



# ST CLEMENT'S SECONDARY SCHOOL

## INFORMATION AND COMMUNICATIONS TECHNOLOGY ORDINARY LEVEL SECONDARY EDUCATION FORM 1



## Introduction to ICT

*Mario Kabula Makanga Chongo*

# Activity

- Teacher to briefly introduce the early computational tools and their historical significance.
- *Early computational tools played a pivotal role in the evolution of modern computing. These tools were crucial in transitioning from manual calculation to mechanical and, eventually, electronic computation, paving the way for modern computers.*

# Evolution of Computers

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# ACTIVITY

- Ask learners to think individually about what they know or imagine about early computational tools (e.g., abacus, Napier's bones, slide rule).
- Then, have them pair up with a classmate to discuss their thoughts.
- Finally, share some of their ideas with the class.

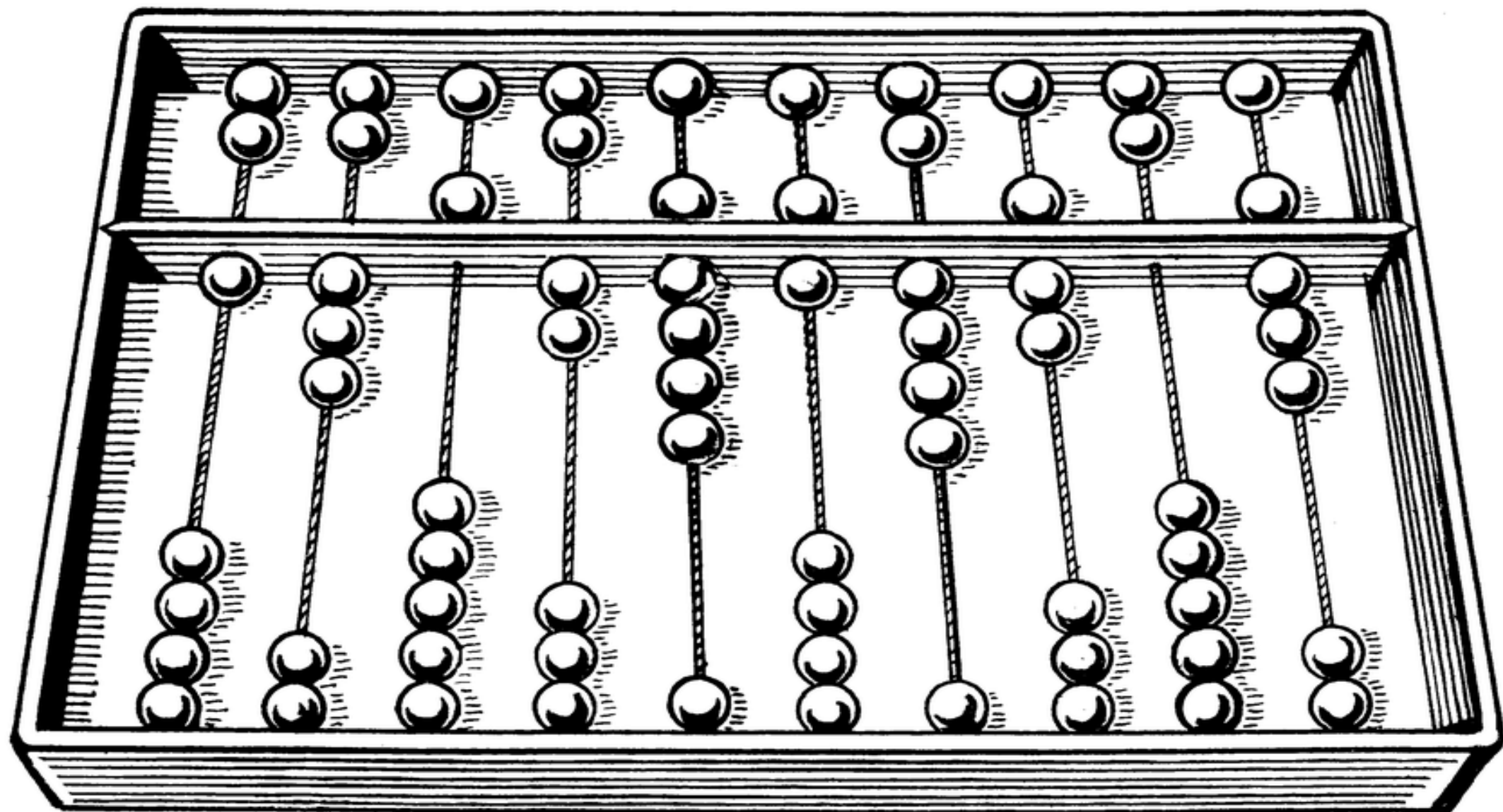
# Mechanical Computers (Pre-20th Century)

- **Abacus (c. 2400 BCE):** One of the earliest computing devices, used for basic arithmetic.
- **Pascal's Calculator (1642):** Blaise Pascal invented a mechanical calculator for addition and subtraction.
- **Analytical Engine (1837):** Designed by Charles Babbage, it was a conceptual mechanical computer capable of performing complex calculations. Ada Lovelace wrote the first algorithm for it, earning her the title of the first programmer.

# Abacus

- The abacus operates on a **place-value system**, where each rod represents a different power of 10 (e.g., units, tens, hundreds).
- Users perform calculations by moving beads to represent numbers and then manipulating them according to arithmetic rules.
- **Addition:** Add numbers by moving beads upward.
- **Subtraction:** Subtract numbers by moving beads downward.
- **Multiplication and Division:** Repeated addition or subtraction, combined with shifting place values.

