characteristics of Computers

Computers have special characteristics that make them useful.

Interdisciplinary Learning

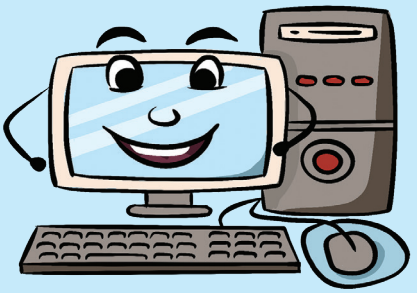
Complete the picture by joining the dots and colour it. Also, write its name.



I am a ____ ____ ____ ____ ____ ____ ____ ____

Types of Computers

Children! Let us meet some different types of computers.



Hi!

I am a desktop computer. You keep me on a desk. I run on electricity. You cannot carry me from one place to another so easily.

Hi!
I am a laptop. I am small and
light-weight. You can put me on your lap.
You can carry me with yourself.

Hi!
I am a tablet. I am smaller than a laptop
but larger than a smartphone. You can keep
me in your bag.

Hi!
I am a Smartphone. I am a small computer.
I have a touchscreen and can fit
in your hand and pocket.

Test Yourself

A. Tick (✓) the correct answers.

1. Which of the following machines works on electricity?
   (a) Bicycle ☐ (b) Washing Machine ☐
2. Which machine helps to keep food and drinks cold?
   (a) Refrigerator ☐ (b) Sewing Machine ☐
3. Which machine helps us to watch cartoons and movies?
   (a) Refrigerator ☐ (b) Television ☐

B. Fill in the blanks.

HINTS: Electricity | Refrigerator | Sewing machine

1. A computer works on _____.
2. A _____ helps us make and repair clothes.
3. A _____ helps to clean dirty clothes.

C. Match the following columns.

Column A	Column B
	Aeroplane
	Boat
	Computer
	Bicycle

D. Answer the following questions:

1. Which machine helps to watch cartoons and movies?

2. What type of power does a bicycle use?

E. Competency/Application-based question.

• Critical Thinking

You want to watch a movie while travelling in a car. Which computer is the best to use?

Fun Time

• Thinking Skills

A. Write (E) for the machines that works on electricity and (H) for human power in the given boxes.




B. Find the hidden words in the word grid.

• Problem Solving

Computer
Boat
Fuel
Machine
Train

Q	R	M	B	G	T	F	H
Q	B	A	E	I	C	U	E
C	O	M	P	U	T	E	R
K	A	H	R	S	F	L	H
Z	T	R	A	I	N	P	C
M	A	C	H	I	N	E	H

Lab Work

• Experiential Learning

- Take students to the computer lab. Show them the computer system.
- Discuss with the students:
  1. Have they seen the computer system before?
  2. Have they ever used this system?
- Help the students write their name in a Word file.
- Ask students to list some more machines, other than the ones mentioned in the chapter.

TEACHER'S NOTES

- Also show them other types of machines like TV, camera, mobile, that can be found in the school.
- Take the students to the lab and show them a computer.
- Switch ON the computer and play a cartoon movie on it.

Uses of a Computer

We can use a computer to do different types of work. Let us know some uses of a computer.

Play fun and educational games

Type letters, poems, and stories

Explore new topics

Draw and colour pictures

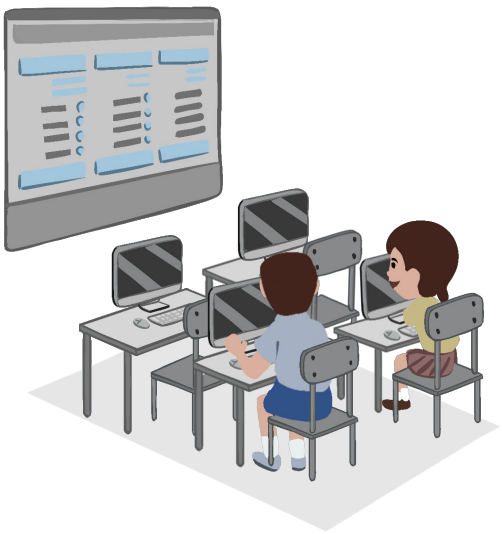
Send and receive messages

Solve sums quickly

Places where computers are used

Let us learn about the different places where computers are used.

In Schools



- To teach students
- To make test papers, mark sheets and report cards

At Homes

- To listen to music
- To play games

At Railway Stations

- To record the information of all the customers and their bank account
- To take out money from ATMs **(Automated Teller Machine)**

In Banks

- To inform arrival and departure times of trains
- To keep a record of all the passengers
- To book and print tickets

In Hospitals

- To diagnose diseases
- To keep records of all patients

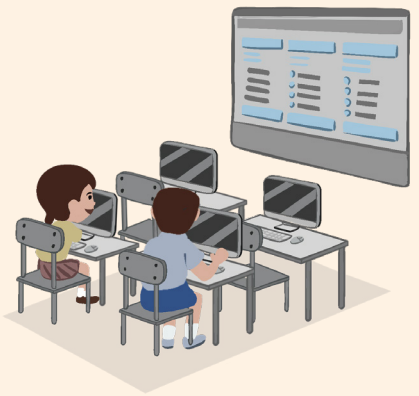
At Airports

- To inform arrival and departure times of flights
- To keep a record of all the passengers
- To book and print tickets

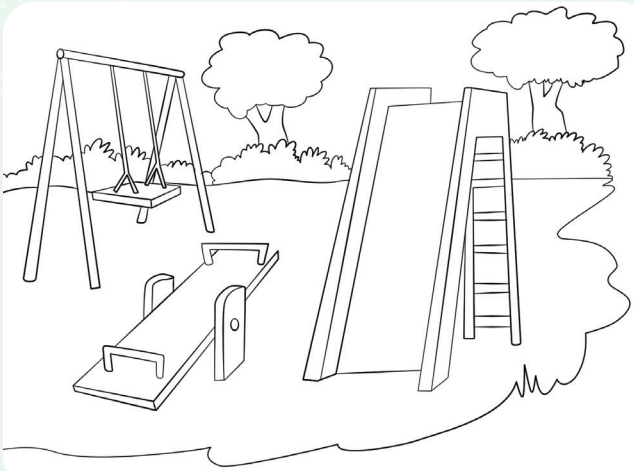
Fun Time

• Problem Solving

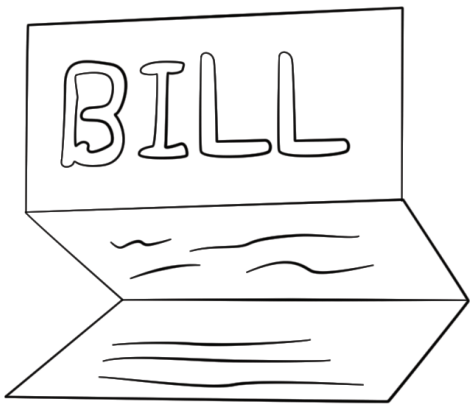
A. Identify the places and write where the computer is being used.



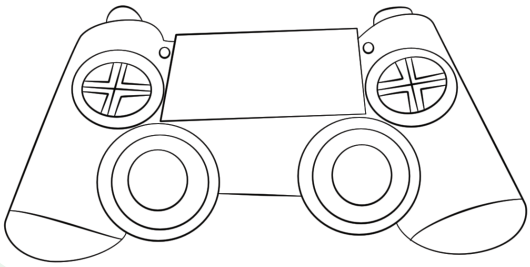
B. Colour the pictures of activities that do not require a computer.



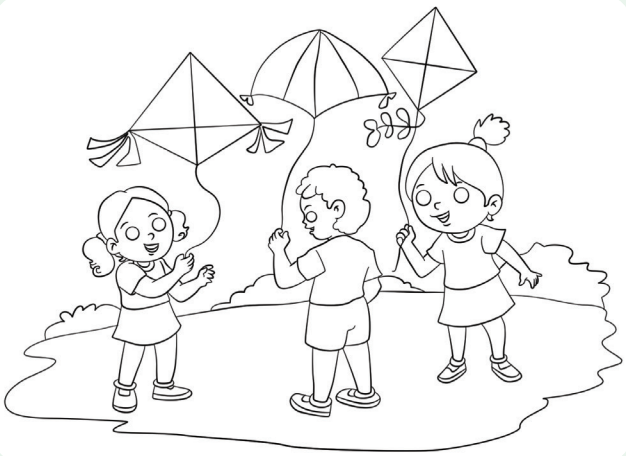
Playing outdoor games



Generating bill



Viewing distant objects



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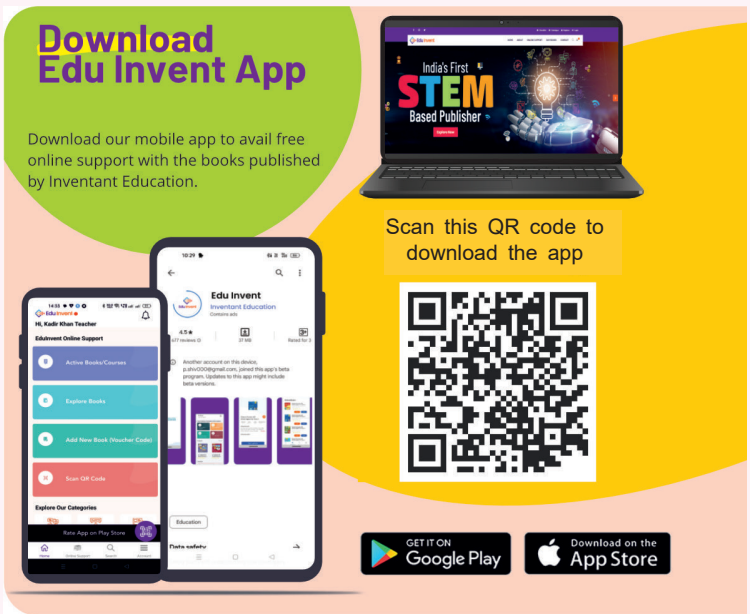

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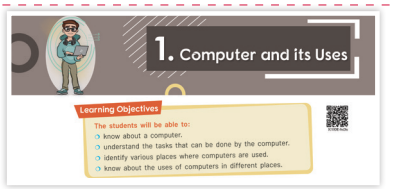

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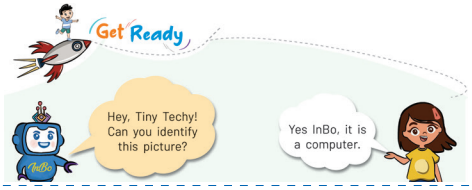
The goals to be reached by the end of the chapter



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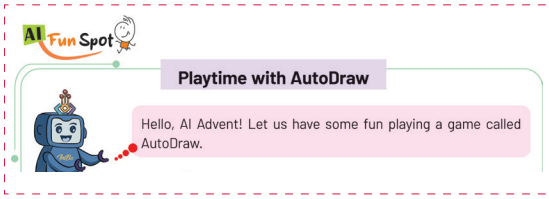
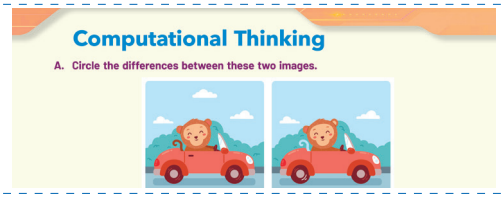


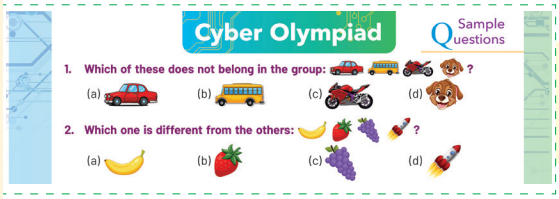
AI Fun Spot

An AI fun lab activity to spark curiosity



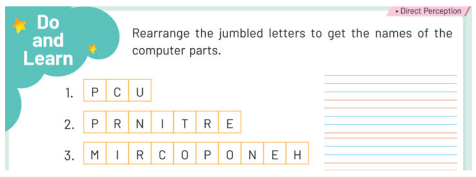
Computational Thinking

A question that needs the learners to think and solve analytically



Cyber Olympiad

A competitive exam conducted by SOF for each class in schools to assess the learners

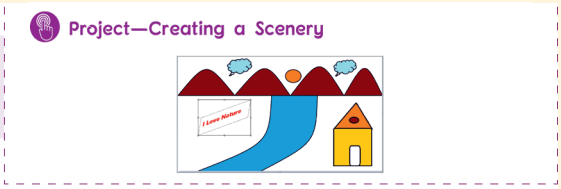


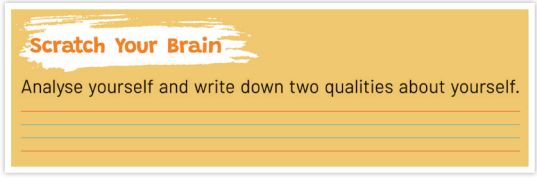
Do and Learn

An activity that reinforce learning among the learners

Project-Based Learning

Focuses on enhancing practical knowledge



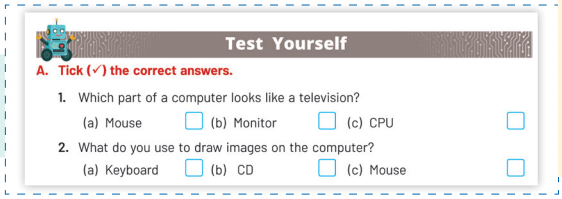


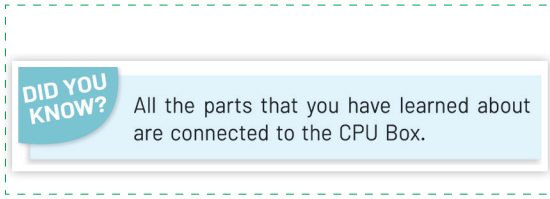
Scratch Your Brain

A hands on exercise that will help the student to get practical knowledge on the topic

Test Yourself

Various kinds of questions to test the gained knowledge



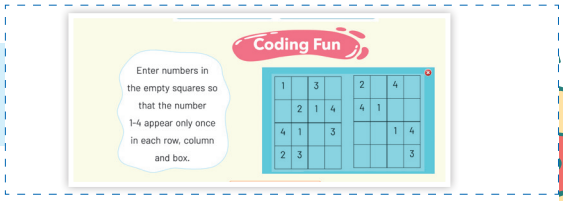


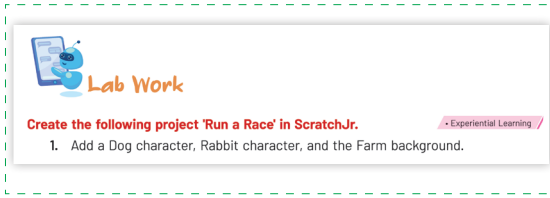
Did You Know

An interesting piece of knowledge

Coding Fun

Fun activity to enhance the thinking power



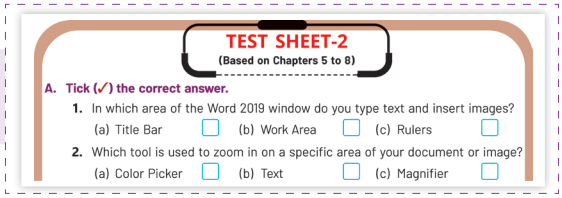


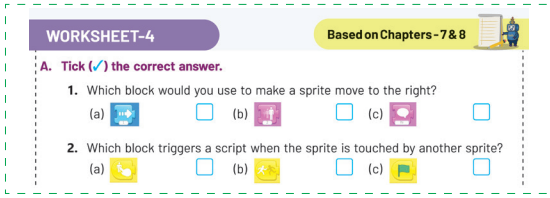
Lab Work

Some activity to be done while in the lab

Test Sheet

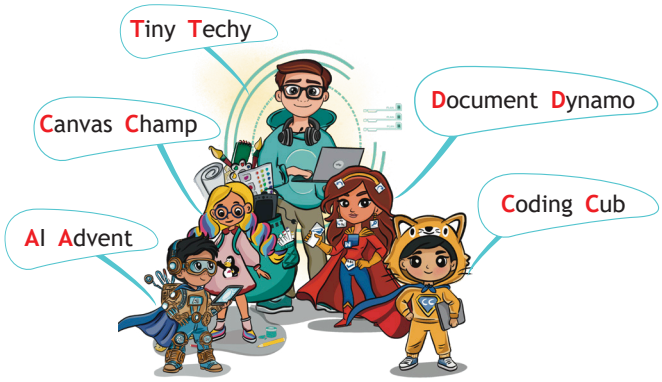
Evaluates the learner's knowledge in a subject





Worksheets

Reinforcing and assessing students understanding



Tech Rangers, a dynamic team of special characters, bring educational content to life, making learning fun and turning every lesson into an exciting adventure.

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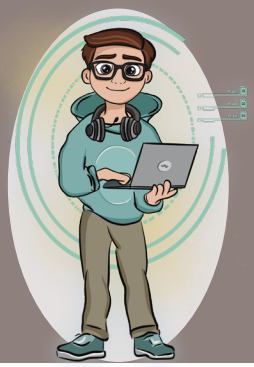


1. Computer and its Uses

Learning Objectives

The students will be able to:

- know about a computer.
- understand the tasks that can be done by the computer.
- identify various places where computers are used.
- know about the uses of computers in different places.

ICODE-bsDn

Get Ready

Hey, Tiny Techy! Can you identify this picture?

Yes InBo, it is a computer.

Bravo, now let us do a challenge.

Ok let us do it.

They are the things you often see at homes.

Identify the machines in this picture and name them.

Given below are some objects.

Computer—A Smart Machine

A computer is a helpful machine that can be found in many places, including schools, homes, shops, offices, banks, and hospitals. It has become an essential part of our lives. Let us learn about the uses of computers in these places.

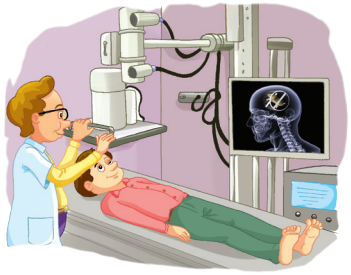
Uses of a Computer

Banks

- To keep the details of customers and their accounts
- To deposit and withdraw money

Schools

- To teach and keep records of students and teachers
- To prepare results and worksheets



Hospitals

To diagnose the diseases of patients

To keep records of all the patients

Homes

- To study and learn new things.
- To play games and listen to music.

Railway Stations and Airports

- For booking and cancellation of tickets
- For maintaining records of trains and flights arrival and departure

DID YOU KNOW?

Computers also help us withdraw money from ATMs. ATM stands for Automated Teller Machine.

Offices

- For keeping the records of employees
- For sending and receiving emails

Space Research

- To find information about space
- To launch rockets and satellites

Computer V/s Human

As you have learned, a computer can perform many tasks, making it a very useful machine. Let us know some characteristics of a computer that make it different from a human.

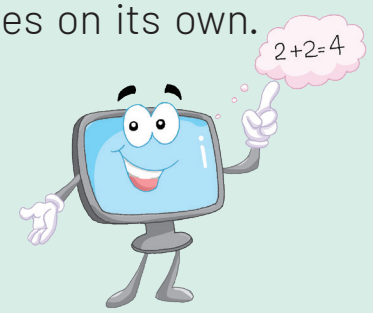
Scratch Your Brain

Analyse yourself and write down two qualities about yourself.

A computer can store a large amount of data and never forgets anything.

Sometimes, a human may forget things.

A computer does not make mistakes on its own.



A human can make mistakes.

A computer never becomes tired and can do many tasks at a time.

A human may become tired after doing some work and needs rest.

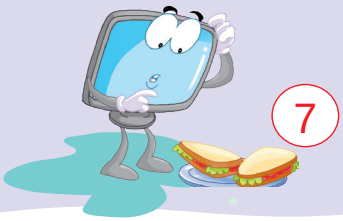
Children, you might think that a computer is superior to a human. But, this is not true. Let us know why.

Human V/s Computer

Computer can do many tasks, but it cannot be called superior to a human because, a computer is created by humans and cannot do certain tasks that a human can, such as:

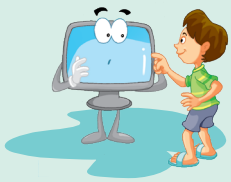
A human eats food to live.

A computer does not eat food. It works on electricity.



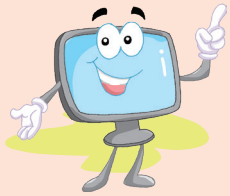
A human can think and make their own decisions.

A computer cannot think; it only follows the instructions given by a human.



A human has feelings. When he is injured, he feels it.

A computer does not have any feelings. It never reacts.



DID YOU KNOW?

The first modern computer was essentially a massive calculator, designed to handle only addition, subtraction, multiplication, and division.

Types of computers

Computers come in various sizes and shapes. Here are some examples.

Desktop

This is also known as a personal computer. It fits on an office desk and is not big in size. You cannot carry it from one place to another.

Desktop

Laptop

This can also do the same work as a desktop computer. It is smaller in size more and compact than a desktop. It can be neatly folded into the shape of a small briefcase. You can take it whenever you want.

Laptop

Tablet

It looks like a laptop but is more compact. It can fit into your bag easily.


Tablet

Smartphone

It is a mobile phone. Modern smartphones can do much more tasks than just make or receive calls. With many apps, they function like small computers. It fit is your pocket.

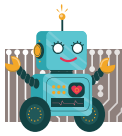

Smartphone

• Thinking Skills

Do and Learn

Tick (✓) the tasks that you can do on computers and cross (✗) the ones you cannot.



Test Yourself

A. Tick (✓) the correct answer.

1. Which of the following is a Human-made thing?

   (a) Computer ☐ (b) Sun ☐ (c) Moon ☐

2. Where are used computers for booking tickets?

   (a) Hotel ☐ (b) School ☐ (c) Railway station ☐

3. Where are computers used to diagnose diseases of the patients?

   (a) Cars ☐ (b) Computers ☐ (c) Hospitals ☐

B. Fill in the blanks.

HINTS: Tickets Feelings Hospitals

1. A computer helps in booking _____ .
2. _____ use computers to prepare medical reports and bills.
3. Computers do not have _____ .

C. Write 'T' for true and 'F' for false.

1. Computers are used in offices to send emails. ☐
2. A tablet computer is more compact than a laptop computer. ☐
3. A computer can work on its own. ☐

D. Answer the following questions.

1. What is the use of computers in schools?

2. Name one machine that is human-made and how does it work.

E. Competency/Application-based questions.

• Critical Thinking

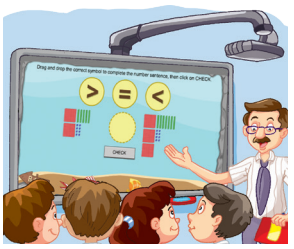
Why do you call a smartphone a computer?

Fun Time

A. Name the places where computers are used as given in the pictures.

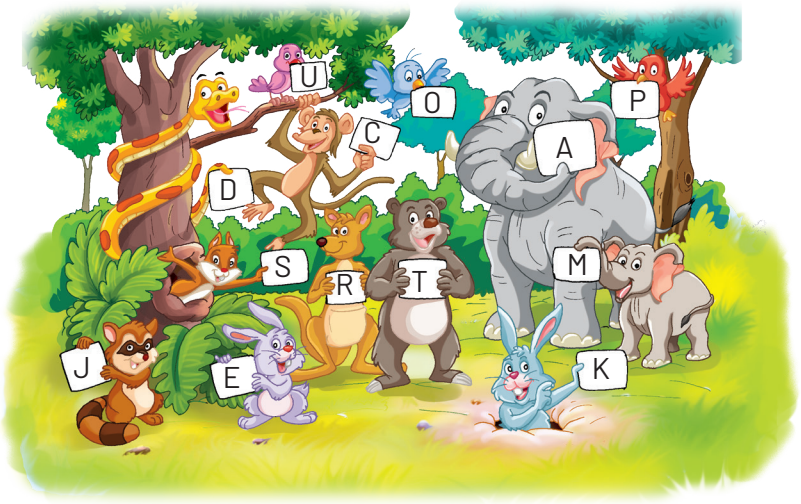
• Direct Perception

1. 

2. 

B. Each animal has a letter. Colour the letters to form the word 'COMPUTER'.

• Analogy • Critical Thinking



Lab Work

• Experiential Learning

- Open WordPad.
- Type five differences between a computer and human.
- Type the name of various places where computers are used.

(**Note:** Take your teacher's help to do these tasks.)

TEACHER'S NOTES

- Tell some more differences to the students between a human and a computer.
- Take the students to the lab and show places where computers are used with the help of pictures.
- Play an animated educational movie on the computer.