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1 3 5 2 9 6 4 7 0 8

# Napier's Bones (1617)

- **Inventor:** John Napier, a Scottish mathematician, invented this tool in 1617.
- **Purpose:** It was designed to simplify multiplication, division, and square root calculations.
- **Design:**
  - Consisted of a set of rectangular rods (or "bones") made of wood, metal, or ivory.
  - Each rod was inscribed with multiplication tables for a specific digit (0–9).
  - By arranging the rods side by side, users could perform calculations by adding numbers in adjacent columns.

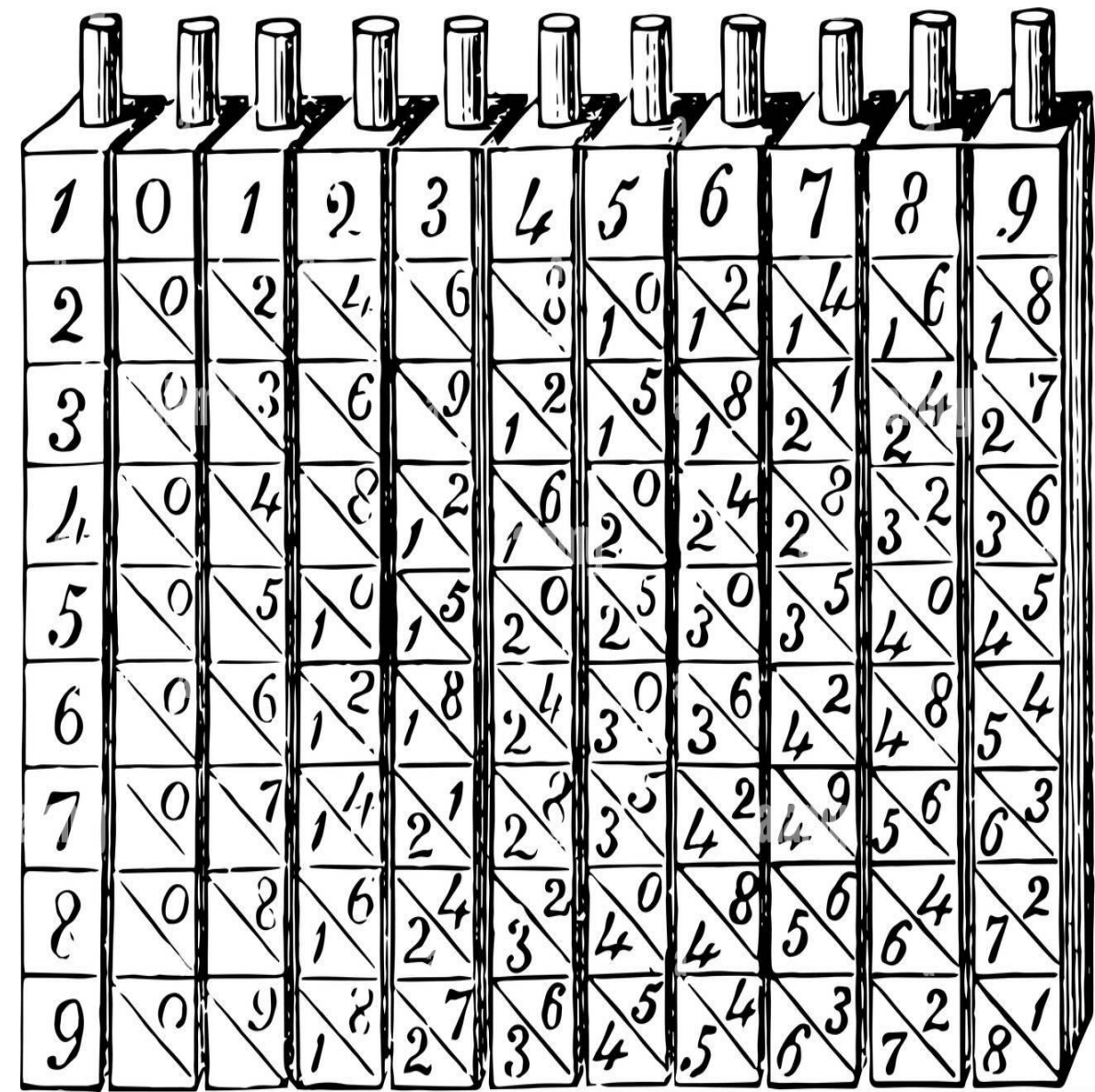
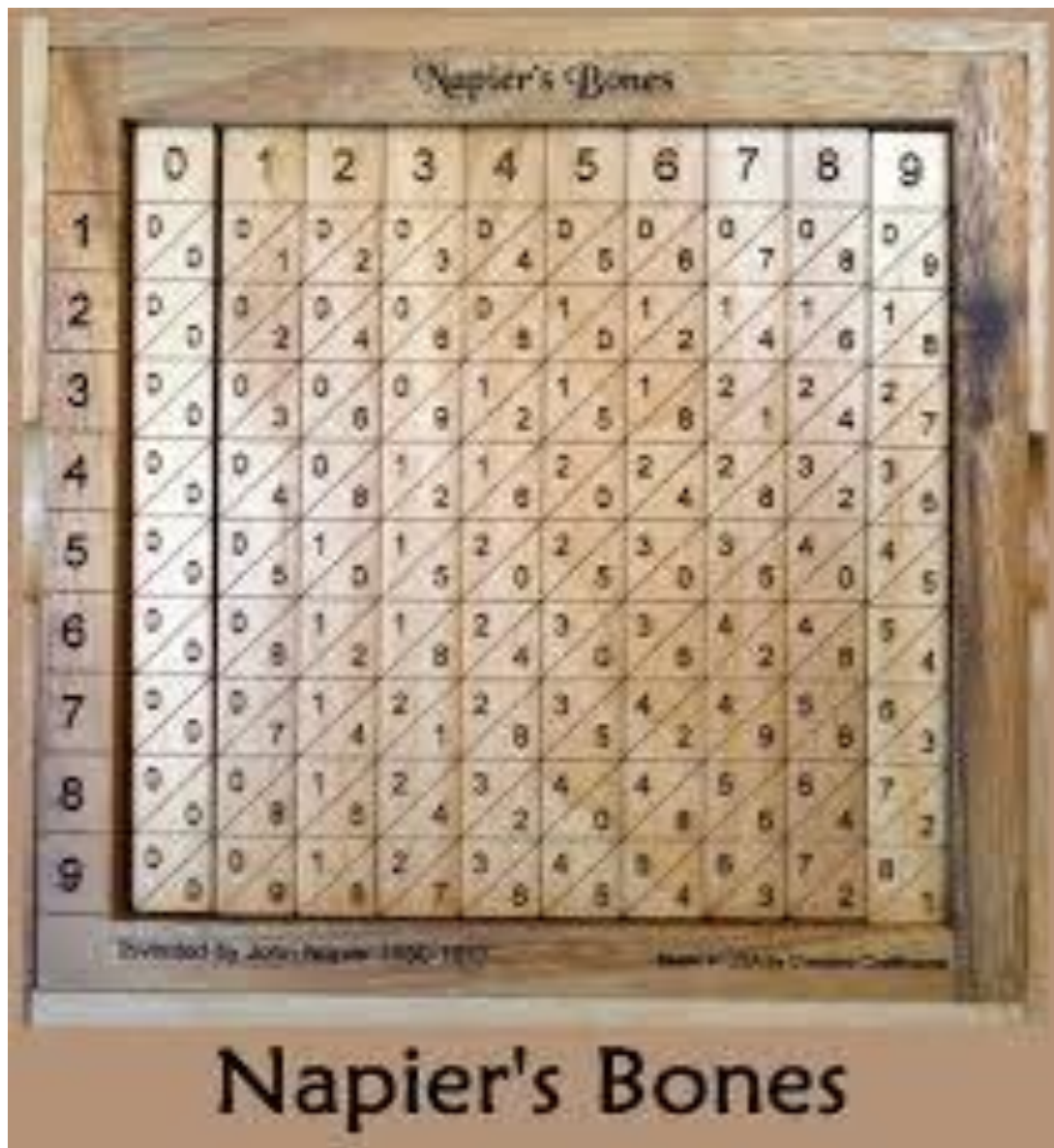


- **How It Worked:**

- To multiply, the user would align the rods corresponding to the digits of the multiplicand.
- The product was obtained by adding numbers diagonally across the rods.
- For division and square roots, the process was more complex but still relied on the rods.

- **Significance:**

- Napier's Bones were one of the earliest mechanical aids for calculation.



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# Exercise

1. State two early computation tools.
2. Explain the function of each tool.
3. How did Users perform calculations using:
  - (a) Abacus
  - (b) Napier's bones

# Slide Rule (17th Century)

- **Inventors:** The slide rule was developed based on the principles of logarithms, which were also introduced by John Napier. The first practical slide rule was created by William Oughtred in the 1620s.
- **Purpose:** It was used for multiplication, division, roots, logarithms, and trigonometric functions.
- **Design:**
  - Consisted of two or more sliding rulers marked with logarithmic scales.
  - The scales allowed users to perform calculations by aligning numbers and reading results.

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- **How It Worked:**

- Multiplication: Align two numbers on the scales, and the product is read directly.
- Division: Reverse the process of multiplication.
- Advanced slide rules included additional scales for trigonometry, exponents, and logarithms.

- **Significance:**

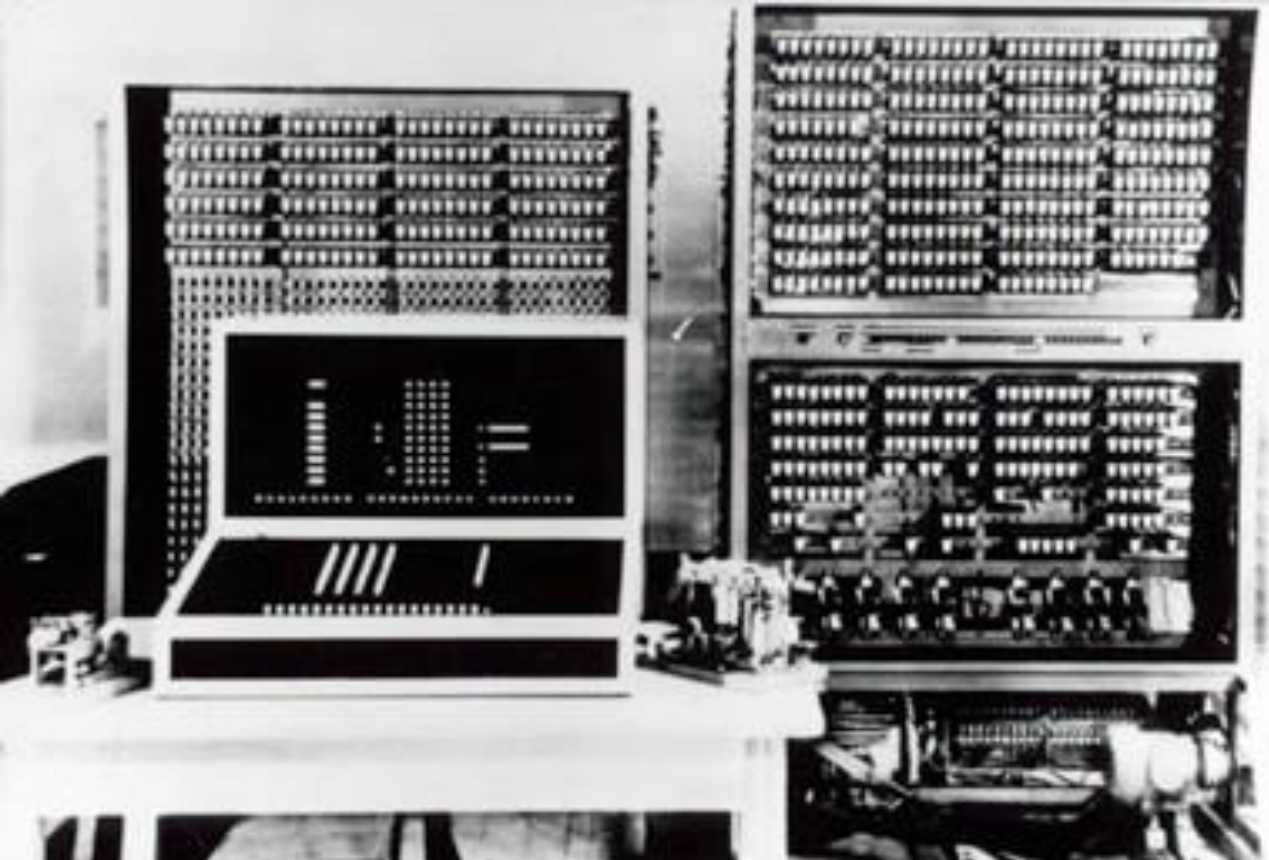
- The slide rule was widely used by engineers, scientists, and mathematicians for over 300 years.
- It was a precursor to modern electronic calculators and computers.
- Its decline began in the 1970s with the advent of pocket calculators.