As per
NEP 2020 and NCF 2023

CURSOR Pro 3

A Textbook of **Computer Science**
for Joyful and Experiential Learning

Based on
Windows 10 and MS Office 2019

By
Editorial Team
Inventant Education

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Introduction

Cursor Pro is a comprehensive computer series for learners in classes 1-8, focusing on computer knowledge, the internet, and advancements in **Machine Learning** and **Deep Learning Systems.**

Inventant Education aims to equip students with computer skills, creativity, and diligence while aligning with Sustainable Development Goals to foster global understanding and problem-solving. Additionally, the projects and activities are aligned with Sustainable Development Goals (SDGs), fostering a deep understanding of global challenges.

The **National Education Policy (NEP) 2020** is integrated into practical activities, highlighting **21st-century** skills like **Healthy Living**, **Artificial Intelligence**, **Cyber Ethics**, **Art Integration**, **Cross-Curricular Activities**, and **more**. The **National Curriculum Framework 2023** fostering cognitive abilities in **Perception, Inference, Comparison, Postulation, Non-Apprehension** and **Verbal Testimony**.

Our Teacher's Resource Book and Online Support offer lesson plans, answer keys, e-books, and animated videos for educators, enhancing learning and shaping the future of education.

—Inventant Education

Aligned with NEP 2020 and NCF 2023

FEATURES OF NEP 2020

21st Century Skills

Learning Skills (4Cs)

- ✓ Critical Thinking
- ✓ Creativity
- ✓ Communication
- ✓ Collaboration

Literacy Skills (IMT)

- ✓ Information Literacy
- ✓ Media Literacy
- ✓ Technology Literacy

Life Skills (FLIPS)

- ✓ Flexibility
- ✓ Leadership & Responsibility
- ✓ Initiative
- ✓ Productivity & Accountability
- ✓ Social Interaction

BASED ON NCF 2023

In NCF 2023, **curriculum** means not only what is given in the books, but also how the learners learn in school, the school's environment, and more. To make learning better, we need positive changes in all these areas.

The Six Pramanas

- Inference
- Perception
- Comparison
- Verbal Testimony
- Non- Apprehension
- Postulation

How to Access Digital Content through QR Code

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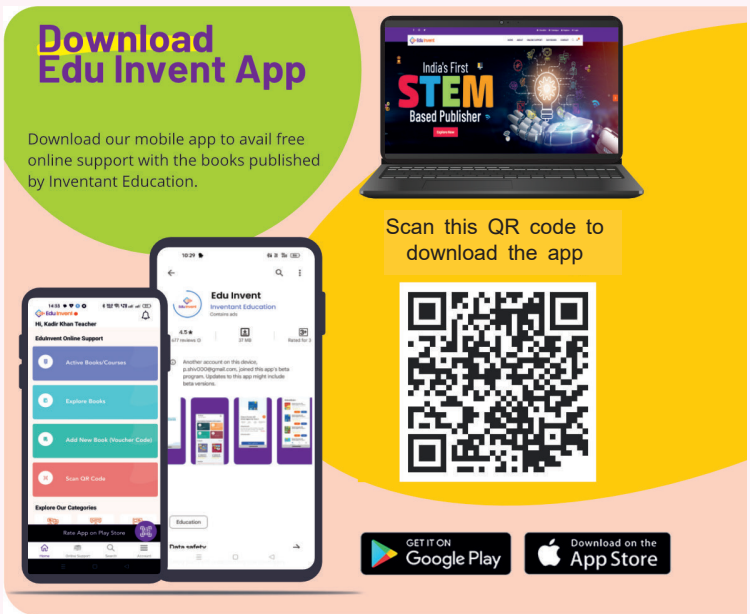
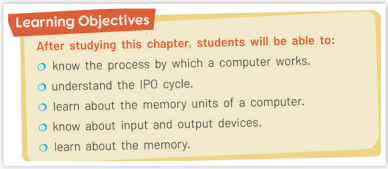
- ✓ "Visit "digital.inventanteducation.com"
- ✓ Click "Register" button available on the top-right.
- ✓ Select 'Teacher/Student' in 'User' Type.
- ✓ Enter your name, email, mobile number and password.
- ✓ Click 'Register', and Enter the OTP to verify your mobile/email.
- ✓ Once registered, login on to the website and go to **Scan and Learn** section. Enter the Codes printed below the QR Codes to view the required content.

For Mobile Users

- ✓ Go to Google Play Store or Apple App Store.
- ✓ Type 'Edu Invent' in the search bar.
- ✓ Tap 'Install'. The app will take a few moments to download and install.
- ✓ Once installed, tap 'Open' to launch the app.
- ✓ Register yourself and login on the app.
- ✓ On the dashboard, click Scan QR Code button.
- ✓ Scan a QR Code printed in the book to explore the learning content associated with the QR Code.

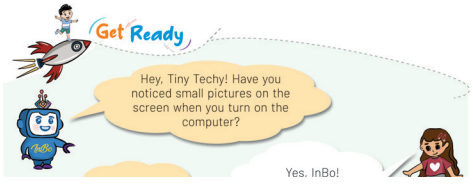


About the Series



Learning Objectives

The goals to be reached by the end of the chapter

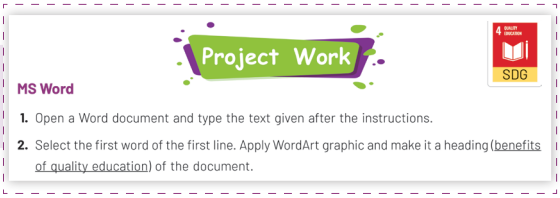


Get Ready

Warm up activities that sparks curiosity and engagement

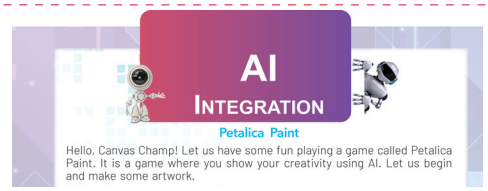
SDGs

Projects and activities are design with SDG goals to raise awareness



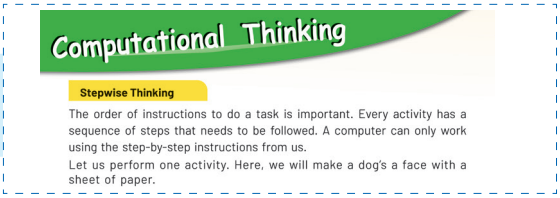
Project Work

In-depth exploration and application of learned concepts



AI Integration

Improve productivity using AI-powered platform



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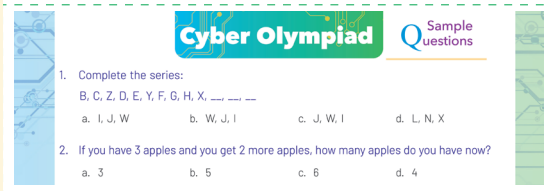

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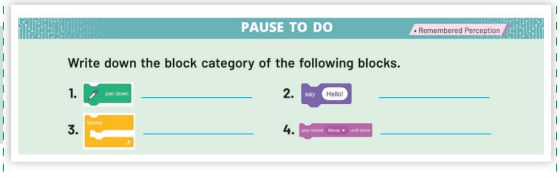


Pause To Do

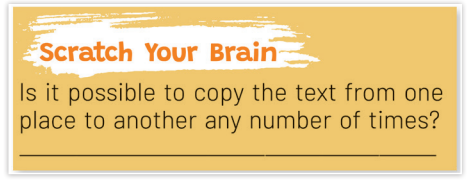
An activity that reinforce learning among the learners

Project-Based Learning

Focuses on enhancing practical knowledge

Project– Quiz Game in Scratch

Let us create an interesting quiz using various sprites and blocks.

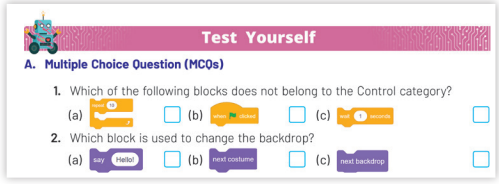


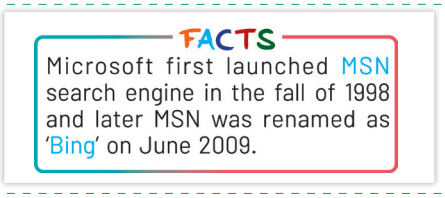
Scratch Your Brain

An interesting question to think out

Test Yourself

Various kinds of questions to test the gained knowledge



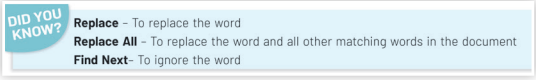


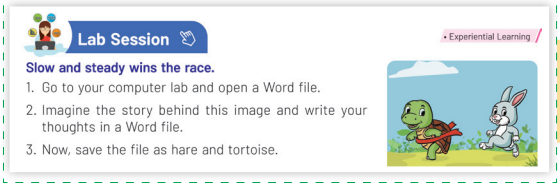
Facts

An interesting bit of knowledge that will help the learners

Did you know

An interesting piece of knowledge



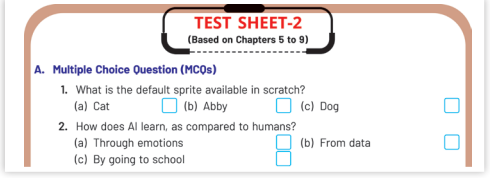


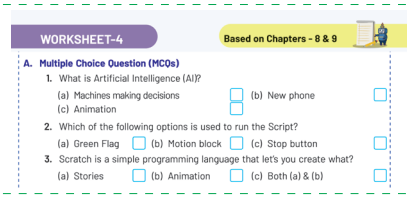
Lab Session

Some activity to be done while in the lab

Test Sheet

Evaluates the learner's knowledge in a subject





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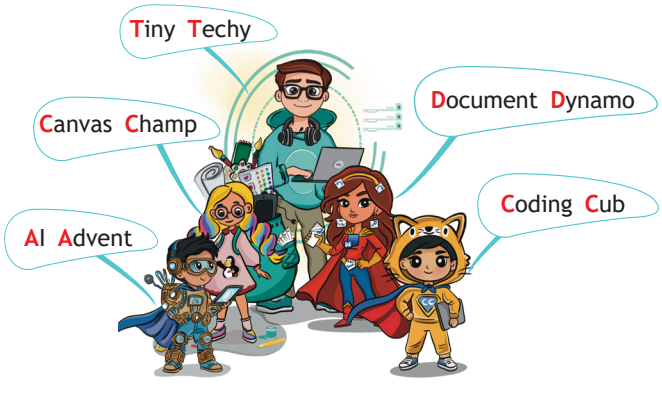

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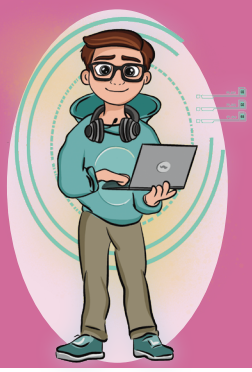


1. How a Computer Works?

Learning Objectives

After studying this chapter, students will be able to:

- know the process by which a computer works.
- understand the IPO cycle.
- learn about the memory units of a computer.
- know about input and output devices.
- learn about the memory.

ICODE-rVym

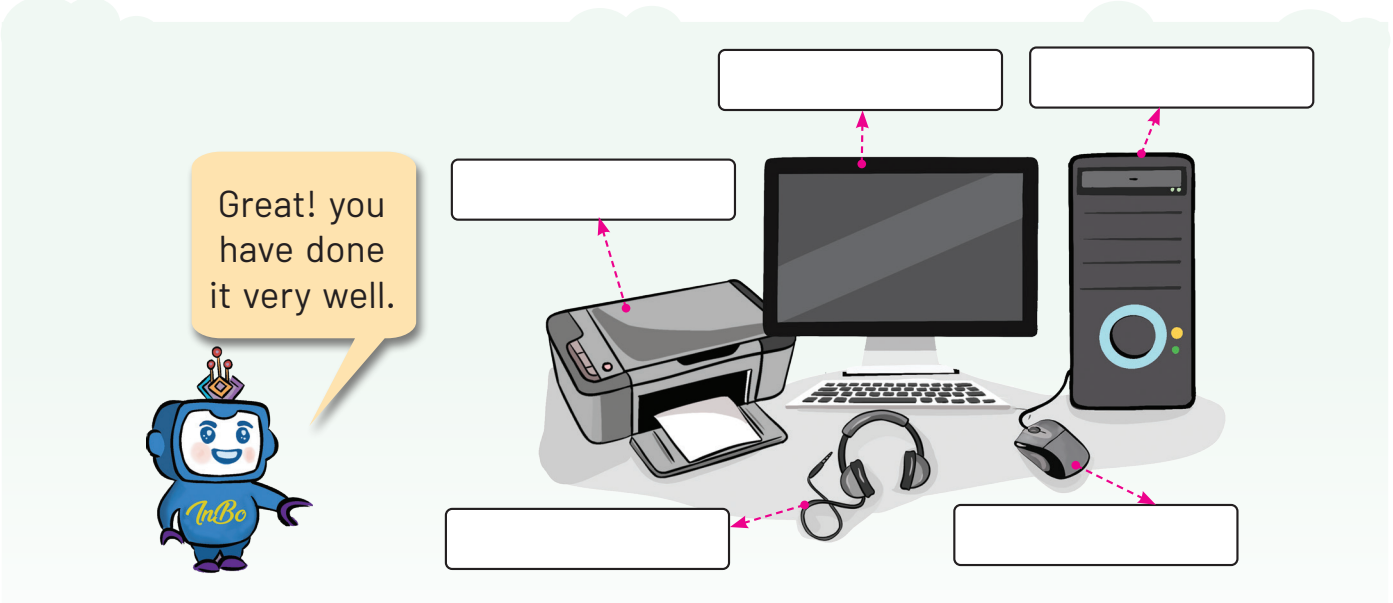
Get Ready

Welcome back, Tiny Techy! You have already learned about computers in your previous class. Now, in this chapter, you will be introduced to different types of computers.

Wow! I am super excited. Let us start.

Sure, but first let us do a warm-up activity.

Write the names of the parts labelled here.



Introduction

In your previous classes, you have learned about the uses of computers. In this chapter, you will learn about the IPO cycle and various principles of computers.

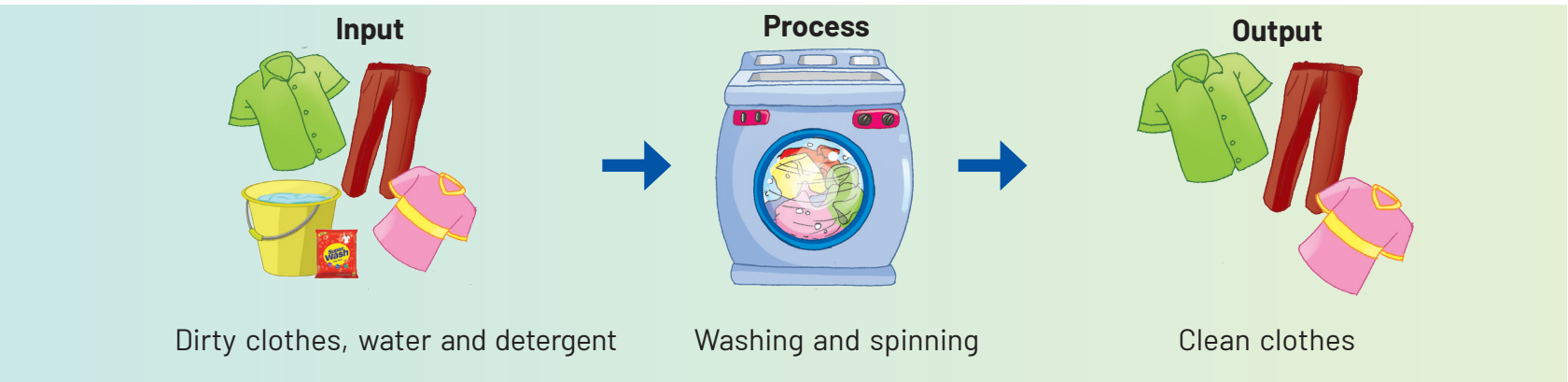
Basic Principles of Computers

A computer is a electronic device capable of solving problems by accepting data, performing operations on data and giving results. A computer follows three steps.

Input → Process → Output

This is also called the IPO cycle. Computers follow the IPO cycle to perform tasks.

Example 1: This is similar to the process of washing dirty clothes.



Input	Process	Output
The data, instructions or commands given to the computer are called **input**.	A computer accepts input and calculates the result. This is called **processing**.	The result given by the computer after processing is called an **output**.
For example: To add two numbers, enter 2,6 and +. Here, 2 and 6 are data and '+' is an instruction that is to be performed on the data.	**For example:** The input instruction (+) will be processed on the input data, such as 2 + 6 = 8. Here, addition operation is performed on the data 2 and 6.	**For example:** The processed information or result will appear on the monitor screen. Here, the output of 2 + 6 is 8.

Let us take some daily life examples to understand the concept of the IPO cycle. The following are some examples where you find **Input** → **Process** → **Output** in daily lives.

Example 2: The following is a way to place a call to a person.

A computer uses different devices to perform tasks. These devices are named as:

1. Input devices
2. Processing device
3. Output devices

PAUSE TO DO

• Problem Solving

Label the following images by I for Input, P for Process and O for Output.

Input Devices

Input devices are used to accept the input from the user. The commonly used input devices are **keyboard**, **scanner**, **mouse**, **microphone**, **light pen**, and so on.

Processing Device

There is just one part that helps the computer think and work, it is called the **CPU**, which stands for **Central Processing Unit**. It is small in size. It is placed on the motherboard of the computer inside the CPU box. CPU is often called the **brain** of the computer.

CPU

Output Devices

Output devices display the result after processing the input. The commonly used output devices are **monitor**, **speakers, plotter, printer,** and so on.

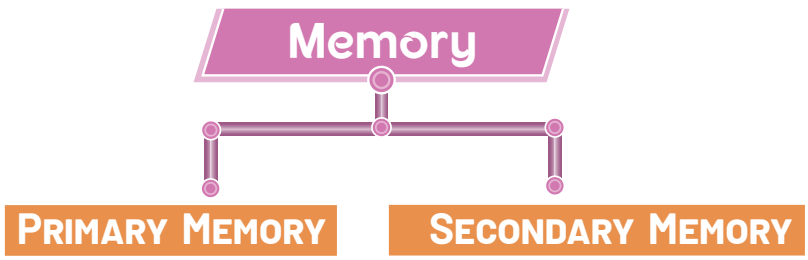
Memory

The capacity of a computer to store data and information is called its **memory**. It is used to store the input data, the processing instructions, and output of the computer. A computer has a large memory capacity, allowing you to easily store text, pictures, games, audio and video files.

Types of Computer Memory

The memory in a computer system can be divided into two types-primary Memory and Secondary Memory.

1. **Primary Memory:** Primary memory is also called the **Internal Memory**. It is used to store the data and programs currently running on the computer. Primary memory is of two types:



(a) **Read Only Memory (ROM):** Read Only Memory stores the data and information permanently. Programs are stored on ROM chips when a computer is manufactured. You can only read the information from ROM. Any new information cannot be written to it. It is a non-volatile memory which means that the data stored in it is not lost when the power is turned off.

DID YOU KNOW?

Intel's 1 KB RAM memory chip was the biggest memory chip available in 1969.

(b) **Random Access Memory (RAM):** Random Access Memory holds the data temporarily. Information can be both read from and written to it. RAM is also known as **read/write** memory. It is a volatile memory which means that the data stored in it is lost when the power is turned off.

ROM

RAM

FACTS

A program is a set of instructions for the computer to perform a task.

2. **Secondary Memory:** Secondary Memory is also called **External Memory**. It is used to store the data permanently.

The different types of external storage devices are:

Hard disk

CD

DVD

Pen drive

Blu-ray disc

Let's Brief

- A computer generally executes the tasks it is given by following: Input → Process → Output cycle.
- Input devices in a computer collectively accept the input from the external world.
- CPU stands for Control Processing Unit.
- A CPU processes the input given to it.
- Output devices show the output of the computer in some form.
- The capacity of a computer to store data and information is called its memory.
- There are two types of computer memory: Primary memory and Secondary memory.

Test Yourself

A. Multiple Choice Question (MCQs)

1. Which of the following devices collects inputs from the external world?

   (a) Mouse ☐ (b) Plotter ☐ (c) Printer ☐

2. What is a single binary digit also known as?

   (a) Bigit ☐ (b) Binary ☐ (c) Bit ☐

3. Which part of the computer is known as the brain of the computer?

   (a) Plotter ☐ (b) CPU ☐ (c) Mouse ☐

B. Fill in the blanks.

HINTS: Process Input RAM Storage

1. _____ is a read/write memory.
2. In IPO, P stands for _____ .
3. Mouse is an _____ device.
4. Blu-ray disc is a _____ device.

C. Write 'T' for true and 'F' for false statements.

1. In computer, tasks are done using IPO. ☐
2. The monitor is an input device. ☐
3. 1 GigaByte is equal to 1024 bytes. ☐

D. Answer the following questions:

1. Explain about the processing device of a computer.

   _____

   _____

2. What is computer memory?

   _____

   _____

3. Give any two examples of secondary storage devices.

   _____

   _____

E. Competency/Application-based questions.

• Critical Thinking

Yachna is making a cup of tea. Explain her how the process of making tea can be divided into Input → Process → Output.

Activity Zone

Skill Hub

• Problem Solving

Solve the following crossword puzzle using the hints as given.

Across

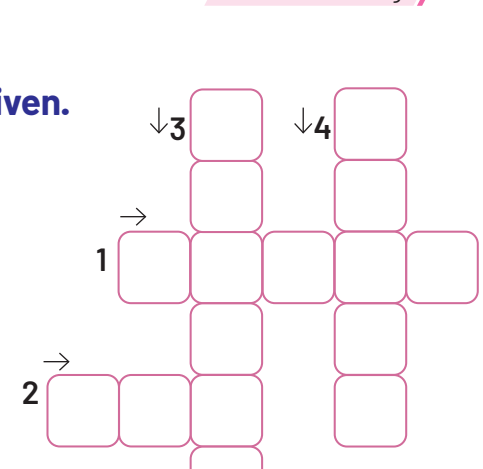
1 – The first stage in IPO as used in computer.

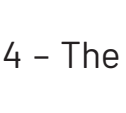
2 – The smallest unit of memory in a computer.

Downward

3 – A necessary output device in a computer.

4 – The other input device apart from keyboard.

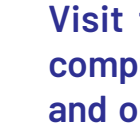




Lab Session

• Experiential Learning

Visit the computer lab and observe different input and output devices of the computer. Also, switch on the computer. Open Word and make a list of all the input and output devices available in your lab.



Project Work

• Exploratory Learning

Make a chart with your friends on different types of primary and secondary storage devices and label them appropriately.

TEACHER'S NOTES

- Emphasise on the concept that a computer is no magic but works due to its parts working in unison.
- Stress should be given on memory of computer and how it is increasing in various devices.

As per
NEP 2020 and NCF 2023

CURSOR Pro 4

A Textbook of **Computer Science**
for Joyful and Experiential Learning

Based on
Windows 10 and MS Office 2019

By
Editorial Team
Inventant Education

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Present Meets Future
(A Unit of EDULABZ International)

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Introduction

Cursor Pro is a comprehensive computer series for learners in classes 1-8, focusing on computer knowledge, the internet, and advancements in **Machine Learning** and **Deep Learning Systems.**

Inventant Education aims to equip students with computer skills, creativity, and diligence while aligning with Sustainable Development Goals to foster global understanding and problem-solving. Additionally, the projects and activities are aligned with Sustainable Development Goals (SDGs), fostering a deep understanding of global challenges.

The **National Education Policy (NEP) 2020** is integrated into practical activities, highlighting **21st-century** skills like **Healthy Living**, **Artificial Intelligence**, **Cyber Ethics**, **Art Integration**, **Cross-Curricular Activities**, and **more**. The **National Curriculum Framework 2023** fostering cognitive abilities in **Perception, Inference, Comparison, Postulation, Non-Apprehension** and **Verbal Testimony**.

Our Teacher's Resource Book and Online Support offer lesson plans, answer keys, e-books, and animated videos for educators, enhancing learning and shaping the future of education.

—Inventant Education

Aligned with NEP 2020 and NCF 2023

FEATURES OF NEP 2020

21st Century Skills

Learning Skills (4Cs)

- ✓ Critical Thinking
- ✓ Creativity
- ✓ Communication
- ✓ Collaboration

Literacy Skills (IMT)

- ✓ Information Literacy
- ✓ Media Literacy
- ✓ Technology Literacy

Life Skills (FLIPS)

- ✓ Flexibility
- ✓ Leadership & Responsibility
- ✓ Intiative
- ✓ Productivity & Accountability
- ✓ Social Interaction

BASED ON NCF 2023

In NCF 2023, **curriculum** means not only what is given in the books, but also how the learners learn in school, the school's environment, and more. To make learning better, we need positive changes in all these areas.