# Electromechanical Computers (Early 20th Century)

- **Tabulating Machines (1890s):** Herman Hollerith developed punch-card machines for the U.S. Census, laying the foundation for data processing.



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# Exercise

1. State two early computation tools.
2. Explain the function of each tool.
3. How did Users perform calculations using:
  - (a) Slide rule
  - (b) Tabulating Machines

# Computers Generations

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- ***The evolution of computers is often categorized into generations, each marked by significant technological advancements.***
- ***Each generation has built upon the previous one, driving innovation and transforming how we live, work, and communicate.***

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# Teaching Materials

- *Timeline templates, historical images of computers, poster paper, markers, or digital tools.*

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# ACTIVITY

- *Explain the concept of a timeline and its importance in understanding the evolution of computers.*

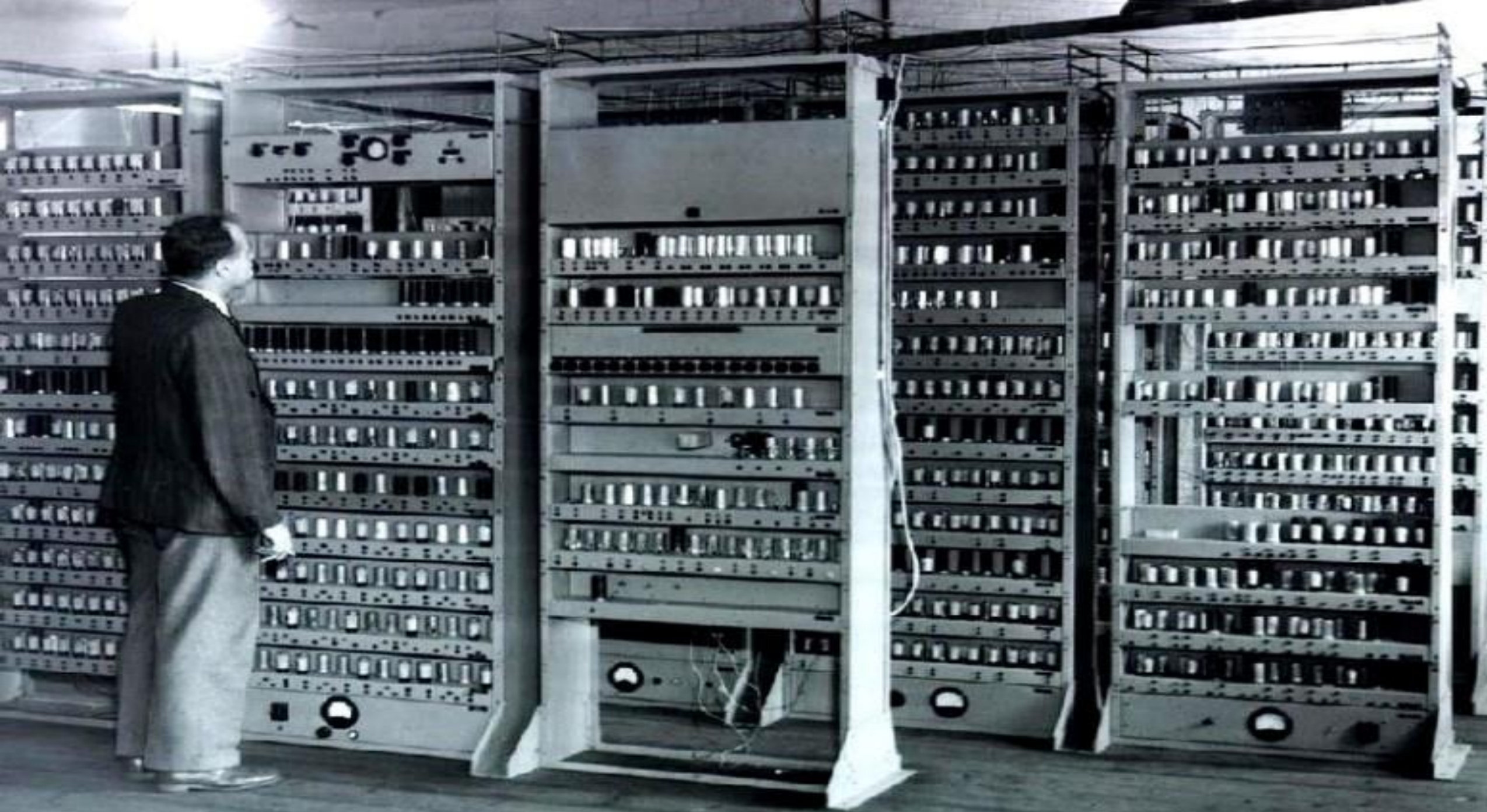
## *Group Work*

- *Divide learners into groups and provide them with a list of key milestones*
- *1<sup>ST</sup> Generation*
- *2<sup>nd</sup> Generation*
- *3<sup>rd</sup> b Generation*
- *4<sup>th</sup> Generation*
- *5<sup>th</sup> Generation*

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# First-Generation Computers (1940s–1950s)

- **ENIAC (1945):** The first electronic general-purpose computer, built for the U.S. Army. It used vacuum tubes and was massive in size.
- **UNIVAC I (1951):** The first commercial computer, used for business and administrative tasks.
- **Key Features:** Vacuum tubes, magnetic drums, and punch cards. These computers were large, expensive, and consumed significant power.