The Six Pramanas

- Inference
- Perception
- Comparison
- Verbal Testimony
- Non- Apprehension
- Postulation

How to Access Digital Content through QR Code

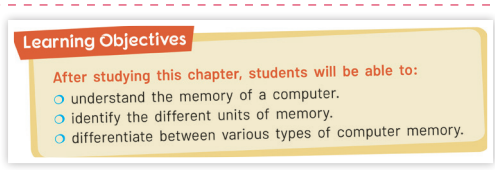
For Website Users

- ✓ "Visit "digital.inventanteducation.com"
- ✓ Click "Register" button available on the top-right.
- ✓ Select 'Teacher/Student' in 'User Type.
- ✓ Enter your name, email, mobile number and password.
- ✓ Click 'Register', and Enter the OTP to verify your mobile/email.
- ✓ Once registered, login on to the website and go to **Scan and Learn** section. Enter the Codes printed below the QR Codes to view the required content.

For Mobile Users

- ✓ Go to Google Play Store or Apple App Store.
- ✓ Type 'Edu invent' in the search bar.
- ✓ Tap 'Install'. The app will take a few moments to download and install.
- ✓ Once installed, tap 'Open to launch the app.
- ✓ Register yourself and login on the app.
- ✓ On the dashboard, click Scan QR Code button.
- ✓ Scan a QR Code printed in the book to explore the learning content associated with the QR Code.

About the Series

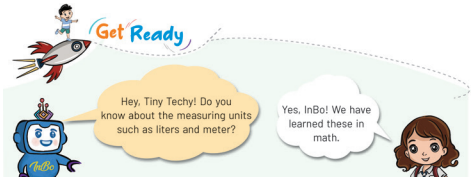


Learning Objectives

The goals to be reached by the end of the chapter

Get Ready

Warm up activities that sparks curiosity and engagement

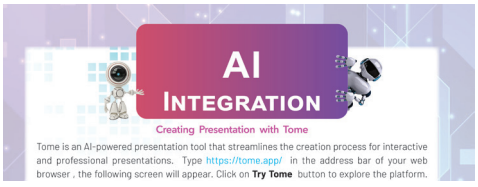


SDGs

Projects and activities are design with SDG goals to raise awareness

Project Work

In-depth exploration and application of learned concepts

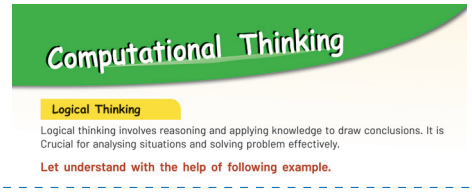


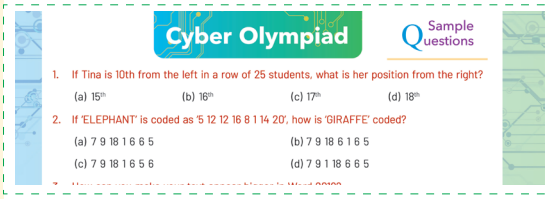
AI Integration

Improve productivity using AI-powered platform

Computational Thinking

A question that needs the learners to think and solve analytically





Cyber Olympiad

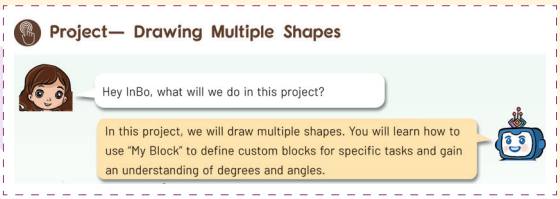
A competitive exam conducted by SOF for each class in schools to assess the learners

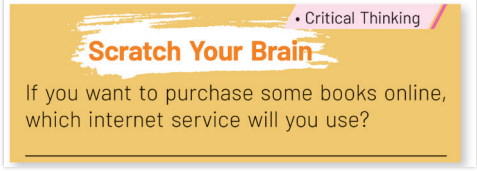
Pause To Do

An activity that reinforce learning among the learners

Project-Based Learning

Focuses on enhancing practical knowledge



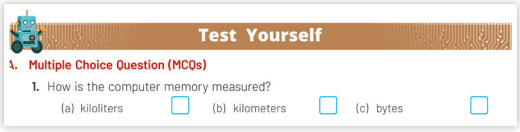


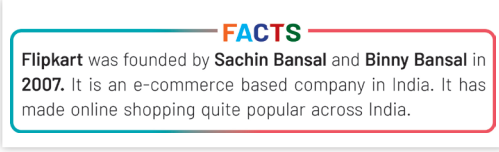
Scratch Your Brain

An interesting question to think out

Test Yourself

Various kinds of questions to test the gained knowledge



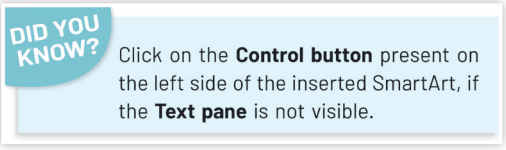


Facts

An interesting bit of knowledge that will help the learners

Did you know

An interesting piece of knowledge

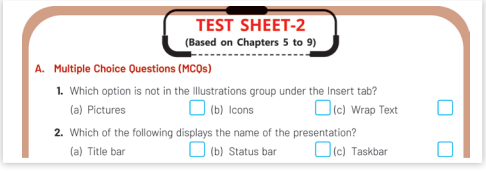


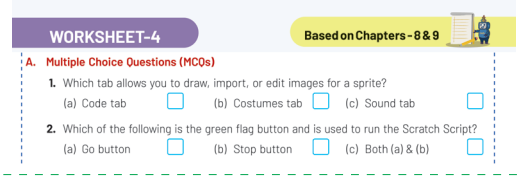
Lab Session

Some activity to be done while in the lab

Test Sheet

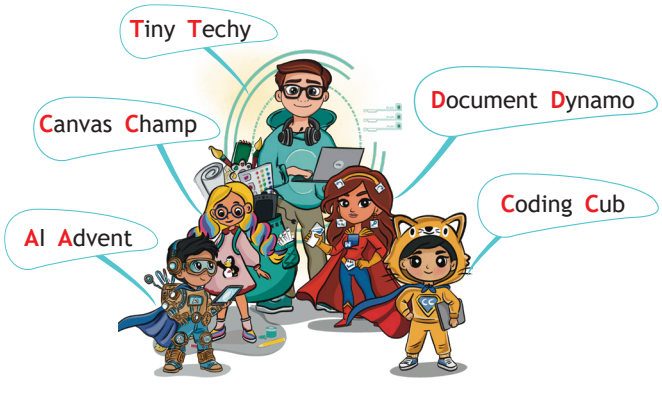
Evaluates the learner's knowledge in a subject





Worksheets

Reinforcing and assessing students understanding



Tech Rangers, a dynamic team of special characters, bring educational content to life, making learning fun and turning every lesson into an exciting adventure.

Contents

1. Data Storage & Memory

Learning Objectives

After studying this chapter, students will be able to:

- understand the memory of a computer.
- identify the different units of memory.
- differentiate between various types of computer memory.

ICODE-U3p2

Get Ready

Hey, Tiny Techy! Do you know about the measuring units such as liters and meter?

Yes, InBo! We have learned these in math.

Great! Now, identify the given units and match them with the correct ones.

Kiloliter

Kilogram

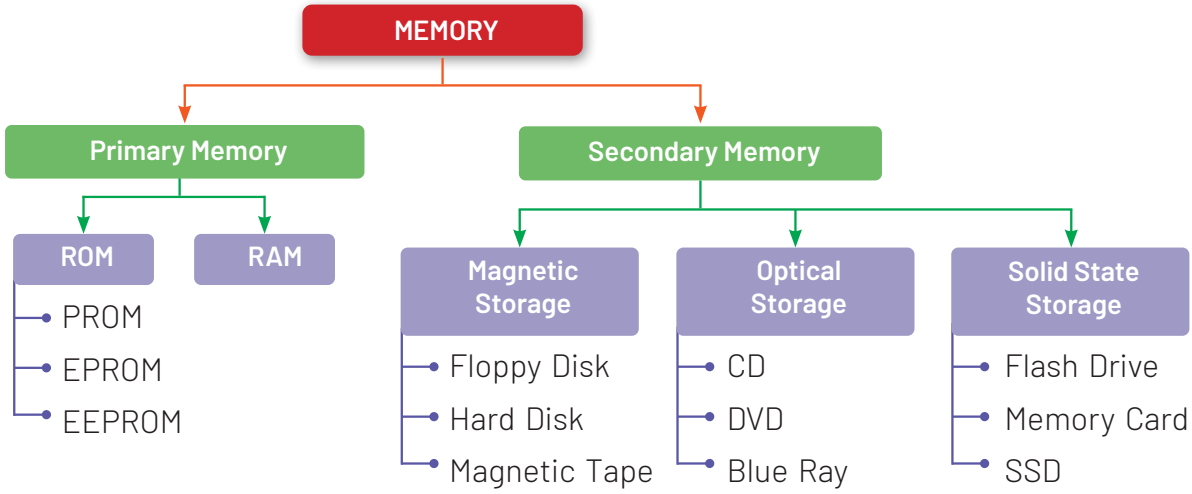
Rupees

Similarly, a computer also has memory to remember and store information. Let us learn about computer memory.

Computer Memory

The CPU is known as the **brain** of a computer. It processes all the information it receives through input devices and stores it in the computer's memory. The storage capacity of a computer is called its **memory**. Computer memory is used for storing data and instructions.

Computers store data, information, and instructions in memory so that they can be used in the future. Computer memory is divided into two types: **Primary Memory** and **Secondary Memory.**



Measuring Computer's Memory

We all know that a computer understands only 0s and 1s. These are called **bits**, short form for Binary Digits. A group of 8 bits (for example, 10111001) is called a **byte**.

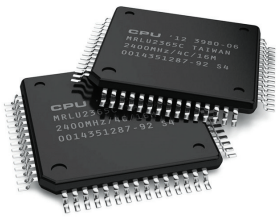
A groups of 4 bits is called a nibble. Given below are save other units of computer memory and their relationship among each other.

(a)	1 Kilobyte (KB) = 1024 bytes	**(b)**	1 Megabyte (MB) = 1024 KB
(c)	1 Gigabyte (GB) = 1024 MB	**(d)**	1 Terabyte (TB) = 1024 GB
(e)	1 Petabyte (PB) = 1024 TB	**(f)**	1 Exabyte (EB) = 1024 PB
(g)	1 Zettabyte (ZB) = 1024 EB	**(h)**	1 Yottabyte (YB) = 1024 ZB

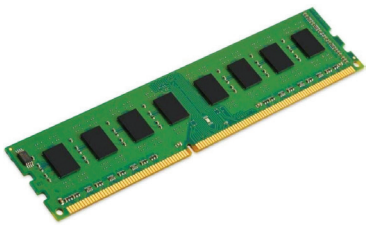
Primary Memory

The primary memory is also called the main memory of the computer. It can be directly accessed by the CPU. It is fixed inside the CPU cabinet. RAM and ROM are the two types of Primary Memory.

- **RAM: RAM** stands for **R**andom **A**ccess **M**emory. RAM refers to read and write memory. Information can be written onto and read from RAM. RAM is **volatile** in nature. So, whenever power fails or the computer is switched off, all the information that has been stored in RAM is lost. It stores information temporarily.
- **ROM: ROM** stands for **R**ead **O**nly **M**emory. It keeps the data permanently. It is **non-volatile** in nature. It retains the data even when a computer is switched off. There are 3 type of ROM:
  - Programmable Read only Memory (PROM)
  - Erasable Programmable Read only Memory (EPROM)
  - Electrically Erasable Programmable Read only Memory (EEPROM)



ROM



RAM

Secondary Memory

We need secondary memory to store our data permanently. The CPU cannot access it directly. It is slower but cheaper than the primary memory. Secondary Memory also called secondary storage device, is divided into three categories: Magnetic, Optical and Solid-State Storage.

Magnetic Storage

Magnetic storage refers to a type of data storage that uses magnetic media to record and retreive information. It is commonly used in devices, such as hard disk drives, magnetic tables and so on.

Hard Disk

Hard disk: A hard disk, also known as a **fixed disk,** is the main secondary storage device found inside the cabinet CPU. It can store a large amount of data up to 8TB.

Optical Storage

Optical storage refers to a type of data storage that uses laser technology to read and write data on optical media, Such as CDs, DVDs, and Blue-ray discs.

FACTS

CD-ROM: Compact Disc Rad Only Memory

CD-R: Comapct Disc Recordable

CD-RW: Co Compact Disc-Rewritable

1. **CD-R and CD-RW:**
   - CD-R (Compact Disc-Recordable): This type of disc allows data to be written once and cannot be changed or deleted afterward.
   - CD-RW (Compact Disc-Rewritable): This disc allows data to be erased or rewritten multiple times.

DVD

CD

2. **DVD** (Digital Versatile Disc or Digital Video Disc): Similar to a CD, but with greater storage capacity. The storage capacity of a DVD ranges from 4.7 GB to 17 GB.
3. **Blu-ray disc:** It is similar to CDs and DVDs, but use violet lasers to read data and can hold large amounts of information. They are primarily used for high-quality video files and games, which require significant storage space. A Blu-ray disc can hold up to 128 GB of data.


Blu-ray Disc

Solid State Storage

These are small portable data storage devices with no moving parts. They require less power and generate less heat than other storage media. Data is stored electronically in these devices.

1. **Pen drive:** A pen drive, also known as a **flash drive**, is a small, portable device that can store and transfer large amounts of data, such as 10 GB or 15 GB, from one computer to another.


Flash Drive

2. **Memory Card:** A memory card is used to store data in various electronic devices such as mobile phones, digital cameras, and many other portable devices. It can store up to 32 GB of data and allows for easy transfer to computers.


SSD

3. **Solid State Drive (SSD):** It is similar to a hard disk but uses flash memory to store data. It is much faster than a hard disk.

Memory Card

DID YOU KNOW?

Nowadays, external hard disks are also available. They are small in size and can be carried anywhere.

• Cognitive Development

Scratch Your Brain

Can you work on a computer without secondary storage devices?

_____

PAUSE TO DO

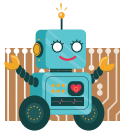
• Remembered Perception

Write the full form of the following:

1. RAM _____
2. CD-RW _____
3. ROM _____
4. EEPROM _____

Let's Brief

- The storage capacity of a computer is called its memory. Computer memory is used for storing data and instructions.
- A bit is the smallest unit of information which a computer can process and store.
- A group of 4 bits is called a nibble and a group of 8 bits is called a byte.
- Computer memory is of two types — primary memory and secondary memory.
- Primary memory is of two types — RAM and ROM.
- ROM is of three types — PROM, EPROM and EEPROM.
- Secondary memory devices are hard disk, CD-ROM, DVD, pen drive, Blu-ray disc and memory card.



Test Yourself

A. Multiple Choice Question (MCQs)

1. How is the computer memory measured?

(a) kiloliters ☐ (b) kilometers ☐ (c) bytes ☐

2. What is the smallest unit of information a computer can process and store?

(a) Byte ☐ (b) Nibble ☐ (c) Bit ☐

3. Which type of memory is known as the main memory or internal memory of a computer?

(a) Secondary ☐ (b) Primary ☐ (c) Auxiliary ☐

4. What is the full form of SSD?

(a) Solid State Drive ☐ (b) Solid Store Drive ☐ (c) Solid State Disk ☐

B. Fill in the blanks.

HINTS Nibble Primary Memory Flash drive

1. The storage capacity of a computer is called its _____.
2. A group of 4 bits is called a _____.
3. A _____ memory is the in-built memory that is fixed inside the System Cabinet.
4. A pen drive is also known as a _____.

C. Answer the following questions:

1. Explain primary memory.

_____

_____

2. What is the difference between RAM and ROM?

_____

_____

3. What do you mean by secondary memory?

_____

_____

D. Competency/Application-based questions.

• Critical Thinking

Pritam wants to copy his assignment from his computer to present it in school. Which device should he use for this purpose?

_____

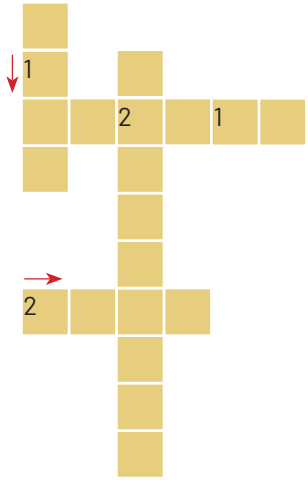
_____

Activity Zone

Skill Hub

• Remembered Perception

Solve the crossword by given here.



Across

1. It is a type of erasable programmable ROM.
2. A type of CD that you may erase data of.

Down

3. A non-volatile primary memory.
4. A small portable device to store data.

Lab Session

• Experiential Learning

Find out the RAM capacity of your computer.

To do this:

1. Click on the **Start** button, and then select **Settings**.
2. Select System > About. You will see all the information of your system.

Group Discussion

• Collaboration & Communication

Split into groups, discuss the points for 15-20 minutes, and brainstorm solutions to discuss software and audio/video piracy, how storage media are misused, and possible actions to control it.

Project Work

• Exploratory Learning

Make a chart on storage Devices. Use pictures from the internet. Make sure the pictures are copyright free.

TEACHER'S NOTES

- Elaborate on the importance of memory to store data and instructions for a running program.
- Elaborate on the differences differences between RAM and ROM and which of the two is active in which activity. If possible, show the students actual parts.

As per
NEP 2020 and NCF 2023

CURSOR Pro 5

A Textbook of **Computer Science**
for Joyful and Experiential Learning

Based on
Windows 10 and MS Office 2019

By
Editorial Team
Inventant Education

Inventant Education
Present Meets Future
(A Unit of EDULABZ International)

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Introduction

Cursor Pro is a comprehensive computer series for learners in classes 1-8, focusing on computer knowledge, the internet, and advancements in **Machine Learning** and **Deep Learning Systems.**

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The **National Education Policy (NEP) 2020** is integrated into practical activities, highlighting **21st-century** skills like **Healthy Living**, **Artificial Intelligence**, **Cyber Ethics**, **Art Integration**, **Cross-Curricular Activities**, and **more**. The **National Curriculum Framework 2023** fostering cognitive abilities in **Perception, Inference, Comparison, Postulation, Non-Apprehension** and **Verbal Testimony**.

Our Teacher's Resource Book and Online Support offer lesson plans, answer keys, e-books, and animated videos for educators, enhancing learning and shaping the future of education.

—Inventant Education

Aligned with NEP 2020 and NCF 2023

FEATURES OF NEP 2020

21st Century Skills

Learning Skills (4Cs)

- ✓ Critical Thinking
- ✓ Creativity
- ✓ Communication
- ✓ Collaboration

Literacy Skills (IMT)

- ✓ Information Literacy
- ✓ Media Literacy
- ✓ Technology Literacy

Life Skills (FLIPS)

- ✓ Flexibility
- ✓ Leadership & Responsibility
- ✓ Initiative
- ✓ Productivity & Accountability
- ✓ Social Interaction

BASED ON NCF 2023

In NCF 2023, **curriculum** means not only what is given in the books, but also how the learners learn in school, the school's environment, and more. To make learning better, we need positive changes in all these areas.

The Six Pramanas

- Inference
- Perception
- Comparison
- Verbal Testimony
- Non- Apprehension
- Postulation

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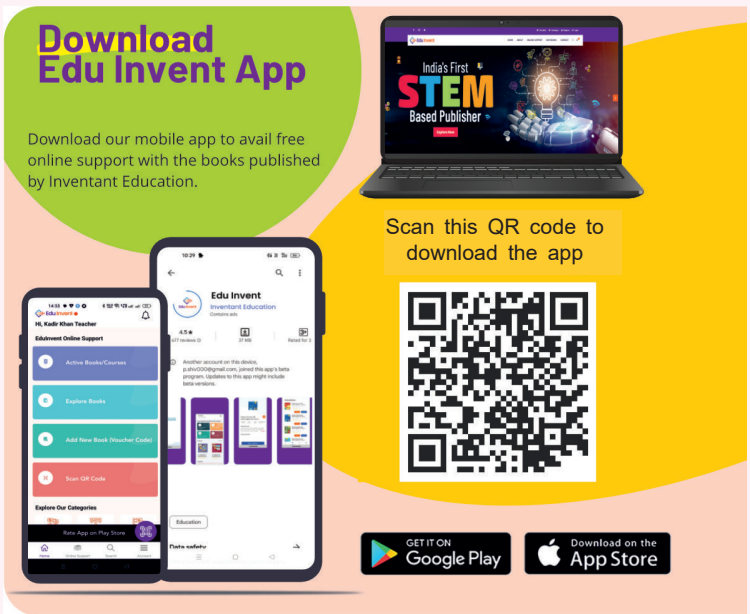
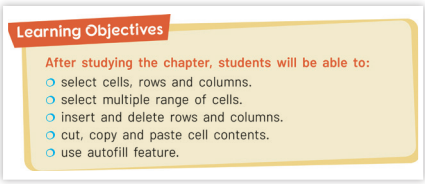
- ✓ Select 'Teacher/Student' in 'User' Type.
- ✓ Enter your name, email, mobile number and password.
- ✓ Click 'Register', and Enter the OTP to verify your mobile/email.
- ✓ Once registered, login on to the website and go to **Scan and Learn** section. Enter the Codes printed below the QR Codes to view the required content.

For Mobile Users

- ✓ Go to Google Play Store or Apple App Store.
- ✓ Type 'Edu Invent' in the search bar.
- ✓ Tap 'Install'. The app will take a few moments to download and install.
- ✓ Once installed, tap 'Open' to launch the app.
- ✓ Register yourself and login on the app.
- ✓ On the dashboard, click Scan QR Code button.
- ✓ Scan a QR Code printed in the book to explore the learning content associated with the QR Code.



About the Series



Learning Objectives

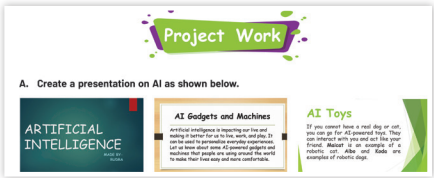
The goals to be reached by the end of the chapter

Get Ready

Warm up activities that sparks curiosity and engagement

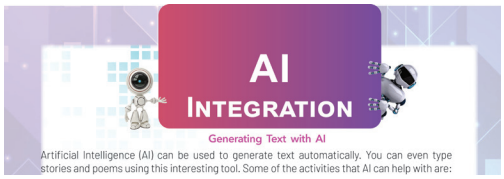
SDGs

Projects and activities are design with SDG goals to raise awareness



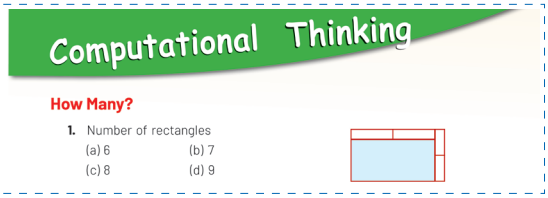
Project Work

In-depth exploration and application of learned concepts



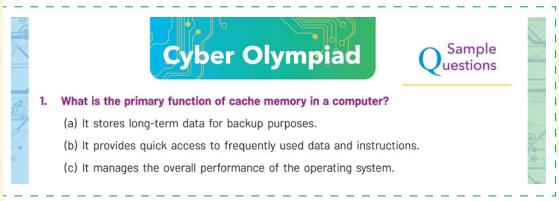
AI Integration

Improve productivity using AI-powered platform



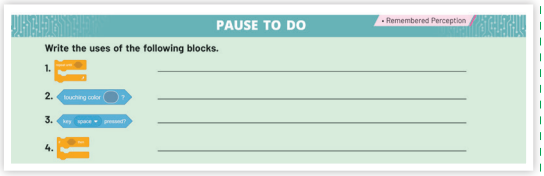
Computational Thinking

A question that needs the learners to think and solve analytically



Cyber Olympiad

A competitive exam conducted by SOF for each class in schools to assess the learners

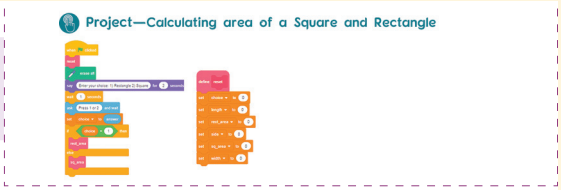


Pause To Do

An activity that reinforce learning among the learners

Project-Based Learning

Focuses on enhancing practical knowledge



• Information Literacy

Scratch Your Brain

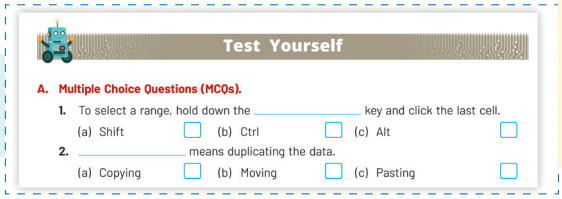
Identify the key of the keyboard that has a similar function to that of Snipping Tool.

Scratch Your Brain

An interesting question to think out

Test Yourself

Various kinds of questions to test the gained knowledge



FACTS

When you delete an email, it goes to **Trash** folder. Emails will remain in the Trash for 30 days, after which all such mails are gradually deleted.

Facts

An interesting bit of knowledge that will help the learners

Did you know

An interesting piece of knowledge

DID YOU KNOW?

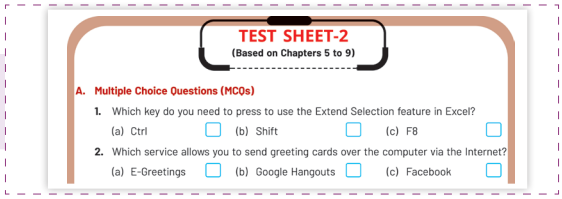
To attach file(s) with an email click on the Attachment button. An 'Open' window will appear. Select the file which is to be attached and click on Open. The file will be attached.

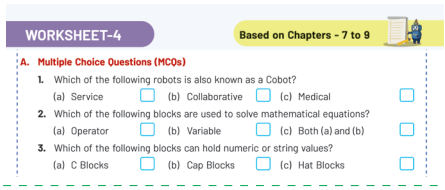
Lab Session

Some activity to be done while in the lab

Test Sheet

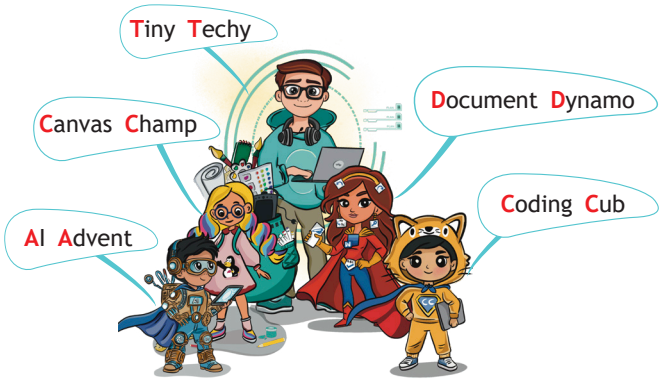
Evaluates the learner's knowledge in a subject





Worksheets

Reinforcing and assessing students understanding



Tech Rangers, a dynamic team of special characters, bring educational content to life, making learning fun and turning every lesson into an exciting adventure.

Contents

1. Evolution of Computers

Learning Objectives

After studying the chapter, students will be able to:

- understand about the various generations of computers.
- know about the characteristics of the various generations of computers.
- learn about the various types of computers.

ICODE-mpFC

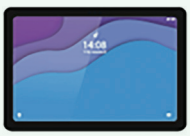
Get Ready

Hey Tiny Techy! Did you know that early computers were as big as a room?

Really? How did they get so much smaller?

Great question! We will learn about that. But first, let's try this challenge activity.

Write the names of the microcomputers shown below.



The computer is not a simple invention; it has evolved over many years. The evolution of computers is a journey that spans over several decades. Advancements and innovations over time led to the classification of computers into several generations. Each generation of computers is characterized by significant technological advancements, leading to improvements in performance, cost, speed, and size. Let us take a look at each generation of computers.

Various Generations of Computers

There are five generations of computers, described as follows:

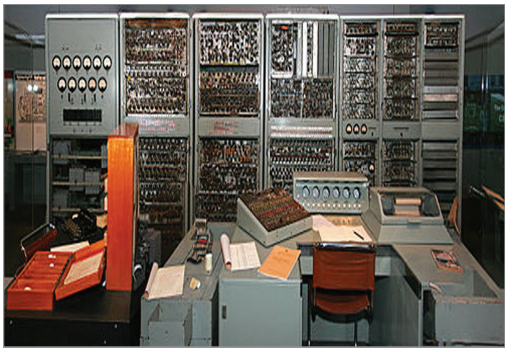
First Generation Computers

The first generation computers were used from 1940 to 1956. The first generation utilized vacuum tubes for circuitry, resulting in large, power-hungry machines.

Features:

- They used machine language.
- The operating systems of these computers were very slow.
- The computers were very large in size.
- They were unreliable and difficult to use.

Examples: ENIAC, EDVAC, EDSAC, and UNIVAC



First generation computer

DID YOU KNOW?

UNIVAC stands for Universal Automatic Computer. It was the first commercially available computer produced in the United States.

FACTS

First-generation computers were developed by scientists John W. Mauchly and J. Presper Eckert.

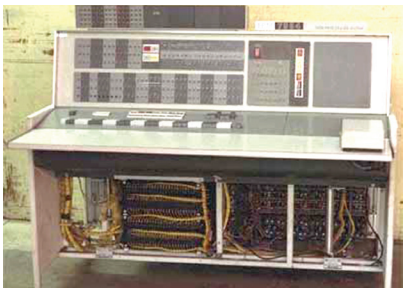
Second Generation Computers

The second-generation computers were used from 1956 to 1964. During this period, **transistors** replaced vacuum tubes.

Features:

- Second-generation computers used low-level languages.
- They were faster and smaller compared to first-generation computers.
- They were more reliable than their predecessors.

Examples: Honeywell 400, PDP-8, IBM 7090



Second generation computer

DID YOU KNOW?

PDP-8 was the first commercially successful minicomputer.

Third Generation Computers

The third-generation computers were used from 1964 to 1971. During this period, **Integrated Circuits (ICs)** were introduced, each measuring about ¼ square inch. The IC was developed by Jack S. Kilby and Robert Noyce.

Third generation computer

Features:

- They used high-level programming languages.
- They were more reliable.
- They were cheaper and smaller in size as compared to second-generation computers.
- They utilized operating systems to coordinate system operations.

Examples: IBM 360/370, CDC 7600, PDP-11, etc

Fourth Generation Computers

The fourth-generation of computers, came into existence in 1971 and continues to the present, marked the rise of microprocessors, which led to the development of personal computers like the Apple II and IBM PC. A microprocessor contains thousands of integrated circuits (ICs) on a single chip. This generation also saw the introduction of networking and the internet.

Fourth generation computer

Features: They had features like:

- Microprocessor-based systems.
- In the fourth generation, various high-level languages were developed like C language, COBOL, PASCAL and Basic.
- They are small and easy to use.
- They are less expensive than computers from earlier generations.

Examples: Apple II, DEC 10, STAR 1000, etc

FACTS

Ted Hoff developed the first microprocessor for Intel in 1971, known as the Intel 4004.

DID YOU KNOW?

The size of modern microprocessors is typically about one square inch.

Fifth Generation Computers (Present and Beyond)

The hardware used in the fifth generation of computers consists of **integrated circuits (ICs)** with **very-large-scale integration (VLSI)** technology. This generation is based on **Artificial Intelligence (AI)** techniques. These computers are commonly used in robotics, voice recognition, gaming, and similar fields.

Features:

- Emergence of supercomputers.
- Support for AI technologies, including expert systems and biometrics.
- These computers have very large storage capacity.
- They utilize extremely large-scale integrated chips.

Examples: Quantum computers, AI, neural networks

DID YOU KNOW?

The storage capacities of computers have been continuously increasing.

FACTS

All high-level languages, such as C, C++, Java, and .NET, are used in fifth-generation computing.

DID YOU KNOW?

In the fifth generation, quantum computing, molecular technology, and nanotechnology will be used.

PAUSE TO DO

• Problem Solving

Here are some devices used in first to fifth-generation computers. Arrange them in sequence from 1 to 5, starting with the device that appeared first.

Microprocessor	☐	Integrated circuit	☐
Vacuum tubes	☐	Artificial intelligence	☐
Transistors	☐		

Types of Computers

Computers can be classified into different types based on their size, speed, cost, and storage capacity.

Supercomputers

Supercomputers have exceptionally large storage capacities and computing speeds, which is many times faster than other types of computers. They are the most

powerful computers available, characterized by their high processing speeds. Due to their advanced capabilities, supercomputers are very expensive and large in size. They are primarily used in fields, such as weather forecasting and nuclear science.

Examples: PARAM, Beowulf, and Cray-I

Supercomputer

DID YOU KNOW?

Seymour Cray designed the first supercomputer, the CDC 6600, in 1964. The CDC 6600 is recognized as the world's first supercomputer.

Mainframe Computers

Mainframe computers are less powerful than supercomputers but still have very high processing speeds. They are typically used in large organizations such as railway stations, scientific laboratories, and other institutions that require robust and reliable computing capabilities. Mainframes have powerful hardware with multiple processors, allowing millions of transactions per second, and support various operating systems to run multiple applications simultaneously.

Mainframe computer

Popular mainframe computers are:

- Fujitsu's ICL VME
- Hitachi's z800

FACTS

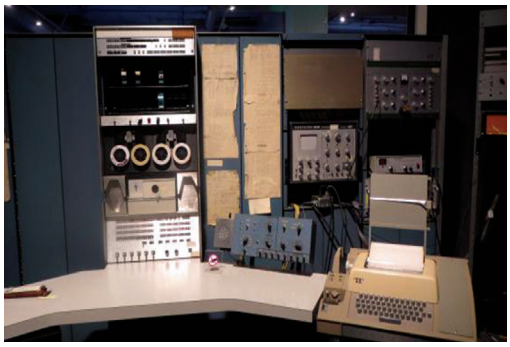
In the 1970s, the mainframes in use were primarily the System/390, made by IBM, or clones produced by Hitachi and Fujitsu.

DID YOU KNOW?

Mainframe computers are kept in climate-controlled rooms and typically run multiple operating systems.

Minicomputer

A minicomputer is a medium-sized computer that is more powerful than a microcomputer. It is a general-purpose computer capable of being used by multiple users simultaneously. They offer more affordable options for organizations that require significant computing power without the extensive resources associated with mainframes.



Minicomputer

Examples: PDP-8 and VAX

DID YOU KNOW?

A minicomputer, also known as a mid-range computer, typically ranges in size from about 12 inches in width to less than 7 feet in height.

Microcomputers (Personal Computers)

Microcomputers, commonly known as personal computers (PCs), are small in size and relatively inexpensive. Microcomputers are specifically designed for general use, such as entertainment, education, and work purposes because they are intended for personal use. Microcomputers typically consist of essential components such as a CPU, memory (RAM), storage (hard drives or SSDs), and input/output devices (keyboard, mouse, and display). They are designed to perform a wide range of tasks, including word processing, internet browsing, gaming, and multimedia editing.

Examples: IBM PCs, APPLE computers

Microcomputer can be classified into two types:

1. Desktops
2. Portables

DID YOU KNOW?

Microcomputers are mainly used in shops, offices, banks, etc.

Desktop computer

DID YOU KNOW?

Desktop models designed to be very compact are sometimes referred to as slimline models.

A desktop computer is fixed on a desk or table, while portable computers can be used while travelling, whereas desktop computers cannot be easily carried around. Different types of portable computers include:

• Critical Thinking

Scratch Your Brain

What would have happened if portable computers did not exist?

a. **Laptop:** This computer is similar to a desktop computer but smaller in size. They are more expensive than the desktop computer.

Laptop

b. **Notebook:** This is similar to a laptop but even more compact.

Notebook

c. **Palmtop (Hand-held):** They are also called **Personal Digital Assistant (PDA)**. These computers are small in size. They can be held in hands. They are capable of doing word processing, spreadsheets and handwriting recognition, game playing, faxing and paging.

Palmtop

PAUSE TO DO

• Problem Solving

Identify and complete the names of the following devices.

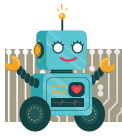
D ___ ___ t ___

L ___ ___ t __ p

P ___ ___ t ___

Let's Brief

- In first generation of computers, vacuum tubes were used.
- Transistors were used in second generation of computers.
- Integrated circuits were used in the third generation of computers.
- In the fourth generation of computers, microprocessors were used.
- Fifth generation computers are meant to have AI technology.
- Supercomputers are most powerful among all the computers.
- Microcomputers are small in size.



Test Yourself

A. Multiple Choice Questions (MCQs).

1. In the first generation of computers, the following were used.

(a) Vacuum tubes ☐ (b) Transistors ☐ (c) Integrated circuits ☐

2. ENIAC is an example of which generation?

(a) First ☐ (b) Second ☐ (c) Third ☐

3. Second-generation computers were characterized by the presence of:
   (a) ICs ☐ (b) Transistors ☐ (c) Vacuum tubes ☐
4. PDP-8 is an example of a:
   (a) Supercomputer ☐ (b) PC ☐ (c) Minicomputer ☐
5. VAX is an example of a:
   (a) Supercomputer ☐ (b) Notebook ☐ (c) Minicomputer ☐

B. Fill in the blanks.

HINTS Supercomputer Second Fifth Fourth Integrated Circuit

1. Microprocessor was used in the _____ generation computers.
2. IBM 7090 is a _____ generation computer.
3. The _____ was developed by Jack Kilby.
4. _____ generation computers are mostly useful in Robotics.
5. Cray-I is a _____.

C. Write 'T' for true and 'F' for false statements.

1. In fifth generation computers, vacuum tubes were used. ☐
2. Second generation computers were smaller and cheaper than the first generation computers. ☐
3. UNIVAC is a second generation computer. ☐
4. PDP-11 is an example of third generation computers. ☐
5. Mainframe computers are used in large organisations. ☐

D. Match the following.

Column A	Column B
1. Microprocessor	(a) Microcomputer
2. Transistors	(b) Third generation computers
3. Integrated circuits	(c) Second generation computers
4. Artificial intelligence	(d) Fourth generation computers
5. Desktop	(e) Fifth generation computers

E. Answer the following questions:

1. Describe three characteristics of the first generation computers.

2. State two features of the third generation computers.

3. What is a supercomputer?

4. Give two examples of a minicomputer.

5. Distinguish between the mainframe computers and microcomputers.

F. Competency/Applications-based questions.

• Critical Thinking

1. Nina is working at Punjab National Bank. What type of computer is she using to store customer data?

2. What type of computer does the weather forecasting agency use to predict weather conditions?

Activity Zone

Skill Hub

• Cognitive Development • Critical Thinking

Find and encircle the hidden words in the given maze with the help of clues.

1. Technology used in first generation computers
2. Technology used in second generation computers.
3. A type of microcomputer
4. These computers are also known as hand-held devices
5. Three examples of high level languages
6. The first company for which microprocessor was developed
7. A type of portable computer which has a chargeable battery

C	A	G	D	E	S	K	T	O	P	T
O	A	K	P	S	A	B	P	L	Q	R
B	A	P	A	S	C	A	L	E	L	A
O	W	Z	R	K	B	S	L	G	A	N
L	Q	D	A	F	E	I	M	H	P	S
S	R	C	M	P	R	C	H	I	T	I
J	Y	O	L	T	P	A	B	S	O	S
C	H	I	N	T	E	L	M	X	P	T
I	B	K	G	S	C	G	P	E	Z	O
P	A	L	M	T	O	P	I	Q	S	R
V	A	C	U	U	M	T	U	B	E	S

Lab Session

• Intellectual Development • Technology Literacy

Go to the computer lab and observe different types of microcomputers. Also, open MS Word 2019 and create a list of companies that manufacture desktop computers.

Group Discussion

• Collaboration & Communication

Divide the class into groups and compare different kinds of the computers. Also, discuss the advantages and disadvantages of each type of computer.

Project Work

• Information Literacy

Collect the names of the computers of each generation (first, second, third and fourth) and write them in your notebook along with pictures.

TEACHER'S NOTES

- Tell the students about the vacuum tubes, transistors, ICs and microprocessors, so that students can easily understand the difference between them.
- Tell the characteristics of some hand-held PCs to the students.

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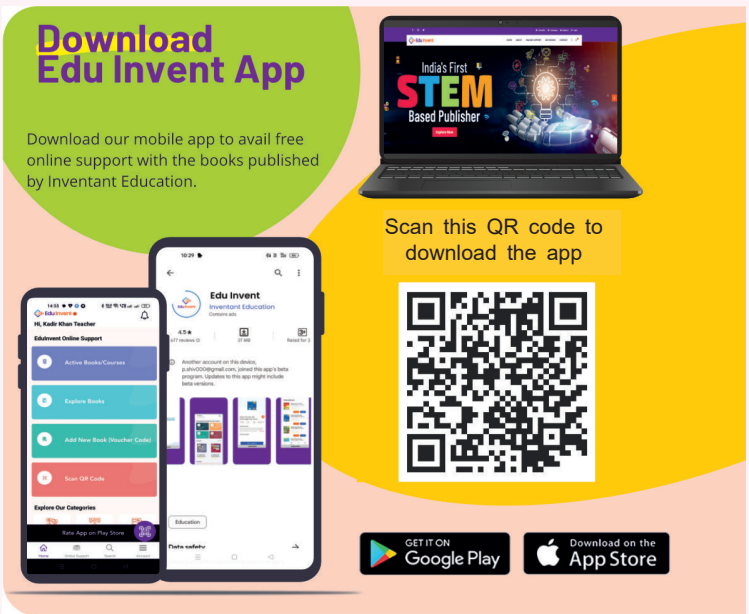
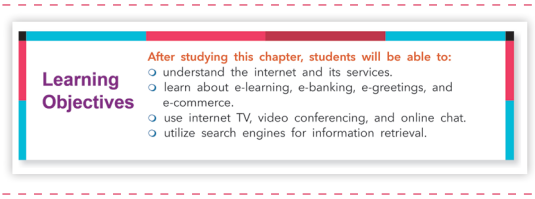


About the Series

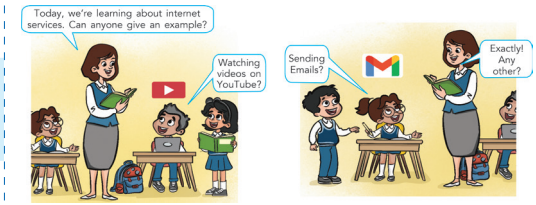


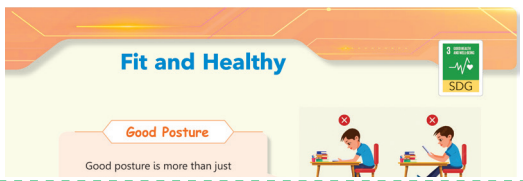
Learning Objectives

The goals to be reached by the end of the chapter.

Comic Strip

Interesting stories to bring the concept to real life.



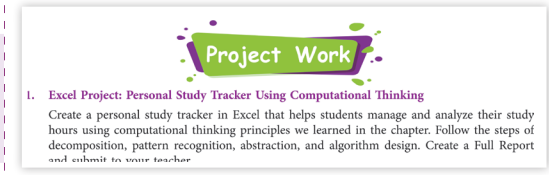


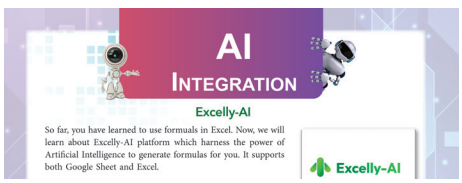
SDGs

Projects and activities are design with SDG goals to raise awareness

Project Work

In-depth exploration and application of learned concepts





AI Integration

Improve productivity using AI-powered platform

Computational Thinking

Applying problem-solving strategies to break down complex tasks and create efficient coding solutions.

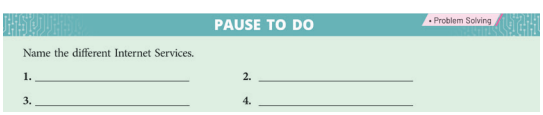
Computational Thinking is a process to solve any problem that involves four major techniques decomposition, pattern recognition, abstraction and algorithm. It is essential for development of computer applications but help across all disciplines.

Cyber Olympiad

A competitive exam conducted by SOF for each class to schools and assesses the learners

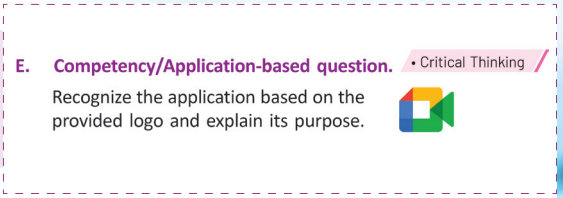
Pause to Do

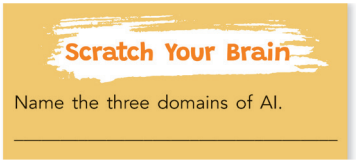
An activity that reinforce learning among the learners.



Competency/Applications-Based Questions

Assesses the learners analytical and critical thinking abilities.



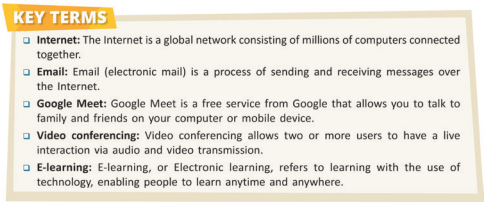


Scratch your Brain

A hands on exercise that will help the student to get practical knowledge on the topic.

Exercises

Various kinds of questions to test the gained knowledge.

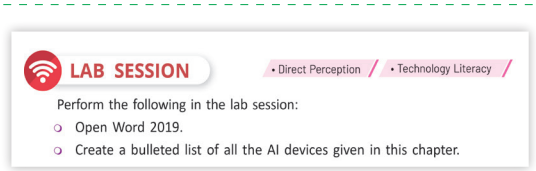


Key Terms

Important word with a specific meaning that helps explain a topic.

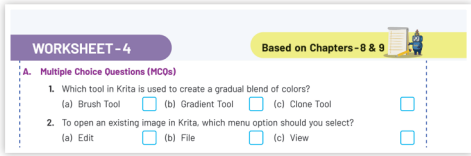
Lab Session

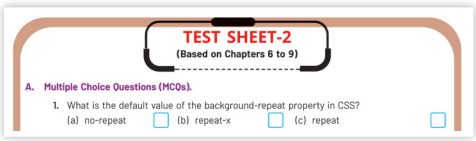
Some activity to be done while in the lab.



Worksheet / Test Sheet

A set of questions to assess the students' knowledge of the chapters.





Digital Citizenship

Navigating the online world responsibly and respectfully

Prompt Engineering

Designing effective prompts to help smart technology provide accurate and relevant answers

Coding Transition

A smooth transition from block-based to text-based programming for advanced coding skills.

UNDERSTANDING THE CODING TRANSITION FROM BLOCKS TO PYTHON CODE

When we create a program using block-based coding (like in MakeCode), we often use visual blocks to represent different commands and actions. Each block corresponds to a specific piece of code in a text-based programming language like Python. Let's break down the transition from block-based coding to Python using a simple example.

Contents

1 Internet Services

Learning Objectives

After studying this chapter, students will be able to:

- understand the internet and its services.
- learn about e-learning, e-banking, e-greetings, and e-commerce.
- use internet TV, video conferencing, and online chat.
- utilize search engines for information retrieval.