## Second-Generation Computers (1950s–1960s)

- **Transistors (1947):** Replaced vacuum tubes, making computers smaller, faster, and more reliable.
- **IBM 1401 (1959):** A popular business computer using transistors.
- **Key Features:** Smaller size, lower power consumption, and assembly language programming.





# Third-Generation Computers (1960s–1970s)

- **Integrated Circuits (ICs):** Jack Kilby and Robert Noyce developed ICs, which combined multiple transistors on a single chip.
- **IBM System/360 (1964):** A family of computers with compatible software and peripherals.
- **Key Features:** Smaller, faster, and more energy-efficient. Introduction of operating systems and high-level programming languages like COBOL and FORTRAN.



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# Exercise

1. List the first three computer generations.
2. Explain how each milestone contributed to the development of modern computers.

# Fourth-Generation Computers (1970s–1980s)

- **Microprocessors (1971):** Intel introduced the first microprocessor, the 4004, which integrated the CPU onto a single chip.
- **Personal Computers (PCs):** The Altair 8800 (1975), Apple II (1977), and IBM PC (1981) brought computing to homes and businesses.
- **Key Features:** Graphical user interfaces (GUIs), floppy disks, and the rise of software applications.



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# Fifth-Generation Computers (1980s–Present)

- **Artificial Intelligence (AI):** Focus on AI, machine learning, and natural language processing.
- **Supercomputers and Parallel Processing:** High-performance computing for complex tasks like weather forecasting and scientific research.
- **Key Features:** Ultra-large-scale integration (ULSI), quantum computing, and cloud computing.

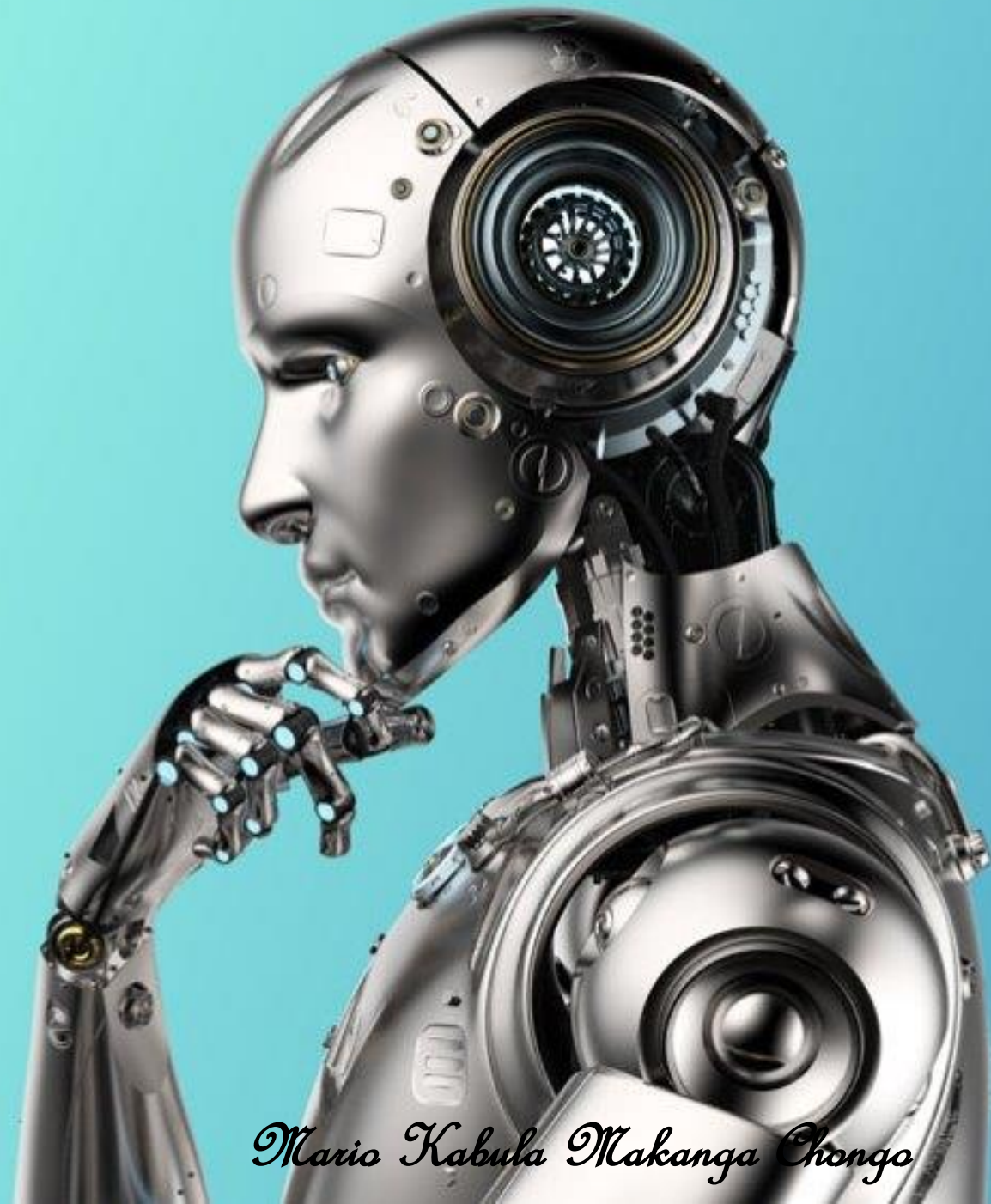
# Modern Era (2000s–Present)