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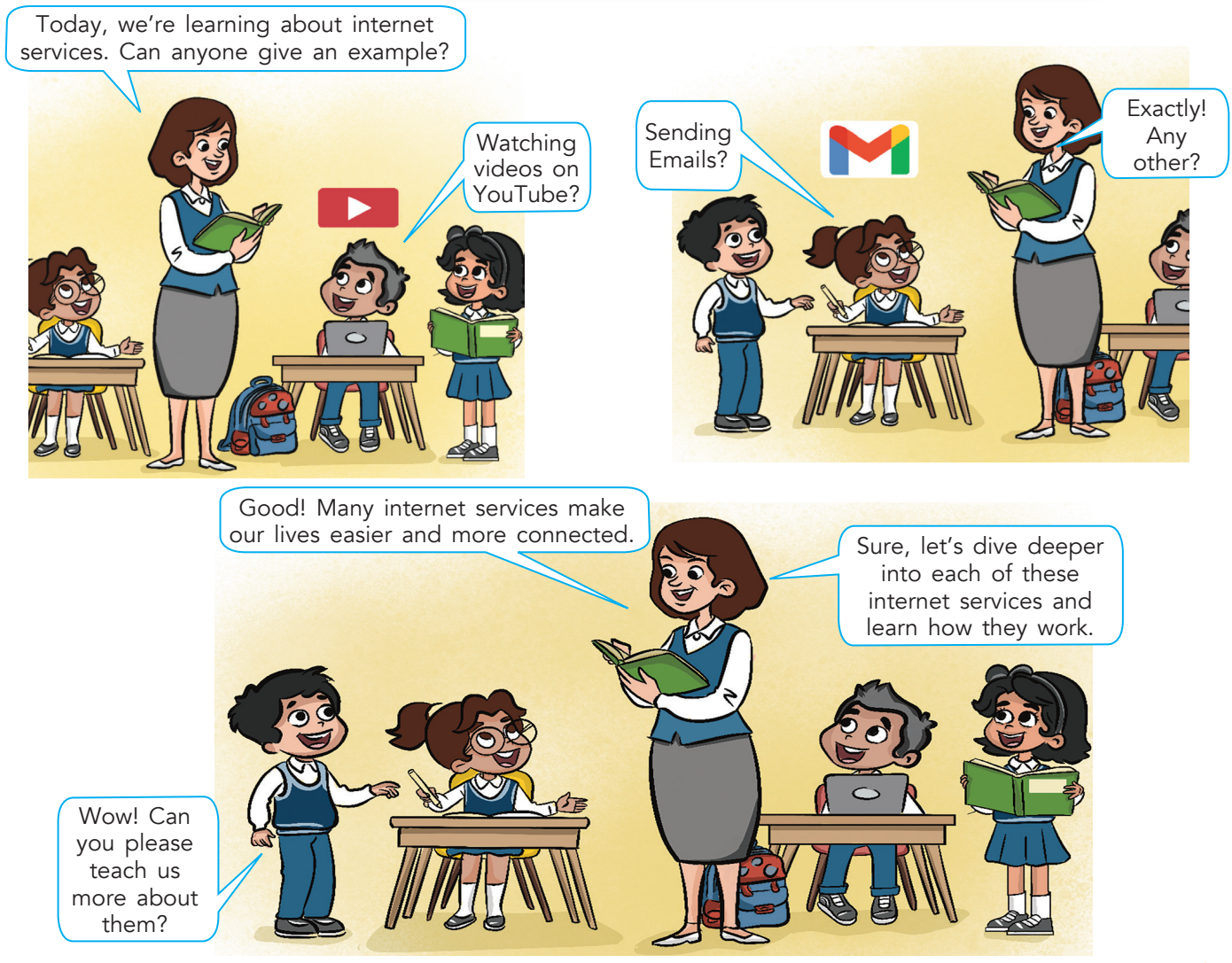


INTERNET SERVICES

The Internet is a global network consisting of millions of computers connected together. It offers a wide range of services that meet various needs. Some of the basic services available on the Internet include search engines, emailing, online chat, video conferencing, and more. In this chapter, we will learn about the various services that make the Internet so popular.

Information Retrieval

The Internet has made it easier to access and share information, which can be in the form of text, pictures, audio, or video. There is a vast amount of information available on the Internet on a wide range of topics such as news, books, products, and more. Search engines on the Internet help you search for and find information on any subject.

Search Engines

Search engines are websites that help users find information on the Internet. By entering keywords or phrases, users can search for and access other websites that contain the relevant information they need.

Some of the popular search engines are Google, Bing, Yahoo!, Search.com, and Lycos.

Email

Email (electronic mail) is a process of sending and receiving messages over the Internet. You must have an email address in order to access your email. Every email account is identified by its unique email address. An email address consists of a **username** and a **domain name** separated by the **"@"** symbol. For example–

preetirajput	@	gmail.com
↓	↓	↓
username	symbol	domain name

DID YOU KNOW

An email address does not contain any space.

- **Username:** It is the name of a person's account. This can be the actual name of the user or any other name.
- **Domain name:** It is the location of the person's account on the Internet. It typically ends in a domain suffix like .com, .org, .edu, etc.

There are many sites on the Internet that provide free email services. Some of them are:

- www.gmail.com
- www.yahoo.com
- www.rediffmail.com

Email vs. Postal Mail

Email is different from postal mail. Postal mail can carry articles, gifts, letters, and documents, which an email cannot. Postal mail is sent to a **physical address**, while email is sent to an **email address**.

Think and Discuss — Collaboration

How is an email better than a postal mail? Discuss in class.

Creating an Email Account

You can easily create an email account by filling out a registration form where you choose your email address and password. After creating an account, you can use the email address and password to access your email account.

DID YOU KNOW

Jerry Yang and David Filo are the founders of www.yahoo.com. Yahoo is an American computer service company founded on 2nd March, 1995.

Chat

Chatting has become a popular way for people to communicate with others. Real-time text communication between two or more users through computers is called **chat**. Chat is also known as **Online chat** or **Internet chat**.

Chatting can be used to send instant messages and allows you to exchange text messages, as well as interact with others through **voice** and **video chat**.

Some popular instant messengers that allow you to chat with people in your friend's list are:

Windows Live Messenger

Yahoo Messenger

Skype IM

Using these messengers, you can chat with friends anywhere in the world and get instant replies, just like chatting in your classroom.

Google Meet

It is a free service from Google that allows you to talk to family and friends on your computer or mobile device. You can even talk to each other live over **video chat** and to make **phone calls and texts**. It's available on its website, as an app for iOS and Android, and as a plug-in for various web browsers.

Google Meet

Dos and Don'ts of Chatting

While chatting can be fun and informative, it's important to follow these dos and don'ts:

Dos	Dont's
Use a chat nickname instead of your real name.	Do not reveal any personal information in a chat room.
Check the terms, conditions, and privacy statement of the chat site.	Do not agree to meet someone you have only talked to in a chat room.
Use decent language while chatting.	Do not use abusive language.

Video Conferencing

Video conferencing allows two or more users to have a live interaction via audio and video transmission. It can be used for:

- Conducting meetings
- Interviewing job candidates
- Educational training
- Health care conferences

There are some sites such as **www.videoconference.com** that allow people to set up video chat rooms. **Skype**, **Yugma**, **Adobe Connect**, and **Ekiga** etc. are examples of some video conferencing applications.

Video Conferencing

E-Learning

E-learning, or **Electronic learning**, refers to learning with the use of technology, enabling people to learn anytime and anywhere. The Internet acts as a global library, overcoming the limitations of time, distance, and resources. E-learning is also less expensive than traditional learning. Some websites offering e-learning tutorials include:

- www.elearningforkids.org
- www.abcya.com

E-learning

E-Banking

E-banking means electronic banking. It is an online banking service that allows users to **monitor**, **transact**, and **manage** their bank accounts online. E-banking services can be used for:

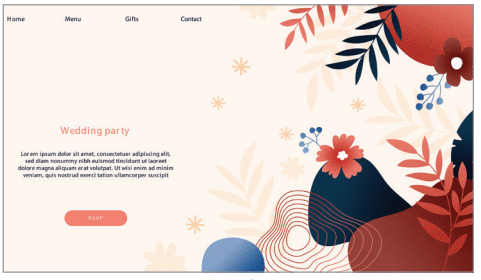
- Downloading statements
- Transferring funds
- Applying for loans
- Paying utility bills
- Requesting cheque books and demand drafts
- Viewing bank account details and balances

E-Banking

E-Greetings

E-greetings are electronic greeting cards that can be sent over the Internet to convey your wishes to a friend or relative. Some popular e-greeting sites are:

- www.123greetings.com
- www.americangreetings.com
- www.hallmarkecards.com



E-greetings

E-Commerce

E-commerce stands for electronic commerce, involves online commercial activities. The Internet offers convenient ways to shop for almost everything from clothes to electronics. We can also buy and sell both new and used goods. This process of **buying** and **selling products** over the Internet is called **Online shopping**. Some e-shopping websites are:

E-commerce

- www.amazon.com
- www.myntra.com
- www.flipkart.com

E-shopping websites

DID YOU KNOW

Flipkart was founded by **Sachin Bansal** and **Binny Bansal** in 2007. It has made online shopping popular across India.

Internet TV

Internet TV is a medium of delivering television content over an Internet connection. It is also known as **web television**. It's almost the same as getting television through an antenna or a series of cable wires, but the difference is that the information is sent over the Internet as **data**.

Some of the popular independent service providers of Internet TV are:

- Disney + Hotstar
- SonyLIVs
- Netflix

PAUSE TO DO

• Problem Solving

Name the different Internet Services.

1. _____ **2.** _____

3. _____ **4.** _____

Let's Brief

- A search engine on the Internet helps you to search and find information on any subject.
- Email (electronic mail) is a process of sending and receiving messages over the Internet.
- Chat has become a popular way for people to communicate with others. Real-time textual communication between two users through computers is called chat.
- Video conferencing allows two or more users to have a live interaction with one another via audio and video transmission.
- E-learning means electronic learning. It refers to learning with the use of technology that enables people to learn anytime and anywhere.
- E-banking means electronic banking. It is a net banking service that allows the users to monitor, transact and manage the bank accounts online.
- E-commerce stands for electronic commerce, which means online commercial activities.
- Internet TV is a medium of delivering television content over an Internet connection.

KEY TERMS

- **Internet:** The Internet is a global network consisting of millions of computers connected together.
- **Email:** Email (electronic mail) is a process of sending and receiving messages over the Internet.
- **Google Meet:** Google Meet is a free service from Google that allows you to talk to family and friends on your computer or mobile device.
- **Video conferencing:** Video conferencing allows two or more users to have a live interaction via audio and video transmission.
- **E-learning:** E-learning, or Electronic learning, refers to learning with the use of technology, enabling people to learn anytime and anywhere.

EXERCISES

A. Multiple Choice Questions (MCQs).

1. Which service allows real-time text communication between users?

(a) E-banking ☐ (b) Chat ☐ (c) E-learning ☐

2. What is the medium called that delivers television content over an Internet connection?

(a) Video conferencing ☐ (b) Internet TV ☐ (c) E-banking ☐

3. Which of the following is an example of an online chat application?

(a) Gmail ☐ (b) Skype IM ☐ (c) Amazon ☐

4. What service allows you to send electronic greeting cards over the Internet?

(a) E-commerce ☐ (b) E-banking ☐ (c) E-greetings ☐

5. Which of the following is an online service that enables the buying and selling of goods?

(a) E-commerce ☐ (b) E-learning ☐ (c) E-banking ☐

B. Fill in the blanks.

HINTS Electronic Internet Technology Online shopping E-Banking

1. Email stands for _____ mail.

2. The process of buying and selling products over the Internet is called _____.

3. _____ TV delivers television content over an Internet connection.

4. E-learning enables people to learn anytime and anywhere using _____.

5. _____ is an online banking service that allows users to monitor their bank accounts online.

C. Write 'T' for true and 'F' for false statements.

1. E-banking allows users to watch television content over the Internet. ☐
2. E-greetings are electronic greeting cards that can be sent over the Internet. ☐
3. Search engines help users find information by entering keywords or phrases. ☐
4. Internet TV requires a physical antenna to receive content. ☐
5. Video conferencing allows live interaction via audio and video transmission. ☐
6. Flipkart was founded in 2007 and is an e-commerce company based in India. ☐

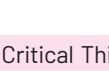
D. Answer the following questions:

1. What are some services provided by E-banking?
2. What is the main difference between email and postal mail?
3. Explain how e-learning is beneficial compared to traditional learning.
4. Describe the process of creating an email account.

E. Competency/Application-based question.

• Critical Thinking

Recognize the application based on the provided logo and explain its purpose.

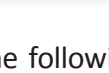


ACTIVITY ZONE

Skill Hub

• Problem Solving

Identify the following icons and write their names.




1. _____ 2. _____ 3. _____ 4. _____

GROUP DISCUSSION

• Collaboration and Communication

Discuss the dos and don'ts of 'Online Chat' with your classmates.

PROJECT WORK

• Creativity

Make a simple PowerPoint presentation on three internet services you learned about, such as email, chat, and e-learning. Include a brief description and an image for each.

TEACHER'S NOTES

❖ Discuss the advantages of E-greetings, E-commerce, E-learning and other Internet services to students.

Google Apps

Google provide several apps free of cost for your computer as well as mobile. Some of them are Gmail, Maps, Google Drive, Google Web Store, YouTube and Google Meet. To use these apps, you must have registered with Google and the apps will be accessible from any device as long as you are logged in. Let's learn about some of the popular Google apps.

Gmail

Google mail or Gmail is one of the best and free mailing apps accessible through a web browser over the Internet. You are already familiar with the process of creating a Gmail account. Your Gmail account is used to access other apps of Google.


Gmail

Google Drive

Google Drive is a **cloud-based** storage service. The synchronisation feature allows you to download and upload files into the remote server. With Google Drive, multiple users can access a single file at the same time, at different locations and from different devices. You can safely store your files on Google Drive. The files can be in any format such as Word document, Excel workbook, PowerPoint presentation and PDF. All the data in Google Drive is encrypted, you have to grant permission to others to access, edit, or view your files.


Google drive

Google Maps

Google Maps is a digital navigation program that provides detailed information about the geographical regions of any particular area. Google Maps application was launched on February 8, 2005. It became available in the Play Store from December 2012. By default, the Map appears in the Map view.


Google Maps

Google Docs

Google Docs is a free online word processing program. It is similar to Microsoft Word. The only difference is that this is a **cloud-based** program. So, the program does not reside on your computer. It was started by Google in the year 2006, as part of its complete office suite. You can access Google Docs from all devices and platforms, all you need is an internet connection and a web browser.


Google Docs

Google Sheets

Google introduced Google Sheets, a spreadsheet application on March 9, 2006. It works like any other spreadsheet tool, but since it is an online app, it offers much more than just the spreadsheet tools. Google Sheets is free and accessible over the internet from anywhere across the globe. You can easily import data and information from other Google services, or directly from the web. Google Sheets has the option to open Excel files, and convert them to Google Sheets, and vice versa. You can also work offline. But to do so, first you need to install and enable the Google Docs Offline extension.


Google Sheets

As per
NEP 2020 and NCF 2023

CURSOR Pro 7

A Textbook of **Computer Science**
for Joyful and Experiential Learning

Based on
Windows 10 and MS Office 2019

By
Editorial Team
Inventant Education

Inventant Education
Present Meets Future
(A Unit of EDULABZ International)

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Introduction

Cursor Pro is a comprehensive computer series for learners in classes 1-8, focusing on computer knowledge, the internet, and advancements in **Machine Learning** and **Deep Learning Systems.**

Inventant Education aims to equip students with computer skills, creativity, and diligence while aligning with Sustainable Development Goals to foster global understanding and problem-solving. Additionally, the projects and activities are aligned with Sustainable Development Goals (SDGs), fostering a deep understanding of global challenges.

The **National Education Policy (NEP) 2020** is integrated into practical activities, highlighting **21st-century** skills like **Healthy Living**, **Artificial Intelligence**, **Cyber Ethics**, **Art Integration**, **Cross-Curricular Activities**, and **more**. The **National Curriculum Framework 2023** fostering cognitive abilities in **Perception, Inference, Comparison, Postulation, Non-Apprehension** and **Verbal Testimony**.

Our Teacher's Resource Book and Online Support offer lesson plans, answer keys, e-books, and animated videos for educators, enhancing learning and shaping the future of education.

—Inventant Education

Aligned with NEP 2020 and NCF 2023

FEATURES OF NEP 2020

21st Century Skills

Learning Skills (4Cs)
- ✓ Critical Thinking
- ✓ Creativity
- ✓ Communication
- ✓ Collaboration

Literacy Skills (IMT)
- ✓ Information Literacy
- ✓ Media Literacy
- ✓ Technology Literacy

Life Skills (FLIPS)
- ✓ Flexibility
- ✓ Leadership & Responsibility
- ✓ Initiative
- ✓ Productivity & Accountability
- ✓ Social Interaction

BASED ON NCF 2023

In NCF 2023, **curriculum** means not only what is given in the books, but also how the learners learn in school, the school's environment, and more. To make learning better, we need positive changes in all these areas.

The Six Pramanas

Inference | Perception | Comparison | Verbal Testimony | Non- Apprehension | Postulation

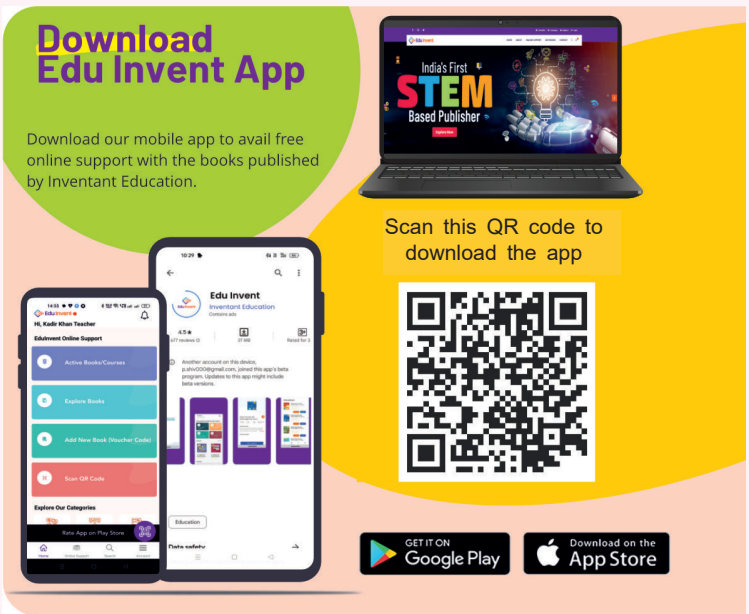
How to Access Digital Content through QR Code

For Website Users

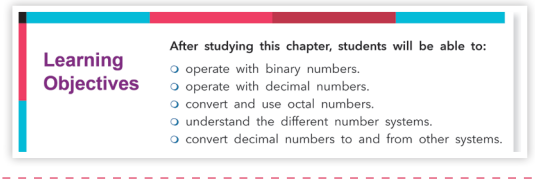
- ✓ "Visit "digital.inventanteducation.com"
- ✓ Click "Register" button available on the top-right.
- ✓ Select 'Teacher/Student' in 'User' Type.
- ✓ Enter your name, email, mobile number and password.
- ✓ Click 'Register', and Enter the OTP to verify your mobile/email.
- ✓ Once registered, login on to the website and go to **Scan and Learn** section. Enter the Codes printed below the QR Codes to view the required content.

For Mobile Users

- ✓ Go to Google Play Store or Apple App Store.
- ✓ Type 'Edu Invent' in the search bar.
- ✓ Tap 'Install'. The app will take a few moments to download and install.
- ✓ Once installed, tap 'Open' to launch the app.
- ✓ Register yourself and login on the app.
- ✓ On the dashboard, click Scan QR Code button.
- ✓ Scan a QR Code printed in the book to explore the learning content associated with the QR Code.

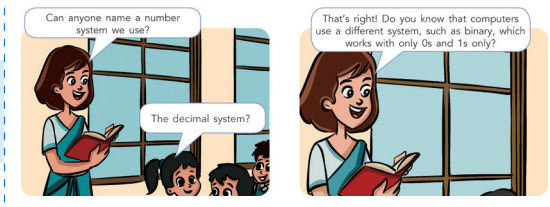


About the Series



Learning Objectives

The goals to be reached by the end of the chapter.

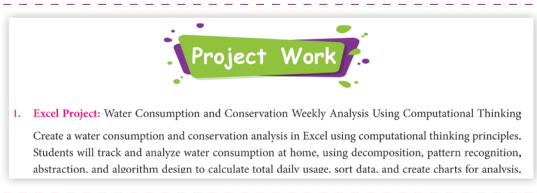


Comic Strip

Interesting stories to bring the concept to real life.

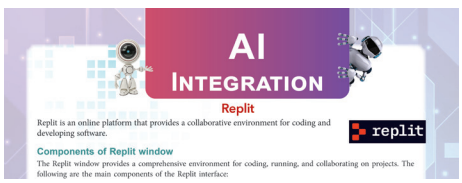
SDGs

Projects and activities are design with SDG goals to raise awareness



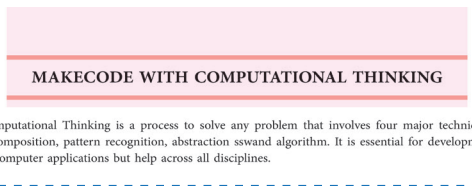
Project Work

In-depth exploration and application of learned concepts



AI Integration

Improve productivity using AI-powered platform

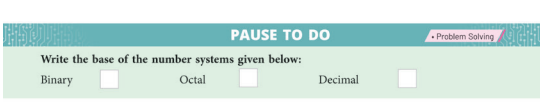


Computational Thinking

Applying problem-solving strategies to break down complex tasks and create efficient coding solutions.

Cyber Olympiad

A competitive exam conducted by SOF for each class to schools and assesses the learners



Pause to Do

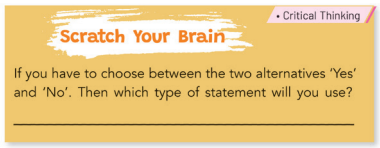
An activity that reinforce learning among the learners.

Competency/Applications-Based Questions

Assesses the learners analytical and critical thinking abilities.

F. Competency/Application-based question. • Critical Thinking

Gaurav's computer teacher asked him to convert the number system of Base 16 to Base 10. Suggest to him the steps which he should apply in converting that number.

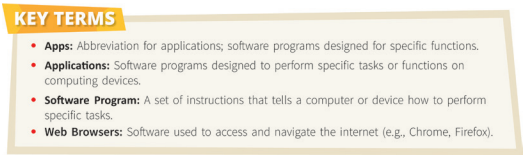


Scratch your Brain

A hands on exercise that will help the student to get practical knowledge on the topic.

Exercises

Various kinds of questions to test the gained knowledge.

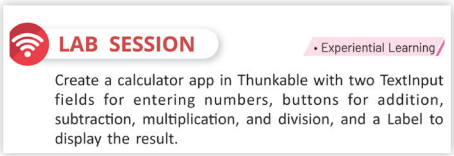


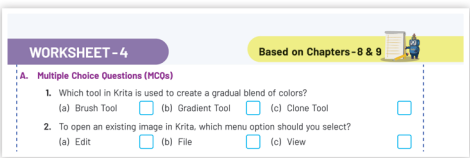
Key Terms

Important word with a specific meaning that helps explain a topic.

Lab Session

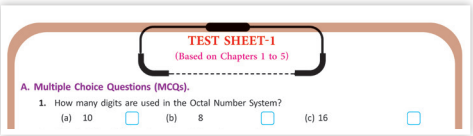
Some activity to be done while in the lab.





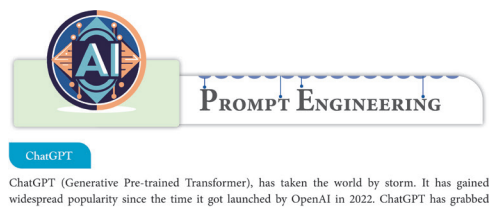
Worksheet / Test Sheet

A set of questions to assess the students' knowledge of the chapters.



Digital Citizenship

Navigating the online world responsibly and respectfully

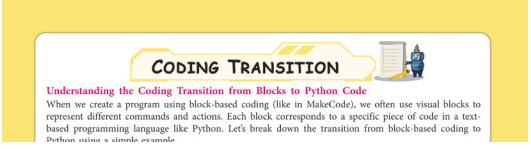


Prompt Engineering

Designing effective prompts to help smart technology provide accurate and relevant answers

Coding Transition

A smooth transition from block-based to text-based programming for advanced coding skills.



Contents

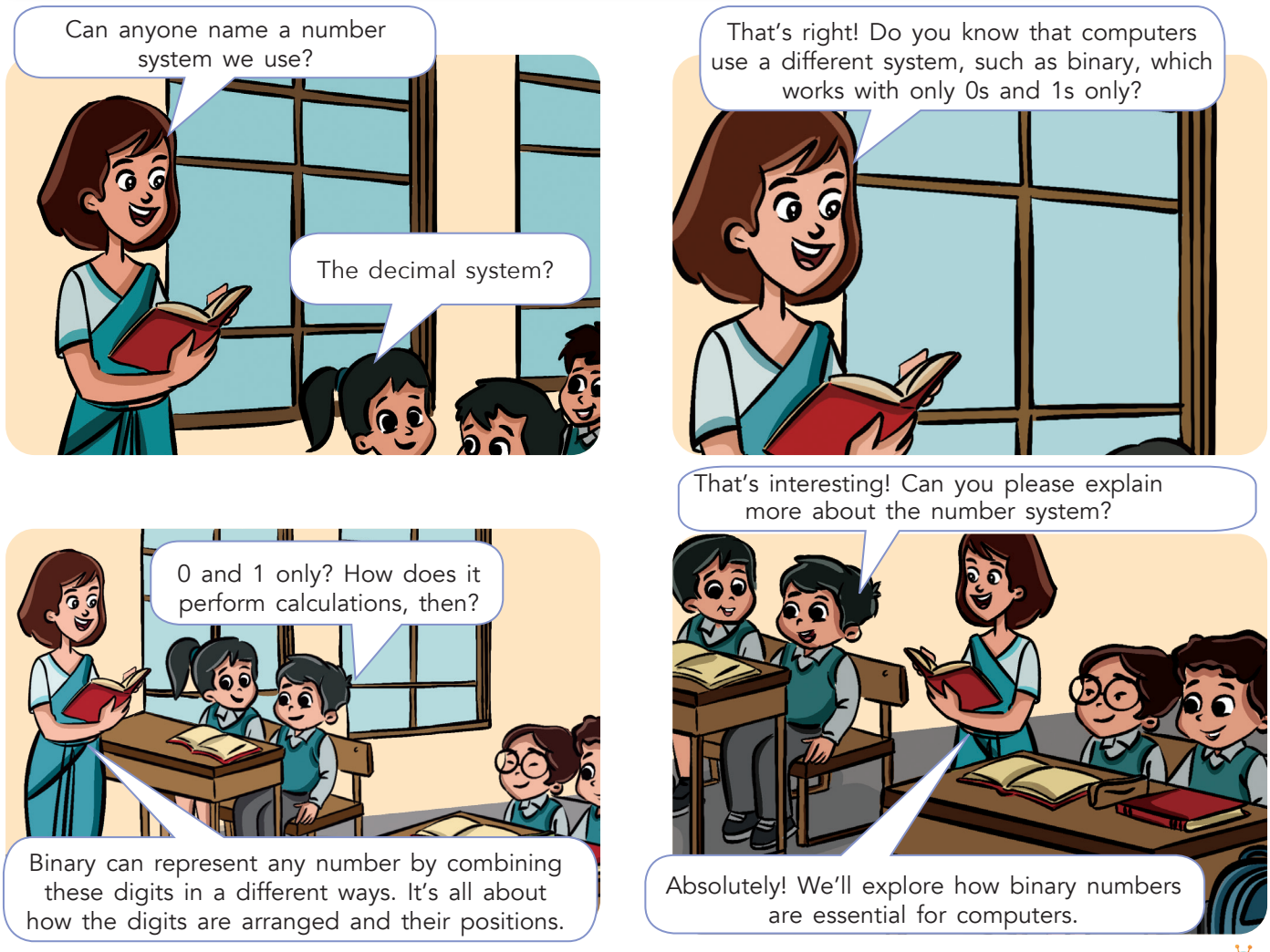
1 Number System

Learning Objectives

After studying this chapter, students will be able to:

- operate with binary numbers.
- operate with decimal numbers.
- convert and use octal numbers.
- understand the different number systems.
- convert decimal numbers to and from other systems.

ICODE-jbhD



BINARY DIGIT

All digital computers store numbers, letters, and other characters using a special code called **binary code**. This code only uses two digits: **0** and **1**. These digits are known as **binary digits**, or **bits**. Every character you see on your screen is represented by a sequence of these 0s and 1s.

When you type something on a computer keyboard, each key press is converted into a binary code. The computer then sends this binary code to other devices. When the other device receives the code, it converts it back into the original characters so you can read or print them.

NUMBER SYSTEM

A number system is a way to represent numbers and characters using different symbols. It provides a method to express values and quantities. Computers use various number systems to handle and process information. Here are some common number systems:

Number System	Digits/Symbols	Number of Symbols
Binary	0, 1	2
Decimal	0, 1, 2, 3, 4, 5, 6, 7, 8, 9	10
Octal	0, 1, 2, 3, 4, 5, 6, 7	8
Hexadecimal	0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F	16

Each of these number systems has its own way of representing numbers and is used for different purposes in computing and mathematics.

BINARY NUMBER SYSTEM

The binary number system uses only two digits: 0 and 1. These digits are called binary digits or bits. Because it uses just two digits, this system is known as having a base of 2.

In the binary system, each digit represents a power of 2. Digital computers use this system to process and store data. When you input data into a computer, it converts the data into binary form.

Examples:

- $(1001)_2$
- $(100110)_2$

In the binary system, the base is written as a subscript ($_2$) next to the number.

DID YOU KNOW

The base or radix of a number system shows how many different digits are used, and we write it as a subscript next to the number.

DECIMAL NUMBER SYSTEM

The Decimal Number System is the system we use every day. It includes 10 digits: 0 through 9. Because it uses ten digits, it has a base of 10.

Examples:

- $(759)_{10}$
- $(893)_{10}$

In the decimal system, the base is written as a subscript ($_{10}$) next to the number.

OCTAL NUMBER SYSTEM

The octal number system uses 8 digits: 0 through 7. Since it uses eight digits, it has a base of 8.

Examples:

- $(706)_8$
- $(477)_8$
- $(235)_8$

In the octal system, the base is written as a subscript ($_8$) next to the number.

HEXADECIMAL NUMBER SYSTEM

The hexadecimal number system uses 16 different digits: 0 through 9 and A through F. It has a base of 16. In this system, each letter represents a numerical value:

- A = 10
- B = 11
- C = 12
- D = 13
- E = 14
- F = 15

Examples:

- $(BEF)_{16}$
- $(B56)_{16}$
- $(192)_{16}$

The base 16 is written as a subscript ($_{16}$) next to the number.

CONVERSIONS

Conversions are the process of changing numbers from one system to another. Understanding conversions helps in grasping how computers handle and store information.

I. Decimal to Binary Conversion

To convert a decimal number (base 10) into a binary number (base 2), follow these steps:

Step 1: Divide the number by 2 and write the remainder on right side.

Step 2: Divide the quotient obtained in Step 1 by 2 and write the remainder on right side.

Step 3: Repeat Step 2 until the quotient becomes zero.

Step 4: Write the remainders in reverse order to obtain the binary equivalent.

DID YOU KNOW

Write the remainders in reverse order, from bottom (Most Significant Digit) to top (Least Significant Digit) to form the binary equivalent.

For example:

(a) $(47)_{10} = (?)_2$

2	47	
2	23	1 → Least significant digit
2	11	1
2	5	1
2	2	1
2	1	0
	0	1 → Most significant digit

Therefore, $(47)_{10} = (101111)_2$

(b) $(893)_{10} = (?)$

2	893	
2	446	1
2	223	0
2	111	1
2	55	1
2	27	1
2	13	1
2	6	1
2	3	0
2	1	1
	0	1

Therefore, $(893)_{10} = (1101111101)_2$

II. Binary to Decimal Number

To convert a binary number (base 2) to a decimal number (base 10), follow these steps:

Step 1: Multiply each binary digit by its positional value. The positional values are powers of 2, starting from 2^0 from the rightmost digit.

Step 2 Increase the power of 2 by one for each digit as you move left from the rightmost digit.

Step 3 Calculate the product and Sum all the products to get the decimal equivalent.

For example:

(a) $(10101)_2 = (?)_{10}$

$(1\ 0\ 1\ 0\ 1)_2$

$1 \times 2^0 = 1$

$0 \times 2^1 = 0$

$1 \times 2^2 = 4$

$0 \times 2^3 = 0$

$1 \times 2^4 = 16$

$1 + 0 + 4 + 16 = 21$

Therefore, $(10101)_2 = (21)_{10}$

(b) $(11101)_2 = (?)_{10}$

$(1\ 1\ 1\ 0\ 1)_2$

$1 \times 2^0 = 1$

$0 \times 2^1 = 0$

$1 \times 2^2 = 4$

$1 \times 2^3 = 8$

$1 \times 2^4 = 16$

$1 + 0 + 4 + 8 + 16 = 29$

Therefore, $(11101)_2 = (29)_{10}$

III. Decimal to Octal Number

To convert a decimal number into an octal number, follow these steps:

Step 1: Divide the decimal number by 8.

Step 2: Write the remainder on the right side and divide the quotient again by 8.

Step 3: Repeat step 2 until the quotient is zero.

Step 4: The octal number is sequence of remainders read from bottom to top.

For example:

(a) $(642)_{10} = (?)_8$ (b) $(9246)_{10} = (?)_8$

8	642	
8	80	2
8	10	0
8	1	2
	0	1

Therefore, $(642)_{10} = (1202)_8$

8	9246	
8	1155	6
8	144	3
8	18	0
8	2	2
	0	2

Therefore, $(9246)_{10} = (22036)_8$

IV. Octal to Decimal Number

To convert an octal number (base 8) to a decimal number (base 10), follow these steps:

Step 1: Multiply each digit of the octal number by its positional value in terms of powers of 8, starting for 8^0 from the rightmost digit.

Step 2: Increase the power of 8 by one for each digit as you move left.

Step 3: Sum all the products to obtain the decimal number.

For example:

(a) $(227)_8 = (?)_{10}$

$(2\ 2\ 7)_8$

$7 \times 8^0 = 7$

$2 \times 8^1 = 16$

$2 \times 8^2 = 128$

$7 + 16 + 128 = 151$

Therefore, $(227)_8 = (151)_{10}$

(b) $(2456)_8 = (?)_{10}$

$(2\ 4\ 5\ 6)_8$

$6 \times 8^0 = 6$

$5 \times 8^1 = 40$

$4 \times 8^2 = 256$

$2 \times 8^3 = 1024$

$6 + 40 + 256 + 1024 = 1326$

Therefore, $(2456)_8 = (1326)_{10}$

V. Decimal to Hexadecimal Number

To convert a decimal number (base 10) into a hexadecimal number (base 16), follow these steps:

Step 1: Divide the decimal number by 16. Write the remainder on the right side and divide the quotient again by 16.

Step 2: Repeat step 1 until the quotient is zero.

Step 3: Arrange the remainders in reverse order (from bottom to top, or from the Most Significant Digit to the Least Significant Digit) to get the hexadecimal equivalent of the decimal number.

Step 4: The octal number is sequence of remainders read from bottom to top.

For example:

(a) $(910)_{10} = (?)_{16}$

16	910	
16	56	14 (E)
16	3	8
	0	3

Therefore, $(910)_{10} = (38E)_{16}$

(b) $(7890)_{10} = (?)_{16}$

16	7890	
16	493	2
16	30	13 (D)
16	1	14 (E)
	0	1

Therefore, $(7890)_{10} = (1ED2)_{16}$

VI. Hexadecimal to Decimal Number

To convert a hexadecimal number (base 16) into a decimal number (base 10), follow these steps:

Step 1: Multiply each hexadecimal digit by its positional value, which is in terms of powers of 16, starting from 16^0 from the rightmost digit.

Step 2: Increase the power of 16 by one for each digit as you move left.

Step 3: Sum all the products to get the decimal number.

For example:

(a) $(4D63)_{16} = (?)_{10}$

$(4\ D\ 6\ 3)_{16}$

$3 \times 16^0 = 3$

$6 \times 16^1 = 96$

$D \times 16^2 = 13 \times 16^2 = 3328$

$4 \times 16^3 = 16384$

$3 + 96 + 3328 + 16384 = 19811$

Therefore, $(4D63)_{16} = (19811)_{10}$

(b) $(BDE)_{16} = (?)_{10}$

$(B\ D\ E)_{16}$

$E \times 16^0 = 14 \times 160 = 14 \times 1 = 14$

$D \times 16^1 = 13 \times 161 = 13 \times 16 = 208$

$B \times 16^2 = 11 \times 162 = 11 \times 256 = 2816$

$14 + 208 + 2816 = 3038$

Therefore, $(BDE)_{16} = (3038)_{10}$

DID YOU KNOW

In hexadecimal (base 16), the letters A to F represent decimal values from 10 to 15.

PAUSE TO DO

Write the base of the number systems given below:

Binary ☐ Octal ☐ Decimal ☐

Let's Brief

- A computer uses sets of values to represent different quantities. Such sets of values include numbers (0–9), letters (A–Z, a–z), and some special characters. These sets of values are known as number systems.
- The number systems is divided into four categories. These are Binary Number System, Decimal Number System, Octal Number System and Hexadecimal Number System.
- The binary number system consists of two digits— 0 and 1 called binary digits or bits. The base of binary number system is 2.
- The decimal number system consists of 10 digits, i.e. 0 to 9. The base of decimal number system is 10.
- The octal number system consists of 8 digits, i.e. 0 to 7. The base of octal number system is 8.
- The hexadecimal number system consists of 16 digits, i.e. 0 to 9 and A–F. The base of hexadecimal number system is 16.

KEY TERMS

- **Binary Code:** A special code used by digital computers that only employs two digits, 0 and 1.
- **Binary Digits (Bits):** The basic units of binary code are: 0 and 1.
- **Number System:** A method to represent numbers and characters using different symbols.
- **Base:** The number of different digits or symbols used in a number system (e.g., base 2 for binary, base 10 for decimal).
- **Decimal Number System:** A number system with a base of 10, using digits from 0 to 9.
- **Octal Number System:** A number system with a base of 8, using digits from 0 to 7.
- **Hexadecimal Number System:** A number system with a base of 16, using digits from 0 to 9 and letters A to F.
- **Conversions:** The process of changing numbers from one number system to another.
- **Binary to Decimal Conversion:** The process of converting a binary number into a decimal number.
- **Decimal to Binary Conversion:** The process of converting a decimal number into a binary number.

EXERCISES

A. Multiple Choice Questions (MCQs).

1. Which of the following is the base of the Binary Number System?
   (a) 8 ☐ (b) 10 ☐ (c) 2 ☐
2. How many digits are used in the Decimal Number System?
   (a) 8 ☐ (b) 10 ☐ (c) 16 ☐
3. Which digits are used in the Octal Number System?
   (a) 0 to 9 ☐ (b) 0 to 7 ☐ (c) 0 to F ☐
4. What is the base of the Hexadecimal Number System?
   (a) 8 ☐ (a) 10 ☐ (c) 16 ☐
5. In the Binary Number System, what is the value of the digit '1' in decimal?
   (a) 0 ☐ (b) 1 ☐ (c) 2 ☐
6. Which letter represents the decimal value 15 in the Hexadecimal Number System?
   (a) A ☐ (b) B ☐ (c) F ☐

B. Fill in the blanks.

HINTS 10 2 12 Octal A

1. The base of the binary number system is _____ .
2. The base of _____ number system is 8.
3. The base of the decimal number system is _____ .
4. In hexadecimal number system, C stands for _____.
5. In hexadecimal number system, _____ stands for 10.

C. Write 'T' for True and 'F' For false statements.

1. The numbers used in hexadecimal number system are 0 to 15. ☐
2. The octal number system consists of 8 digits, i.e. 0 to 7. ☐
3. The digits 0 and 1 are known as binary digits or bits. ☐
4. To convert a decimal number into an octal number, divide the number by 10. ☐
5. To convert a decimal number into a binary number, divide the number by 2. ☐

D. Solve the following.

1. Convert the following decimal numbers into binary numbers.
   (a) $(778)_{10}$ (b) $(12548)_{10}$
2. Convert the following decimal numbers into octal numbers.
   (a) $(452)_{10}$ (b) $(1258)_{10}$
3. Convert the following decimal numbers into hexadecimal numbers.
   (a) $(8585)_{10}$ (b) $(5842)_{10}$

E. Answer the following questions:

1. Explain the number system. Name the different types of number systems.
2. Briefly explain the binary number system.
3. Briefly explain the hexadecimal number system.
4. Write the rules for converting a decimal number to a binary number.
5. What are the rules for converting a decimal number to an octal number?

F. Competency/Application-based question.

• Critical Thinking

Gaurav's computer teacher asked him to convert the number system of Base 16 to Base 10. Suggest to him the steps which he should apply in converting that number.

ACTIVITY ZONE

Skill Hub

• Problem Solving

Convert the following decimal numbers into binary number.

1. $(83)_{10}$ = (_____)$_2$
2. $(2024)_{10}$ = (_____)$_2$

GROUP DISCUSSION

• Communication

Divide the class into four group each assigned a number system to discuss its role, advantages, and limitation in computing.

PROJECT WORK

• Critical Thinking

Prepare a PowerPoint presentation on 'Number System' and explain each number system with the help of an example.

TEACHER'S NOTES

Students should be given a sufficient number of questions to practice.

As per
NEP 2020 and NCF 2023

CURSOR Pro 8

A Textbook of **Computer Science**
for Joyful and Experiential Learning

Based on
Windows 10 and MS Office 2019

By
Editorial Team
Inventant Education

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Introduction

Cursor Pro is a comprehensive computer series for learners in classes 1-8, focusing on computer knowledge, the internet, and advancements in **Machine Learning** and **Deep Learning Systems.**

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Aligned with NEP 2020 and NCF 2023

FEATURES OF NEP 2020

21st Century Skills

Learning Skills (4Cs)
- ✓ Critical Thinking
- ✓ Creativity
- ✓ Communication
- ✓ Collaboration

Literacy Skills (IMT)
- ✓ Information Literacy
- ✓ Media Literacy
- ✓ Technology Literacy

Life Skills (FLIPS)
- ✓ Flexibility
- ✓ Leadership & Responsibility
- ✓ Initiative
- ✓ Productivity & Accountability
- ✓ Social Interaction

BASED ON NCF 2023

In NCF 2023, **curriculum** means not only what is given in the books, but also how the learners learn in school, the school's environment, and more. To make learning better, we need positive changes in all these areas.

The Six Pramanas

Inference | Perception | Comparison | Verbal Testimony | Non- Apprehension | Postulation

How to Access Digital Content through QR Code

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- ✓ Enter your name, email, mobile number and password.
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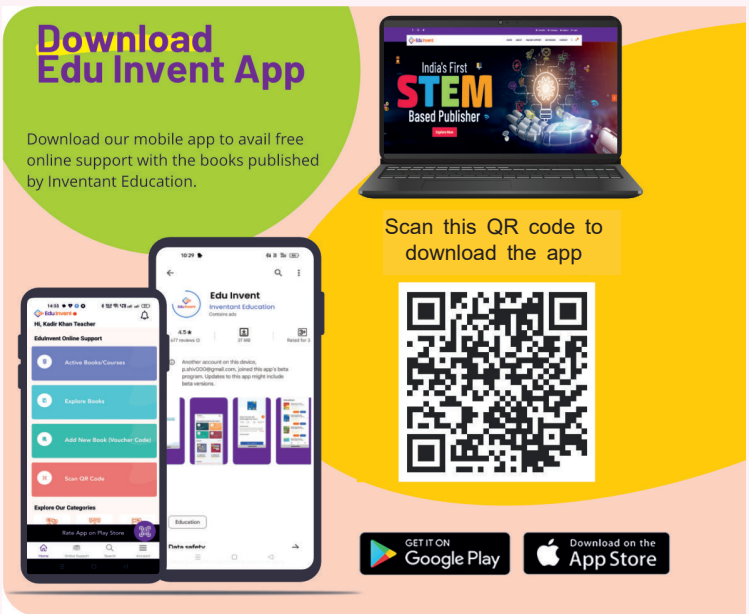
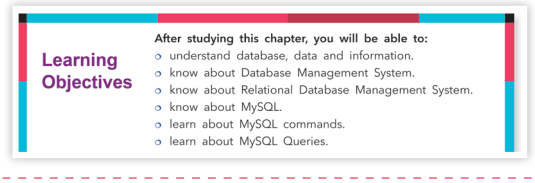
- ✓ Type 'Edu Invent' in the search bar.
- ✓ Tap 'Install'. The app will take a few moments to download and install.
- ✓ Once installed, tap 'Open' to launch the app.
- ✓ Register yourself and login on the app.
- ✓ On the dashboard, click Scan QR Code button.
- ✓ Scan a QR Code printed in the book to explore the learning content associated with the QR Code.

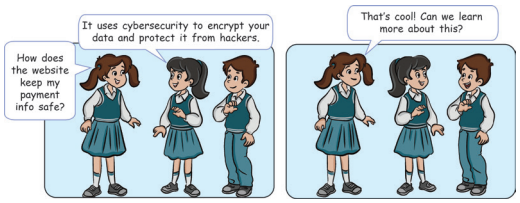


About the Series



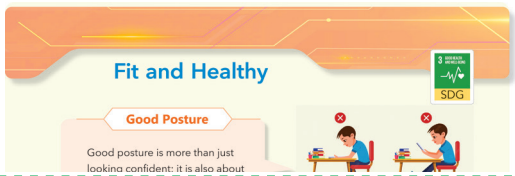
Learning Objectives

The goals to be reached by the end of the chapter.



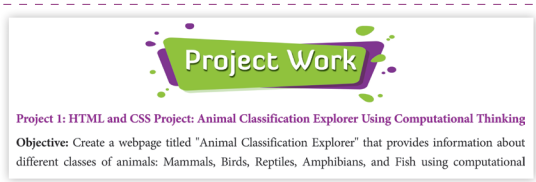
Comic Strip

Interesting stories to bring the concept to real life.



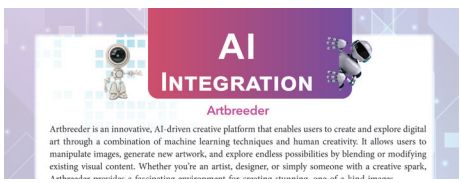
SDGs

Projects and activities are design with SDG goals to raise awareness



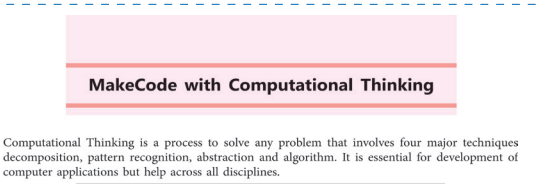
Project Work

In-depth exploration and application of learned concepts



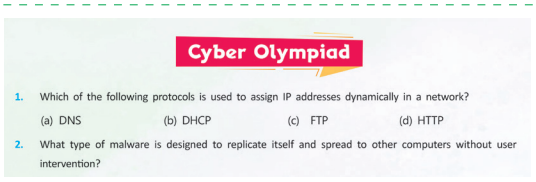
AI Integration

Improve productivity using AI-powered platform



Computational Thinking

Applying problem-solving strategies to break down complex tasks and create efficient coding solutions.



Cyber Olympiad

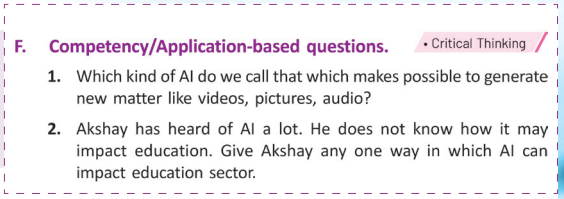
A competitive exam conducted by SOF for each class to schools and assesses the learners

Pause to Do

An activity that reinforce learning among the learners.

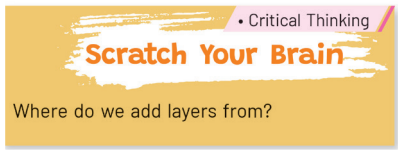
Competency/Applications-Based Questions

Assesses the learners analytical and critical thinking abilities.



F. **Competency/Application-based questions.** • Critical Thinking

1. Which kind of AI do we call that which makes possible to generate new matter like videos, pictures, audio?
2. Akshay has heard of AI a lot. He does not know how it may impact education. Give Akshay any one way in which AI can impact education sector.

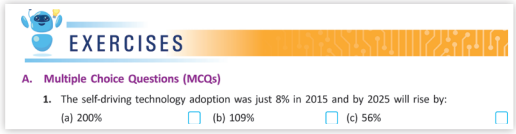


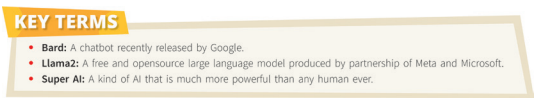
Scratch your Brain

A hands on exercise that will help the student to get practical knowledge on the topic.

Exercises

Various kinds of questions to test the gained knowledge.



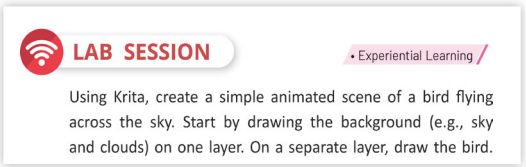


Key Terms

Important word with a specific meaning that helps explain a topic.

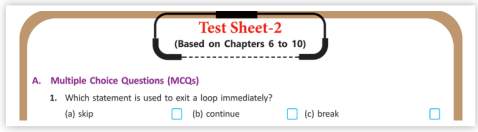
Lab Session

Some activity to be done while in the lab.



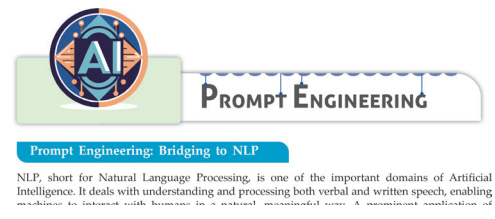
Worksheet / Test Sheet

A set of questions to assess the students' knowledge of the chapters.



Digital Citizenship

Navigating the online world responsibly and respectfully

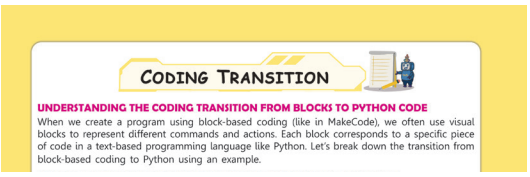


Prompt Engineering

Designing effective prompts to help smart technology provide accurate and relevant answers

Coding Transition

A smooth transition from block-based to text-based programming for advanced coding skills.