- **Mobile Computing:** Smartphones and tablets revolutionized personal computing.
- **Cloud Computing:** Remote data storage and processing over the internet.
- **Quantum Computing:** Early stages of development, promising exponential computational power.
- **AI and Machine Learning:** Integration of AI into everyday applications, from virtual assistants to autonomous vehicles.





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# Exercise

1. List the last three computer generations.
2. Explain how each milestone contributed to the development of modern computers.

# MICROPROCESSORS

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# Teaching Materials:

- *Case studies*
- *articles on microprocessor applications*
- *presentation tools (e.g., PowerPoint, flip charts).*

# ACTIVITY

- *Explain what a microprocessor is and its role in modern technology.*
- *Provide learners with case studies or articles on how microprocessors have impacted industries such as healthcare, education, and entertainment. Divide learners into small groups and assign each group an industry to analyze.*
- *Group discusses on the impact of microprocessors in their assigned industry.*

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# Microprocessors

- A **microprocessor** is an integrated circuit (IC) that contains the functions of a central processing unit (CPU) on a single chip.
- It is the "brain" of a computer, executing instructions and performing calculations.





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# Activity

- ***Group discusses on the impact of microprocessors in their assigned industry and prepares a short summary.***
- ***Class Presentation of their findings to the class.***
  
- ***Facilitate a class discussion on how microprocessors have transformed daily life and what the future might hold***

# Impact of Microprocessors

- The invention and evolution of microprocessors have had a profound impact on technology, society, and the global economy.
- The following are key areas where microprocessors have made a significant difference:

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# Evolution in Computing

- **Miniaturization:** Microprocessors allowed computers to shrink from room-sized machines to portable devices like laptops and smartphones.
- **Increased Power:** They enabled faster processing speeds, greater efficiency, and the ability to handle complex tasks.
- **Affordability:** Mass production of microprocessors drastically reduced costs, making computing accessible to individuals and small businesses.

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# Personal Computing

- **PC Revolution:** Microprocessors made personal computers (PCs) possible, empowering individuals with tools for work, education, and entertainment.
- **User-Friendly Interfaces:** They enabled the development of graphical user interfaces (GUIs), making computers easier to use for non-technical users.

# Economic and Social Impact

- **Job Creation:** The microprocessor industry has created millions of jobs in tech, manufacturing, and services.
- **Global Connectivity:** They have connected people worldwide, fostering collaboration and cultural exchange.
- **Education:** Microprocessors have transformed education through e-learning platforms and digital tools.

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# Consumer Electronics

- **Smart Devices:** Microprocessors are the backbone of smartphones, tablets, smart TVs, and wearable devices.
- **Home Appliances:** They power modern appliances like washing machines, refrigerators, and microwaves, making them "smart" and energy-efficient.

# Communication and Connectivity

- **Internet and Networking:** Microprocessors enabled the development of routers, modems, and other networking devices, facilitating the growth of the internet.
- **Mobile Communication:** They are essential in mobile phones, enabling global connectivity and the rise of social media.



# Automation and Industry

- **Industrial Automation:** Microprocessors control machinery, robotics, and assembly lines, increasing efficiency and precision in manufacturing.
- **Embedded Systems:** They are used in cars, airplanes, and medical devices, enhancing functionality and safety.

# Transportation

- **Automotive Innovation:** Microprocessors are central to engine control units (ECUs), infotainment systems, and advanced driver-assistance systems (ADAS).
- **Electric and Autonomous Vehicles:** They are critical for the development of electric cars and self-driving technologies.

# Healthcare

- **Medical Devices:** Microprocessors power diagnostic tools, imaging systems, and wearable health monitors.
- **Telemedicine:** They enable remote patient monitoring and virtual consultations, improving access to healthcare.

# Entertainment and Gaming

- **Gaming Consoles:** Microprocessors have driven the evolution of gaming, from simple arcade games to immersive virtual reality experiences.
- **Streaming and Media:** They enable high-quality video streaming, music playback, and digital content creation.

# Future Innovations

- **Artificial Intelligence (AI):** Microprocessors are enabling AI applications like machine learning, natural language processing, and computer vision.
- **Internet of Things (IoT):** They are the foundation of IoT, connecting everyday objects to the internet for smarter living.
- **Quantum Computing:** Advances in microprocessor technology are paving the way for quantum computing, which promises to solve problems beyond the reach of classical computers.