Contents

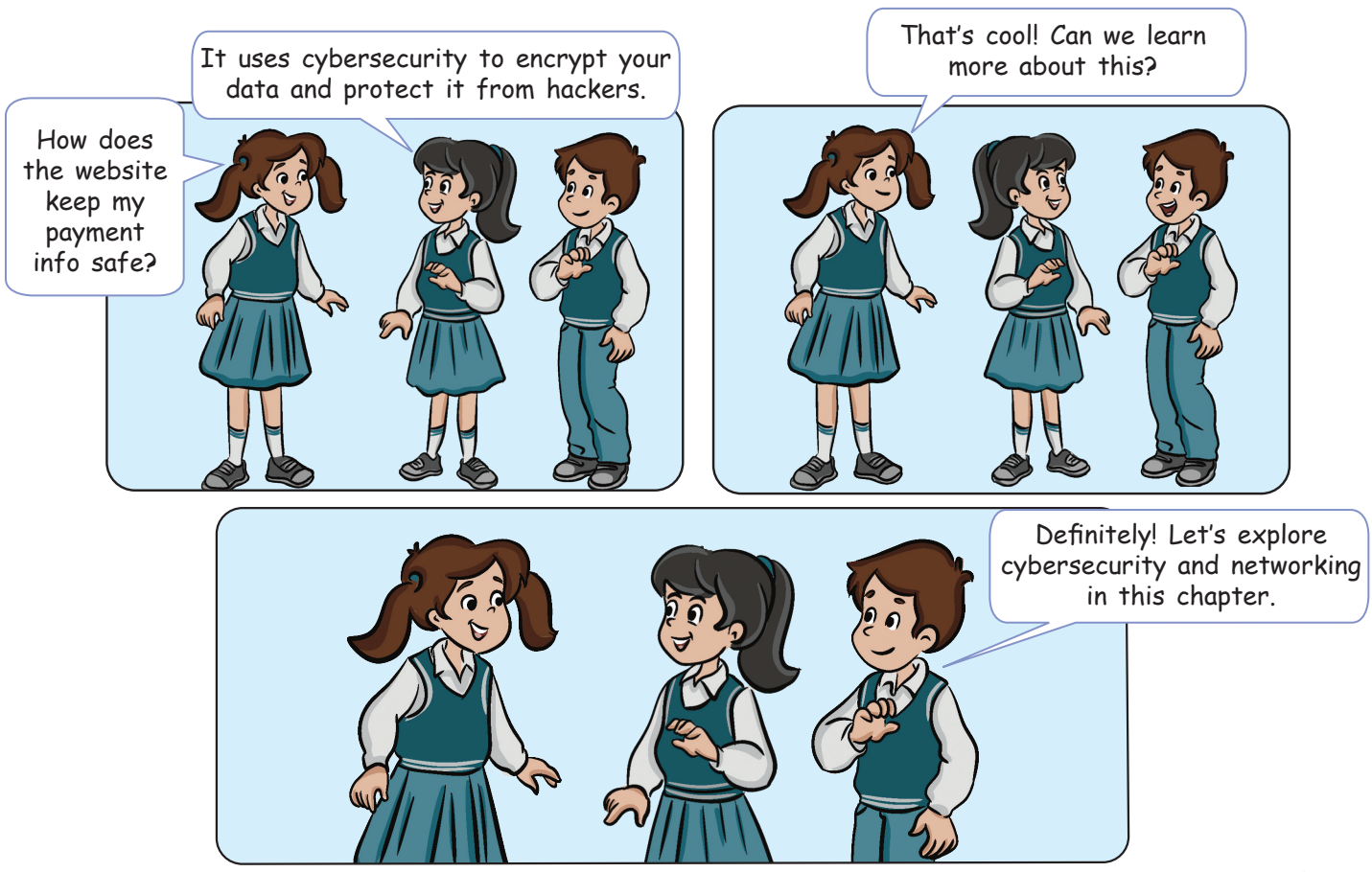
1 Computer Networking and Internet

Learning Objectives

After studying this chapter, you will be able to:

- define network and its components.
- know about the different transmission mediums.
- know the advantages and applications of networking.
- discuss the different types of networks.
- know about the different terms related to internet.
- define the types of network architectures.
- learn about the various network devices.
- know about network layout and its types.
- discuss the various wireless technologies.

ICODE-kb5K

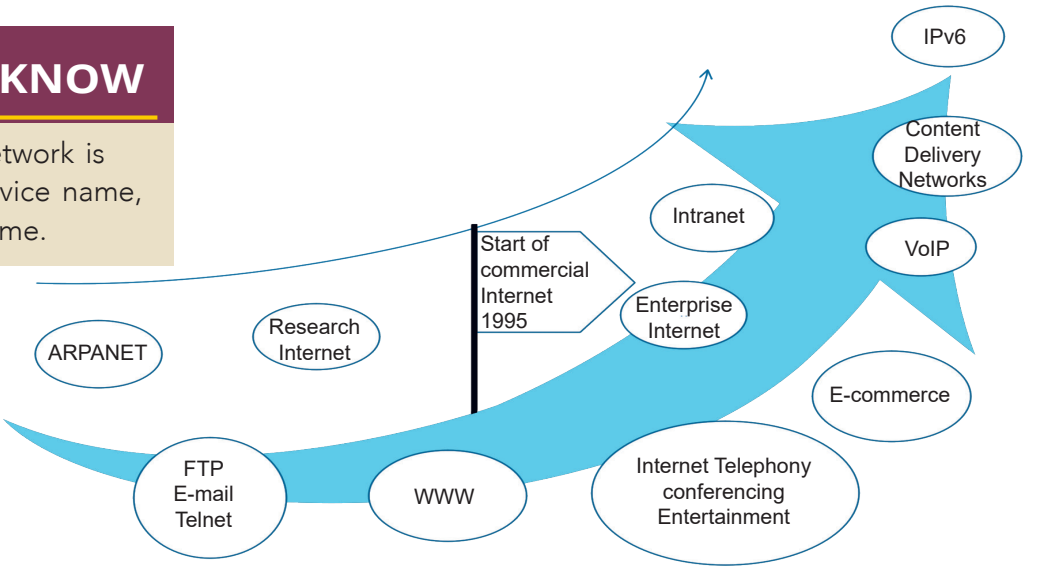


INTRODUCTION

Late in the 1960's, the need was felt to create a computer network. In this effort, the ARPANET was developed. **ARPANET** stands for **Advanced Research Projects Agency Network**. It was developed as a project of the United States Department of Defence. The goal of this project was to connect computers at different universities and U.S. defence. The engineers, doctors, students, and others who were part of this system began exchanging data and messages on it. This project's users were also able to play games and communicate with people over long distances.

DID YOU KNOW

Each device in the network is assigned a unique device name, known as the host name.



Chronicle of the Internet

In the early to mid–1970's, additional networks besides ARPANET came into being. ALOHA net, a satellite network linking together universities on the Hawaiian Islands, Telenet, Tymnet and Transpac, a French network came into existence.

Vinton Cerf and Robert E. Kahn pioneered work on interconnecting networks, essentially creating a network of networks, under the sponsorship of **DARPA (Defence Advanced Research Projects Agency)**.

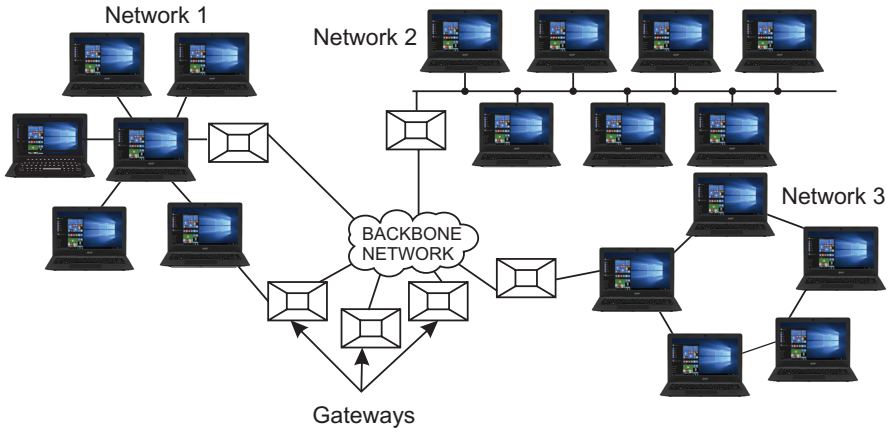
NETWORK

A network is a group of computers that share resources and communicate with each other. In a computer network, all computers are peers and there is no master–slave relationship between any two computers. Autonomous computers are those that do not have master-slave relationships. The first aim is to exchange data from all points in the world. The network allows the users to share information. When you communicate, you are sharing information.

DID YOU KNOW

The Internet is a network of connected computers that enables the user to exchange the information anywhere in the world.

In a given network, two computers communicate with each other through a specific medium. One of the computers acts as a sender and the other acts as the receiver. The roles may change from time to time.

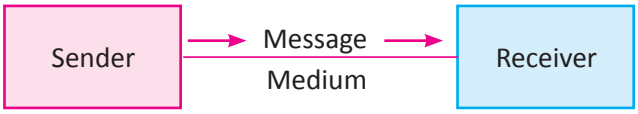


Internet

Technological advances are making tremendous changes for business, industry, telephone services such as conference calling, call waiting, voice mail and caller ID have been executed. You can use the internet to download and upload information quickly and accurately and at any time.

NETWORK COMPONENTS

Data communications are the exchange of data between two devices via a transmission medium, such as a wired cable. For communicating data, the devices must be part of a communication system made up of hardware (physical equipment) and software (programs).



Components of network
(Sender, Medium and Receiver)

A data communication system or network consists of the following five components:

Message

The message is the information to be communicated. It may include text, numbers, pictures, audio and video.

Sender

The sender is the device that sends the data message. It can be a computer, workstation, etc.

Receiver

The receiver is the device that receives the message. It can also be a computer, workstation, etc.

Transmission Medium

The transmission medium is a physical path by which a message travels from sender to receiver. Twisted-pair cable, coaxial cable, fiber optic cable and radio waves.

Protocol

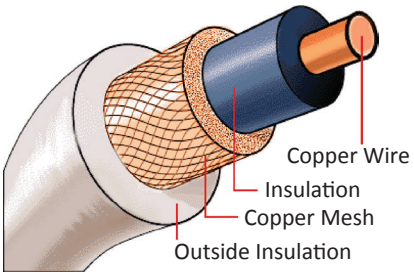
A protocol is a set of rules that governs data communication. Without a protocol, two communicating devices may be connected but cannot exchange data. For example, a person speaking Japanese cannot be understood by a person who speaks French.

TRANSMISSION MEDIUM

Among the medium for network communication you have:

Coaxial cable

Coaxial cable is an electrical cable covered by an insulating layer conductor made up of flexible material. The insulating layer is also covered by a conductive layer made up of copper wire and covered on the outside with a thin insulating layer.



Coaxial cable

FACTS

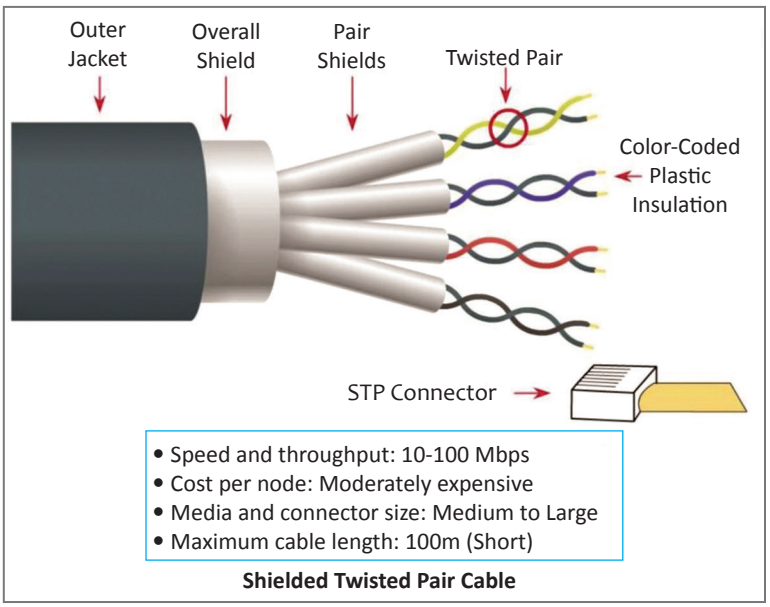
Coaxial cable was invented by English engineer and mathematician Oliver in 1880.

DID YOU KNOW

Coaxial cable is also known as coax, that is derived from the geometric axis created beneath a shield and insulator.

Twisted Pair Cable

Twisted pair cable is a commonly used medium for networking. Twisted pair wiring involves twisting two conductors of a single circuit together. The twisted pair cancels out the electromagnetic interference. It is a thin, flexible cable. It is easy to use and affordable.



Twisted pair cable

Optical Fibre Cable

An optical fibre cable is a cable containing one or more optical fibres. The optical fibres are coated with plastic layers. It consists of a core and a cladding layer selected for total reflection. We use them for long-distance communication or high-speed data connections between different parts of a building.


Optical fiber cable

Infrared Radiation

Infrared radiation is not visible; humans can sense it as heat. Your eyes only see a tiny portion of the **electromagnetic spectrum**. Infrared waves are lower energy and less harmful. These are used for security and military purposes.

ADVANTAGES OF NETWORKING

The various advantages of networking are as follows:

Data Sharing

The easiest way to share the data around the world is through the Internet. Multiple users can easily share the information and resources at the same time over the network.

Reliability

In a network, a computer fails occasionally due to a technical fault. A network is reliable if it recovers quickly when the failure occurs. In a network, other computers can easily work without the failure.

Security

A network provides security by ensuring that only authorised users have access to the files and applications.

Efficiency

If all data or software modifications, upgrades, and deletions occur at a single point, the network is considered efficient.

Less Hardware Cost

One computer can easily share hardware devices such as printers, scanners, and modems across a network. This reduces the cost of hardware equipment.

Efficient Use of Storage Media

A network allows you to store shareable application data on a server. It helps to avoid storing copies of data on each user's computer.

APPLICATIONS OF NETWORKING

Networking has become an indispensable part of business, industries, education and entertainment. Following are some network applications:

Electronic Messaging

The most popular electronic messaging service on the Internet is **Electronic Mail (Email)**. Email allows you to send and receive messages from anywhere in the world.

Electronic Data Interchange

EDI is a method of transferring data over the Internet. It is helpful for business.

Teleconferencing

Teleconferencing allows people to exchange and share their ideas with each other without being present at the same place. It is of two types: **Video Conferencing** and **Voice Conferencing**.

1. **Video Conferencing:** Where users can see as well as talk to one another.
2. **Voice Conferencing:** Users can engage in simultaneous voice communication over the phone.

Marketing and Sales

Both marketing and sales organizations extensively use computer networks. Professionals use them to exchange and analyze the data relating to customer needs.

Electronic Funds Transfer

EFT allows the users to transfer the money online without going to a bank.

DID YOU KNOW

ATM (Automated Teller Machine) is a kind of **electronic funds transfer** where you can withdraw the amount from your bank account.

DIFFERENT TYPES OF NETWORKS

We can divide the computer network into different categories based on the size of its span. These are:

PAN (Personal Area Network)

In a PAN, the devices (which can be computers, mobile phones, printers, hubs, etc.) are kept within a radius of few meters from each other. The devices involved in PAN can be connected to each other using a cable or wireless links (as in Bluetooth). Some actions you can have with PAN is sharing of songs from a mobile to another via Bluetooth. You may also transfer songs from a laptop to a mobile.

PAN network

LAN (Local Area Network)

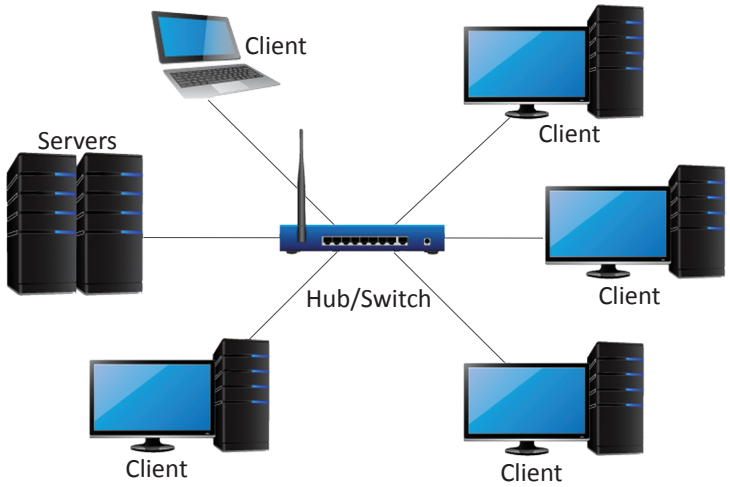
This type of network spans about a kilometer. This is usually installed in a company building, school or campus. LAN consists of central server that is connected to several other computing devices. Sometimes, each computer lab in a school has separate LANs.

FACTS

PAN was developed by Thomas Zimmerman and other researchers at MIT's Media lab and later supported by IBM's Almaden research lab.

DID YOU KNOW

LAN offers high speed data communication at the rate of 4 to 16 megabits per second (Mbps).



LAN network

MAN (Metropolitan Area Network)

This type of network spans about a few kilometres. This type of network is installed in different branches of an office in the same city.

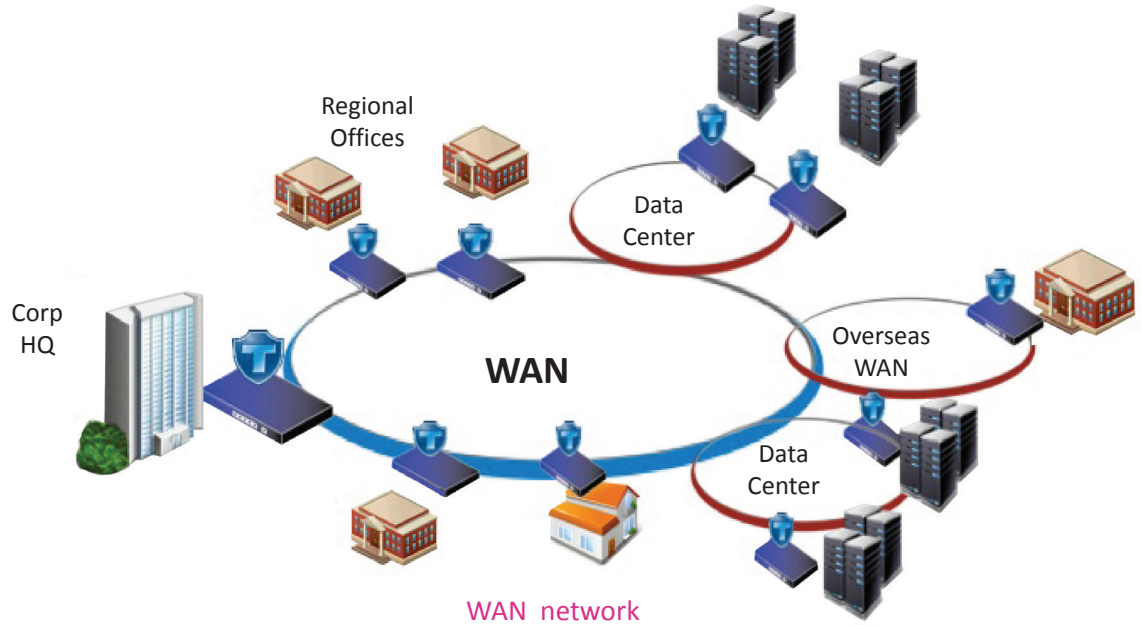
MAN network

PAUSE TO DO • Remembered Perception

What are the differences between the PAN and LAN area networks?

WAN (Wide Area Network)

This type of network may span thousands of kilometres and can encompass the entire world. The Internet is considered to be a network of computers in the world and called as **WAN**. Evidently, WAN can span countries and even continents.



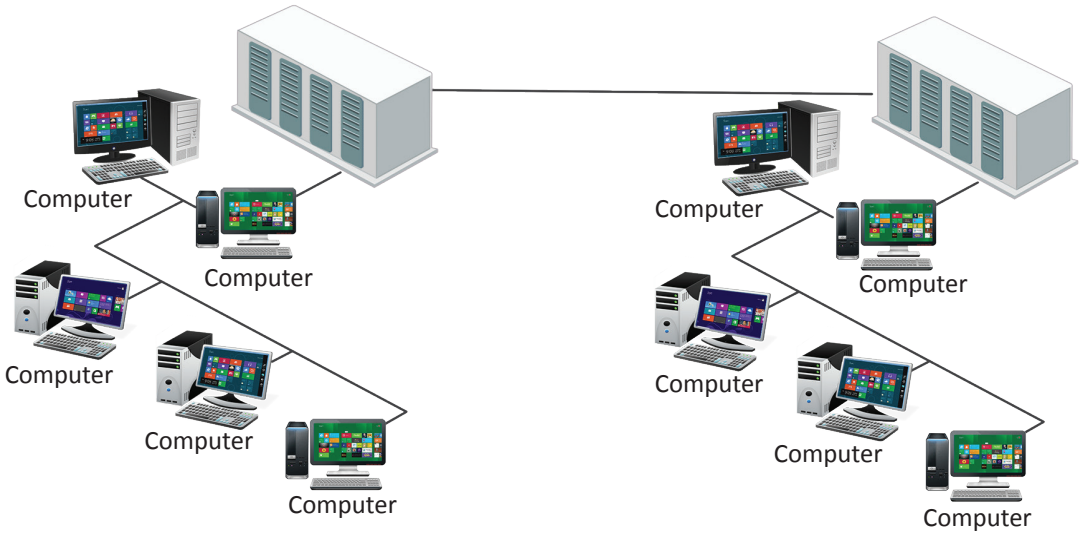
WAN network

CAN (Cluster Area Network)

It is a network spanning multiple LANs but smaller than a MAN, such as on a university or local business campus. It is also known as **Campus Area Network**.

DID YOU KNOW

When two or more networks are connected they become an **internet** or work as internet.



CAN network

VARIOUS TERMS RELATED TO INTERNET

Intranet

An Intranet is a type of private network accessible only to an organisation staff. It is a local or restricted communications network, especially a private network created using World Wide Web software.

Intranet

URL

It stands for **Uniform Resource Locator**. It is the unique address of a web page. The URL is typed into the address bar of the browser to open the web page.

ISP

ISP stands for **Internet Service Provider**. This is a company that allows customers, companies, and businesses to connect to Internet. You have to pay the cost of the Internet line to the ISP. **Airtel**, **Reliance Communications**, **BSNL**, **MTNL** and **Aircel** are some Internet service providers in India.

IP address

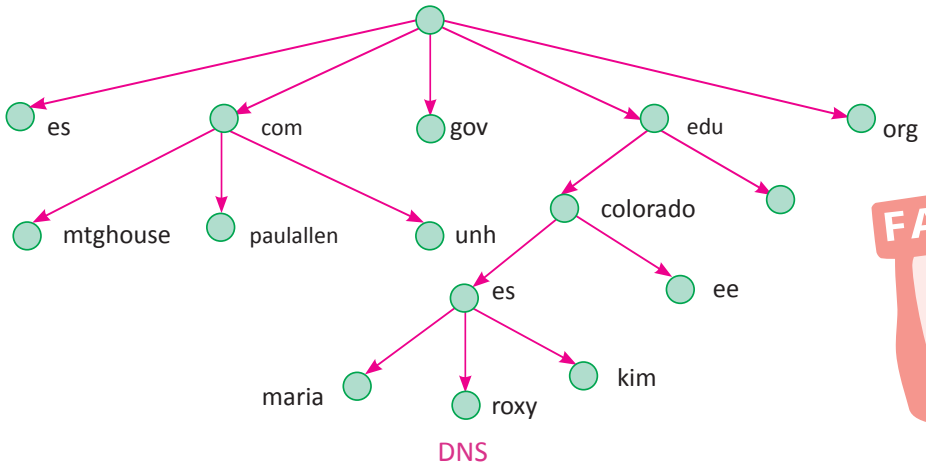
This specifies numbers separated by dots to specify the address of the computer according to TCP/IP. An example of IP address could be : 45.79.151.25. An **Internet Protocol address** is assigned to each device in a network that uses IP (Internet Protocol) for communication.

DNS

DID YOU KNOW

There are two versions of IP address: IPv4 and IPv6.

The **Domain Name System (DNS)** is a hierarchical naming system used to provide host names for computers or any other resource connected to the internet or a private network. This can be understood in a tree manner. Each node in a tree has a label and a domain name. A full domain name is a sequence of labels separated by dots (.).



DNS

FACTS

DNS (Domain Name System) was introduced by Paul Mockapetris and John Postel in 1983.