# Exercise

1. what a microprocessor?
2. Explain how microprocessors have impacted the following industries.
  - (i) Healthcare,
  - (ii) Education,
  - (iii) Entertainment.
3. Discuss how microprocessors have transformed daily life and what the future might hold.

# Research

Create a report on the impact of microprocessors.

(a) Education

(b) Finance

(c) Mining



# **BASIC CONCEPTS OF ICT**

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# ICT

- **ICT** stands for **Information and Communication Technology**.
- It refers to the integration of technologies used to manage and communicate information.
- ICT encompasses a wide range of tools, systems, and applications that enable the processing, storage, transmission, and retrieval of data and information.

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# **ICT tools and their purposes**

## **1. Hardware:**

1. Physical devices such as computers, servers, smartphones, tablets, and networking equipment (routers, switches, etc.).

## **2. Software:**

1. Applications and programs that run on hardware, including operating systems, productivity tools, and specialized software for data analysis, communication,

# TYPES OF ICT TOOLS

# Information and Communications Technology tools

❖ these are hardware, software, and systems used to manage, process, store, transmit, and retrieve information.



# Activity

- Ask learners to discuss ICT tools used at home.
- Demonstrate the use of basic tools
- Role-play scenarios using different ICT tools.

# **ICT tools used at home**

- ICT (Information and Communications Technology) tools are widely used at home to enhance convenience, entertainment, communication, and productivity.
- **Smartphones and Tablets**
- **Email Services:**
  - Gmail, Outlook, Yahoo Mail for personal and professional communication.
- **Instant Messaging Apps:**
  - WhatsApp, Telegram, Signal, and Facebook Messenger for text and voice messaging.



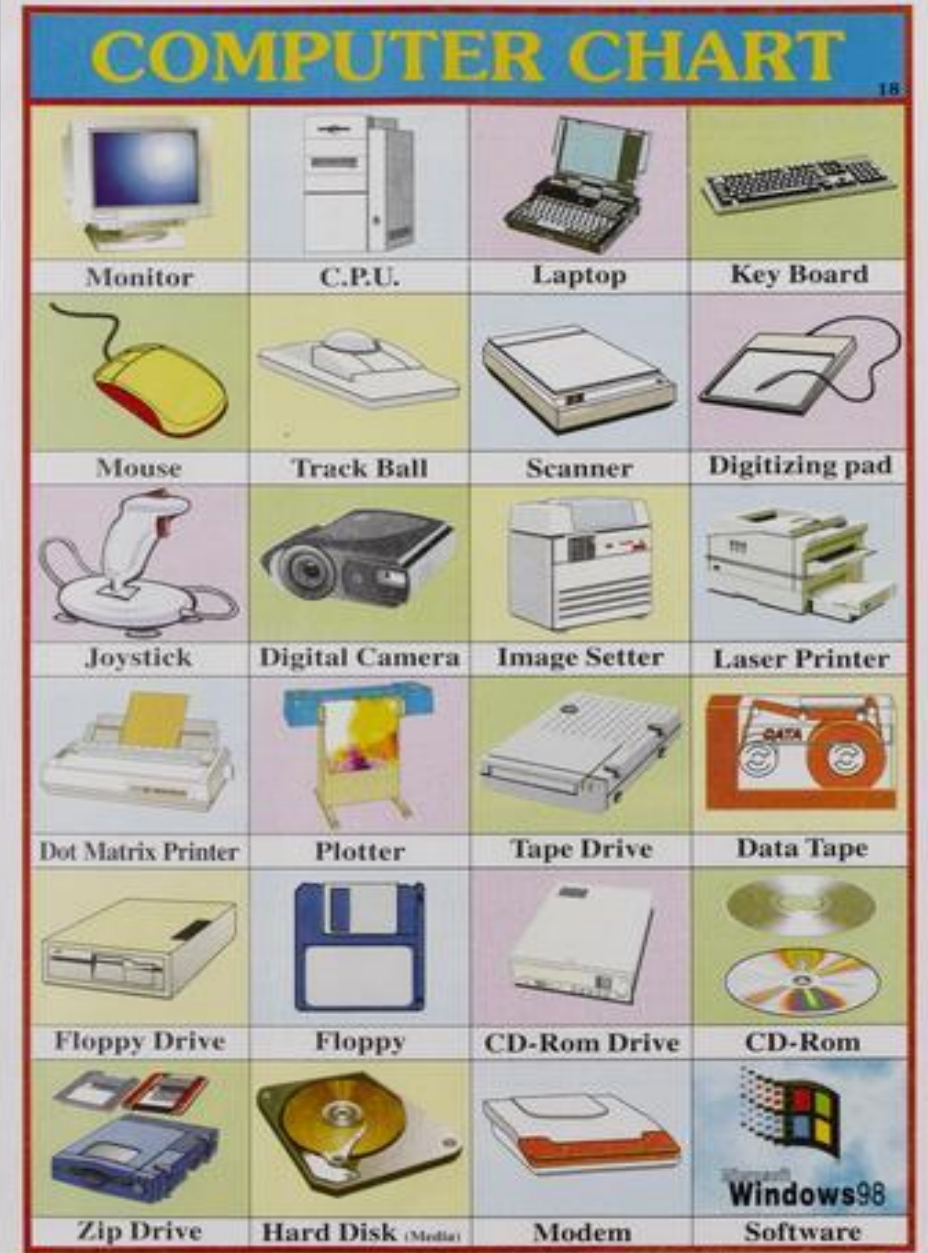
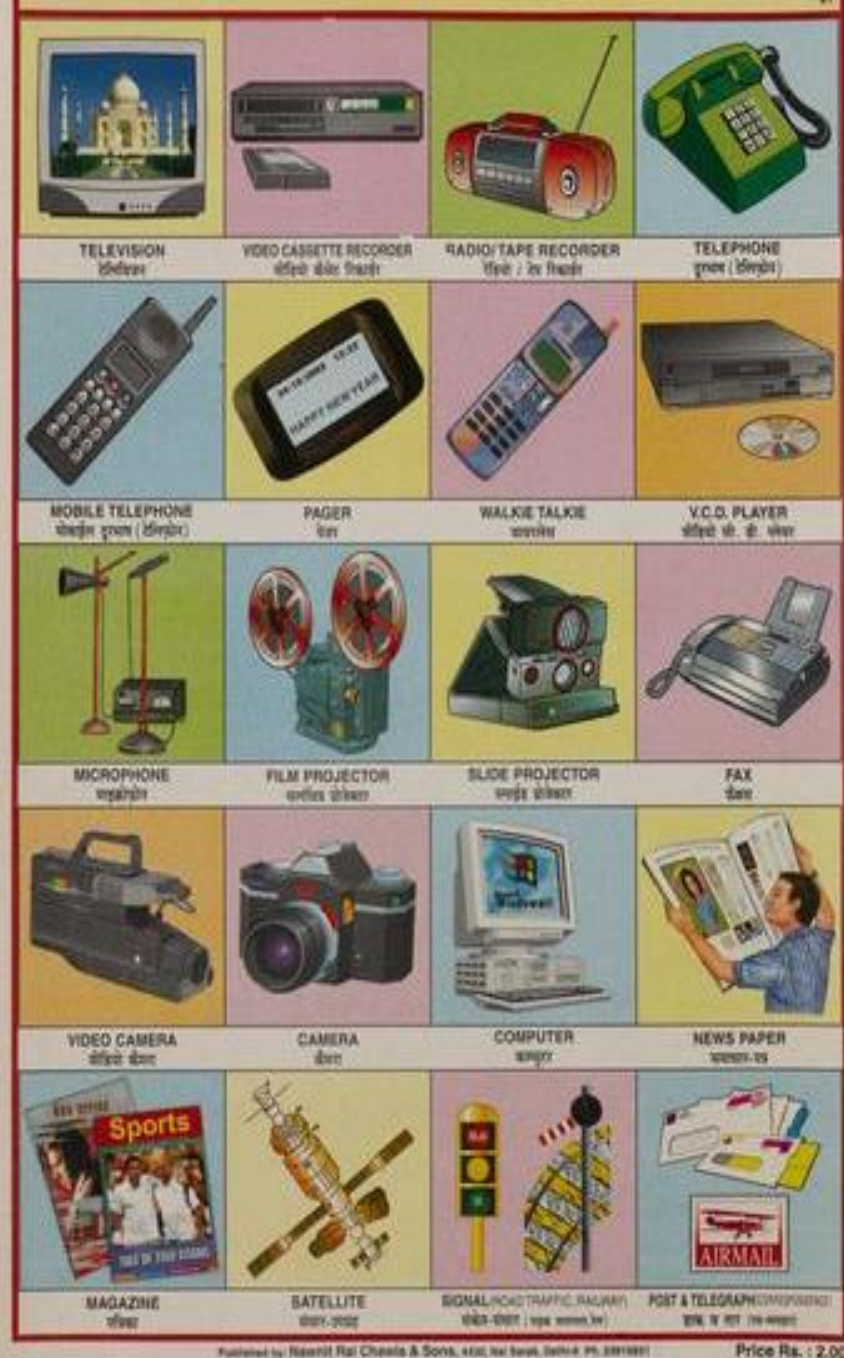
- **Video Calling Apps:**
  - Zoom, Skype, Google Meet
- **Gaming Consoles:**
  - PlayStation, Xbox, and Nintendo Switch for video games.
- **Smart TVs:**
  - Internet-connected TVs with apps like YouTube, Netflix
- **Productivity Tools**