Here **maria.es.colorado.edu** is a full domain name. Some of the domain labels are:

Labels	Description
com	Commercial organisations
edu	Educational institutions
gov	Government institutions
info	Information service providers
mil	Military groups
org	Nonprofit organisation

Short for **Domain Name System** or **Domain Name Service**, a DNS, is an Internet or network server that helps to point domain names or hostnames to their associated Internet Protocol Address. Without a DNS, to resolve a domain name or the proper rights, users would have to know the IP address of each of the web pages or computers you wanted to access.

Web Page

Web pages are the building blocks of the Internet. They are made up of HTML code and web browsers can read the information of web pages. A web page usually contains **links** (called hyperlinks) that connects to other web pages.

Website

A website is a group of interrelated web pages related to a single organisation, cause, institute, etc. The introductory or first web page of a website is known as a **home page**.

Web Portal

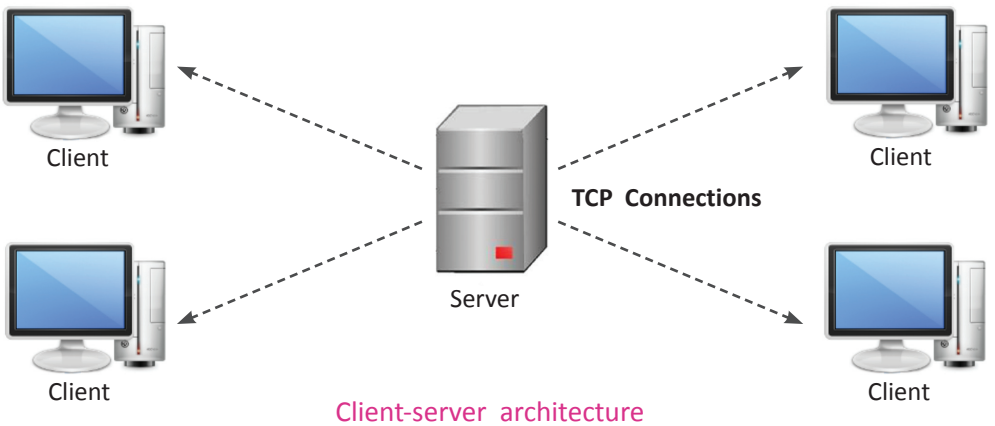
It is an idea of a website or service that offers a broad range of services such as e-mail, games, quotes, search, news, stocks, etc. The idea of a portal or web portal is to offer such a wide range of commonly accessed services that visitors are more likely to visit more often. The **Yahoo** homepage is a good example of a portal that gives visitors access to all the places and the news that are most popular.

NETWORK ARCHITECTURES

An architecture of network describes how a computer network is configured and what strategies are being used. There are mainly two types of network architectures as listed below:

Client–server Architecture

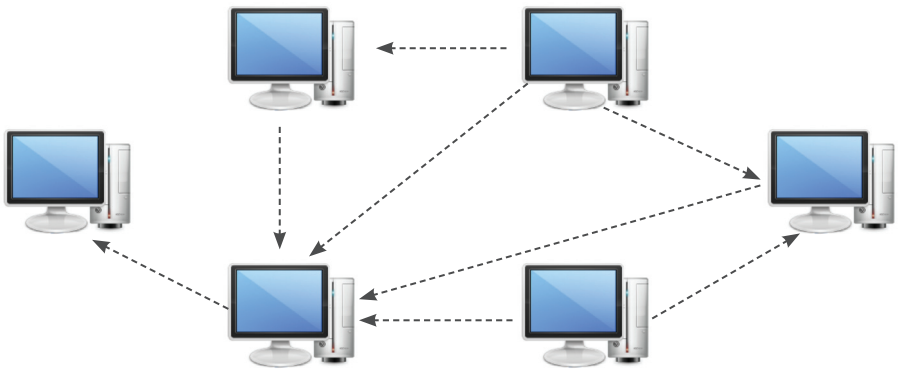
In a client–server network architecture, several computers are connected to the main computer called **server**. Clients are the computers which send requests, like data retrieval and any query to the server. Server provides the services to the clients and controls software and hardware access.



Client-server architecture

Peer-to-Peer Architecture

In peer-to-peer network architecture, there is no central server. All the computers (called **peers**) having equal capabilities are connected together to use the resources available on the network. The peer–to–peer networking is common in small local area networks (LANs), particularly home networks, offices, etc.



Peer-to-peer architecture

NETWORK DEVICES

Networking devices are used to establish the Internet connection. Following are some of the network devices:

Hub


Hub

A hub is a central controller device which provides the connection for all of the computers on a network. In this network, all computers can communicate directly with each other. Hubs are of two types: passive and active Hubs.

A passive hub connects devices without processing or amplifying signals, simply allowing data to pass through.

An active hub not only connects devices but also regenerates and amplifies signals to maintain data integrity over longer distances.

Switch

A switch is a device that logically connects multiple computers together within a LAN. It is used to create temporary connections between two or more devices attached to the switch. A switch is called an **Intelligent Hub**. Switch is a box with a set of **RJ-45** ports.

DID YOU KNOW

RJ-45 is Registered Jack. This is an eight-wire connector used to connect the nodes to hub/switch in a network.

Repeater


Repeater

A repeater is an electronic device which provides the connection between two segments of a LAN. It enables signals to travel longer distances over a network by regenerating the received signals and then retransmits the regenerated signals on other segments.

Router


Router

A router is attached to one or more networks to forward packets from one network to another.

Bridge

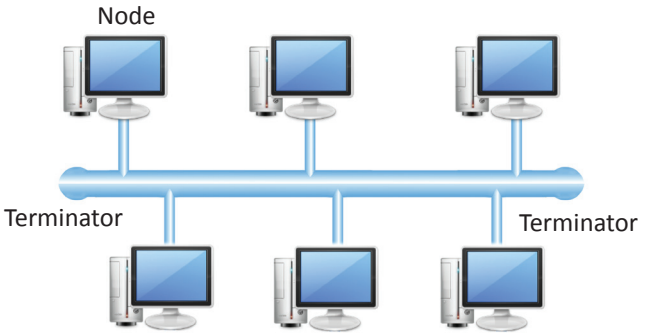
A bridge is a networking device, responsible for filtering the data. It checks the destination address of a packet and decides whether it should be forwarded or dropped. It connects two LANs.

NETWORK LAYOUTS

The arrangement of connected nodes in a communication network is called **network layout**. It is also referred to as the **topology** of a network. It is the geometric representation of the relationship of all the nodes to one another. There are mainly four types of topologies. They are as follows:

Bus Topology

In bus topology, all the nodes are connected to a single cable called **bus**. This central cable acts as the backbone of the network. Every node communicates with other devices through this bus. However, if the backbone cable fails, the entire network goes down. In this, the source node places the data in a bus and the message is received by the intended receiver. It is also known as **linear bus topology**.



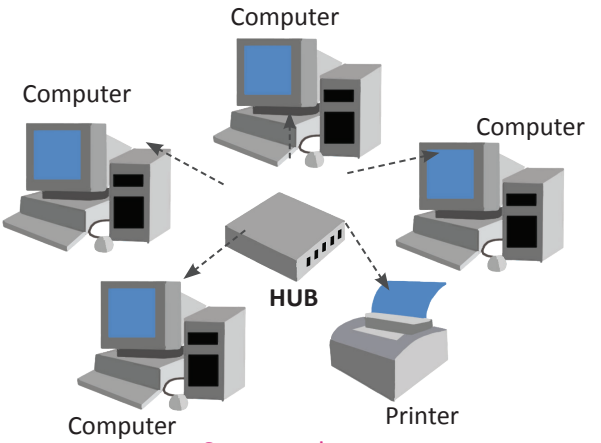
Bus topology

DID YOU KNOW

Bus topology transmits data only in one direction.

Star Topology

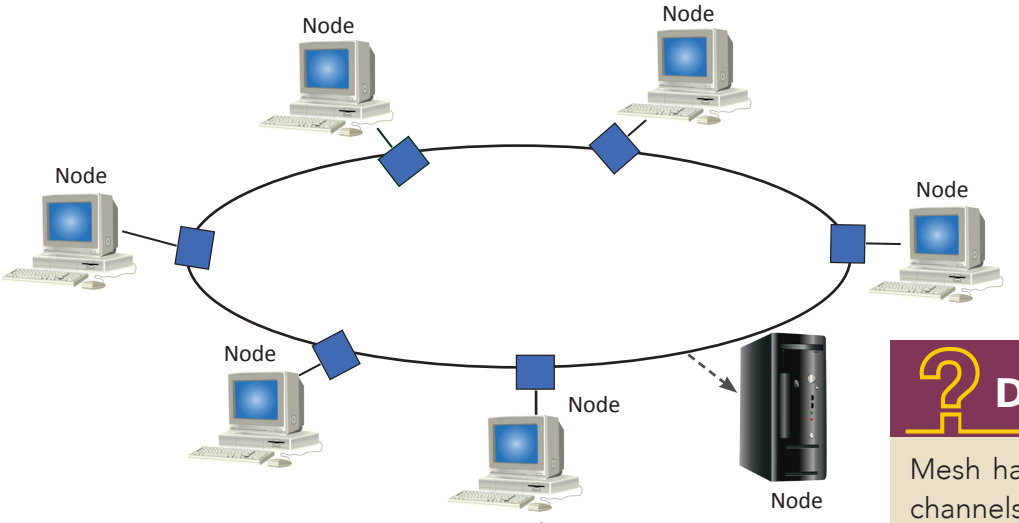
In star topology, each node is connected to a centrally located device called **hub**. In this topology, all the data is transmitted through hub to the destination node. Hub manages and controls the entire network. If one node gets failed, then it does not affect the entire network. In this topology, new nodes can easily be added without affecting the rest of the network. If the hub fails, the whole network goes down.



Star topology

Ring Topology

In a ring topology, each node is connected with the adjacent nodes in a **circular chain** using a **single cable**. The data flows in the chain in only one direction and passes through all the nodes until it reaches its destination. This makes the network slow. If a single node or a cable breaks down, the entire network breaks down.



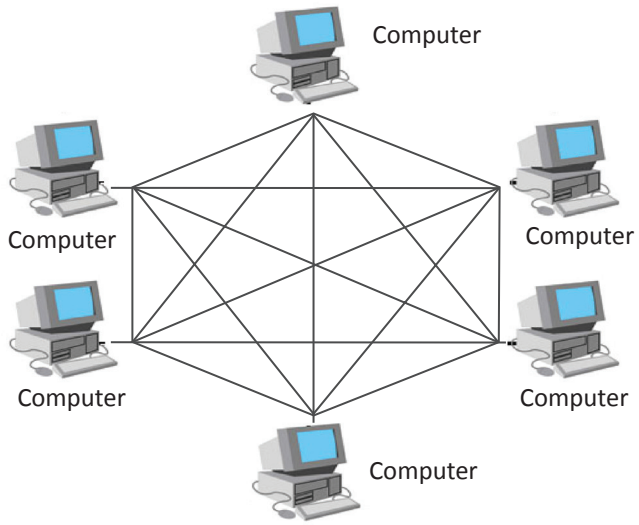
Ring topology

DID YOU KNOW

Mesh has n(n–1)/2 physical channels to link devices.

Mesh Topology

In mesh topology, each node is connected to every other node to provide an alternative path for transferring data. This topology provides redundant interconnections among nodes. If one of the node breaks down, then all the other nodes in a network can still communicate with each other directly through one or more intermediate nodes. It is very expensive and commonly used in wireless networks.



Mesh topology

WIRELESS TECHNOLOGIES

In wireless technologies, several devices are connected together to each other without wires. Nowadays, wireless technologies are widely used.

Some of the popular wireless technologies are as follows:

FACTS

The term Bluetooth was proposed in 1997 by **Jim Kardach**.

Bluetooth

Bluetooth is a wireless technology standard used to exchange data over short distances, typically up to 10 metres. It was developed by **Ericsson** in 1994. It is very secure and can connect up to eight devices (items of electronic equipment) at the same time. It connects the devices, like mobile phones, laptops, printers, digital cameras, etc. using wireless connection.


Bluetooth icon

Wi-Fi (Wireless Fidelity)

It allows an electronic device to exchange data or connect to the Internet. It is a high-speed wireless technology that connects Wi-Fi equipped devices, like computers, laptops, mobile phones, tablets, video games, etc. to each other with the help of radio waves. Nowadays, you can use the Wi-Fi service in public places, like airports, hotels, offices, shopping malls, etc.


Wi-Fi signal

GPS (Global Positioning System)

It involves a receiver that receives and transmits signals through a satellite. GPS is mainly used to identify the location of the user. GPS system is used in navigation, mapping and vehicle tracking system.

DID YOU KNOW

GPS is maintained by the US government and is freely accessible to anyone with a GPS receiver.

Infrared Communication

It is wireless technology that allows computing devices to communicate via short-range (up to 5 metres) wireless signals. With infrared, computers can transfer files and other data bi-directionally. Infrared network signals cannot penetrate walls or other obstructions and work only in the direct line of sight. In infrared communication, data is transferred and communicated with the help of infrared ports. Devices like television, air conditioners, music systems and their remotes use the infrared system.

Activity

Between the client-server and peer-to-peer architecture, rank them in order of:

1. Reliability of network
2. Cost of network

Also, do the same for mesh, bus and star topology.

Let's Brief

- In the late 1960's, the need was felt to create a computer network. In this effort, the ARPANET was developed.
- A network is a group of computers connected to each other so that they can share each other's resources and communicate with each other.
- The data communication system has five components namely: message, sender, receiver, transmission medium and protocol.
- Based on the size of the networks, the computer network can be divided into PAN, LAN, MAN, WAN and CAN.
- Intranet is a local or restricted communications network, especially a private network created using World Wide Web software.
- DNS is short for Domain Name System or Domain Name Service, a DNS is an Internet or Network server that helps to point domain names or hostnames to their associated Internet Protocol Address.
- There are two network architectures: Client server architecture and peer–to–peer architecture.
- A switch is a device that logically connects multiple computers together within a LAN.
- The arrangement of connected nodes in a communication network is called network layout.
- Some of the popular wireless technologies are: Bluetooth, Wi–fi, GPS and infrared communication.

KEY TERMS

- **Message:** The message is the information to be communicated. It may include text, numbers, pictures, audio and video.
- **Infrared radiation:** It is not visible, humans can sense it as heat. Infrared waves are of lower energy and less harmful.
- **URL:** Stands for Uniform Resource Locator. It is the unique address of a web page.
- **DNS:** Short for Domain Name System or Domain Name Service, is an Internet or network server that helps to point domain names or host names to their associated Internet Protocol Address.
- **Bridge:** is a networking device responsible for filtering the data. It checks the destination address of a packet and decides whether it should be forwarded or dropped.

EXERCISES

A. Multiple Choice Questions (MCQs)

1. In which year, the term bluetooth was proposed?

(a) 1996 ☐ (b) 1997 ☐ (c) 1998 ☐

2. Which type of cable is commonly used as a medium for networking?

(a) Optical ☐ (b) Coaxial ☐ (c) Twisted ☐

3. What does LAN expand to?

(a) Local Access Network ☐ (b) Localised Attribute Network ☐

(c) Local Area Network ☐

4. Which kind of network can span countries and even continents?

(a) LAN ☐ (b) WAN ☐ (c) MAN ☐

5. Who invented coaxial cable?

(a) Oliver ☐ (b) Einstein ☐ (c) Newton ☐

6. Which of the following allows the users to transfer the money online without going to a bank?

(a) EFT ☐ (b) GPS ☐ (c) Teleconferencing ☐

7. In domain name, what does .com stands for?

(a) Common organisation ☐ (b) Compact organisation ☐ (c) Commercial organisation ☐

B. Fill in the blanks.

HINTS Web pages Protocol Dots WAN Campus Switch Hub LAN

1. A _____ is a device that logically connects multiple computers within a LAN.

2. _____ is the kind of network that spans about a kilometer.

3. CAN stands for _____ Area Network.

4. _____ are the building blocks of the Internet.

5. A full domain name is a sequence of labels separated by _____.

6. In star topology, each node is connected to a centrally located device called _____.

7. _____ is a type a network that spans thousands of kilometres.

8. A _____ is a set of rules that governs data communication.

C. Write T for true and F for false statements.

1. Wi-Fi stands for Wireless Fiction. ☐
2. Bluetooth technology was developed by Ericsson. ☐
3. A website is a group of interrelated web pages related to single organisation, cause, institute, etc. ☐
4. Using a switch, there is a direct communication path between any two computers of the network. ☐
5. A router is attached to one or more networks to forward packets from one network to another. ☐
6. A network is a group of computers connected to each other.
7. There are five versions of IP address. ☐
8. In peer-to-peer network architecture, there is no central server. ☐

D. Match the following columns.

Column A	Column B
1. RJ-45	(a) Unique address of a web page
2. GPS	(b) Wide Area Network
3. WAN	(c) Domain Name System
4. URL	(d) Global Positioning System
5. DNS	(e) Registered Jack

E. Answer the following questions:

1. Define the term network. Define the different types of network.
2. What is a web page?
3. What is DNS?
4. Define Wi-Fi.
5. Write a short note on:

   (a) Switch (b) Bluetooth (c) Repeater
6. Write two advantages of networking.
7. Describe the concept of components of a network.
8. Define the two types of network architecture.

F. Competency/Application-based questions.

• Critical Thinking

1. Which type of network is most suitable for your school library?
2. Rahul wants to use the internet on his computer. Name the device which can help him to do so.

ACTIVITY ZONE

Skill Hub

• Critical Thinking

Find and encircle 12 meaningful terms extracted from this chapter. Search across and downward.

X	M	Y	X	R	O	R	H	U	B
S	E	R	V	E	R	O	S	Z	W
E	S	T	Q	P	T	U	W	M	E
N	S	P	R	E	U	T	I	I	B
D	A	R	P	A	N	E	T	N	S
E	G	O	S	T	M	R	C	T	I
R	E	T	M	E	Z	X	H	E	T
O	T	O	N	R	Y	M	N	R	E
R	E	C	E	I	V	E	R	N	A
Z	Y	O	X	W	X	B	G	E	Z
A	B	L	U	E	T	O	O	T	H

LAB SESSION

• Experiential Learning

Visit the lab and do the following tasks:

- Make a PowerPoint presentation on the topic 'Wireless Technologies'.
- Using the Internet, find the information about various Bluetooth devices commonly used nowadays.

GROUP DISCUSSION

• Communication

Conduct a group discussion on the topic: "Advantages of networking" v/s "Disadvantages of networking".

PROJECT WORK

• Creativity

Using the Internet, find the information about various types of networks and make a chart on it. Also paste pictures related to them.

TEACHER'S NOTES

- Show the students various network devices and network layouts.
- Students should have knowledge of terms used to describe network and Internet.

PHP stands for **Hypertext Preprocessor**. It is a free and open source technology and very useful. It is easy to grasp its tricks. We will introduce some new applications required to deal with PHP effectively.

Some of the advantages of using PHP are:

- **Easy to Learn:** The syntax is simple and easy to grasp.
- **Portable:** The PHP code written on a system is readily ported as there is no change required from system to system.
- **PHP is free:** It comes free of cost.
- **PHP is secure:** PHP is a server-side scripting language. The web server created using PHP can be secured.
- **Minimum requirements:** Much software need not be installed to have the PHP based apps up and running. Some sophisticated text editor like Notepad++ and any web browser can do.

Text Editor

Although Notepad itself will suffice, Notepad++ is a better app and can deal with PHP coding or any language coding much better. You can download the Notepad++ app by clicking on the link:

https://notepad-plus-plus.org/downloads/

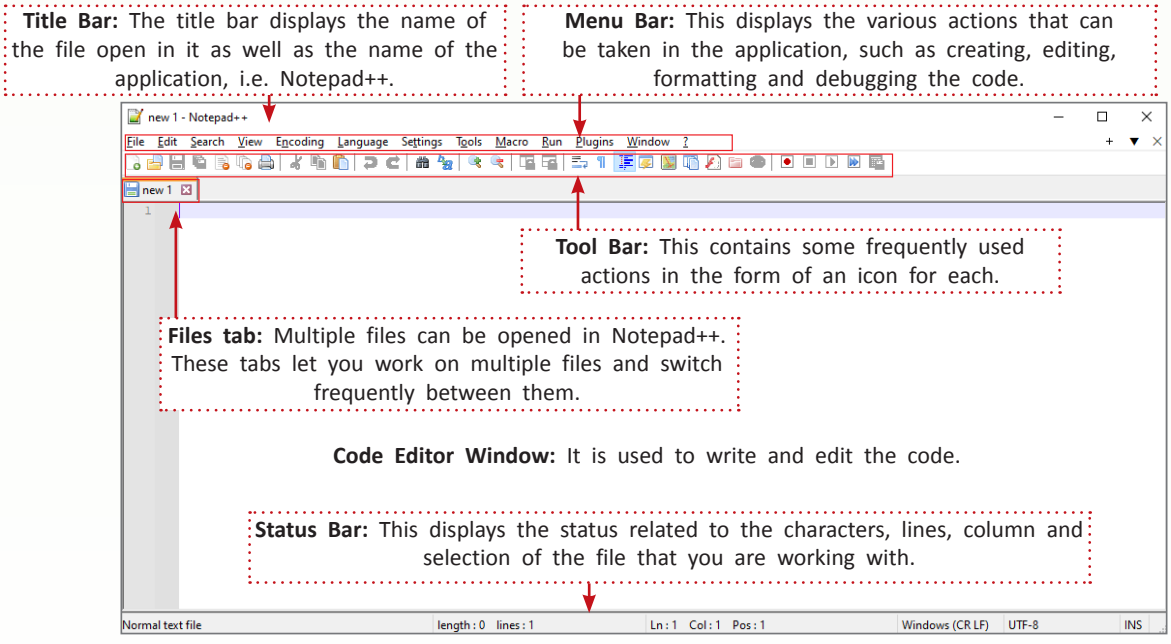
For PHP coding, you have to create web server. This can be done using the XAMPP app. You have to download the setup file from the given below link:

https://www.apachefriends.org/index.html

After installation of Notepad++, it is easily opened by double–clicking its icon or from the Start menu. This is how the Notepad++ app looks after being launched.

Components of the Notepad++ window

Notepad++ window opens with the following components:



The Notepad++ screen

Variables

PHP is a loosely typed language. This means that any variable may at a place in the code hold any variable type. The variables are not ascribed any particular data type in PHP.

Keywords in PHP

PHP has a set of keywords that are reserved words which cannot be used as function names, class names or method names.

PHP identifiers

Identifiers are used to name the different components of a PHP program, like variables, objects, functions, classes, etc. The sample code shows an example of an identifier.

PHP code

The php code starts with **<?php** in the file.

The php code ends with the earliest **?>** in the file.

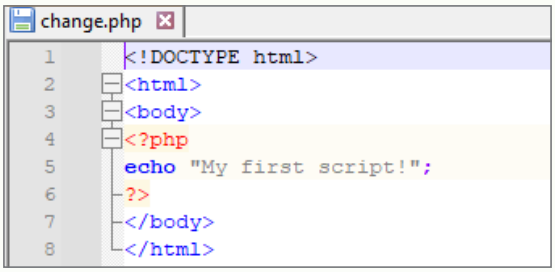
Process of Writing PHP File

In order to create a PHP file, follow these steps:

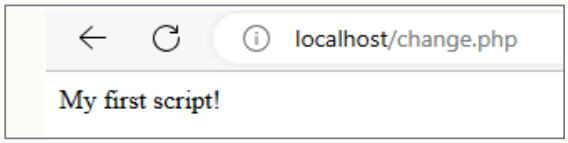
1. Open the **C:\xampp** folder. There, enter the **htdocs** folder.
2. Create a **.php** file in that and start typing the HTML/ PHP code into it.
3. After finishing, save and close the file.

To launch the created page, just type in http://127.0.0.1/ change.php.

The file will be displayed. You may also use http://localhost/ change.php. It also works.



The created PHP file



Display of created PHP file

Operators in PHP

Operators are the symbols available in PHP to do arithmetic or logical calculations. The whole group consisting of variables, operators and values are known as an **expression**. An expression evaluates to a single value. For example:

$n + 3

is a valid expression. If n stores the value 7, this expression evaluates to 10.

Arithmetic and logical operators are available in PHP. The arithmetic operators are addition, subtraction, multiply, divide and remainder (on division).

Logical operators are: and (&&), or (||), not (!). There are also comparison operators like > , < <=, >=, == and !=.

Get and Post Methods

You must have filled out forms on webpages. After the data has been filled and submit (or equivalent button) has been pressed, the data is communicated to another web page. Now, there are two ways in which this communication takes place. One is the GET method and the other is POST method.

In the GET method, the data filled in the form is communicated as part of the URL itself. This is thus not a secure way. Anyone watching the URL will be able to know what data has been entered. The other method is the POST method. In this, the URL does not contain any data and can be communicated silently to the web page at the other end.