# Activity

- Divide learners in groups and ask them to discuss the ICT tools
- Create a chart categorizing ICT tools into hardware and software.

- Divide learners in groups and ask them to discuss the ICT tools



# Hardware Tools

- **Computers:** Desktops, laptops, and tablets.
- **Smartphones and Tablets:** Mobile devices for communication and productivity.
- **Servers:** For storing and managing data in networks.
- **Printers and Scanners:** For creating and digitizing documents.
- **Projectors and Smartboards:** For presentations and interactive learning.
- **Networking Devices:** Routers, switches, and modems for internet connectivity.
- **Storage Devices:** USB drives, external hard drives, and cloud storage.
- **Wearable Technology:** Smartwatches and fitness trackers.



# Activity

Match ICT tools to their respective functions in a worksheet





ComputerHope.com







# Assessment

1. What is an ICT tool?
2. Name four hardware ICT tools.
3. Mention hardware two tools used in communication.
4. Distinguish between a printer and a projector.

# Software Tools

- **Productivity Software:** digital application.“ A software program designed to perform a specific task.
  - Microsoft Office Suite (Word, Excel, PowerPoint).
  - Google Workspace (Docs, Sheets, Slides).
- **Communication Tools:**
  - Email clients (Outlook, Gmail).
  - Video conferencing tools (Zoom, Microsoft Teams, Google Meet).
  - Instant messaging apps (WhatsApp, Slack, Telegram).

- **Learning Management Systems (LMS):**
  - Moodle, Canvas, Blackboard.
- **Graphic and Multimedia Tools:**
  - Adobe Photoshop, Canva, iMovie.
- **Web Browsers:**
  - Google Chrome, Mozilla Firefox, Safari.
- **Antivirus and Security Software:**
  - Norton, McAfee, Windows Defender.



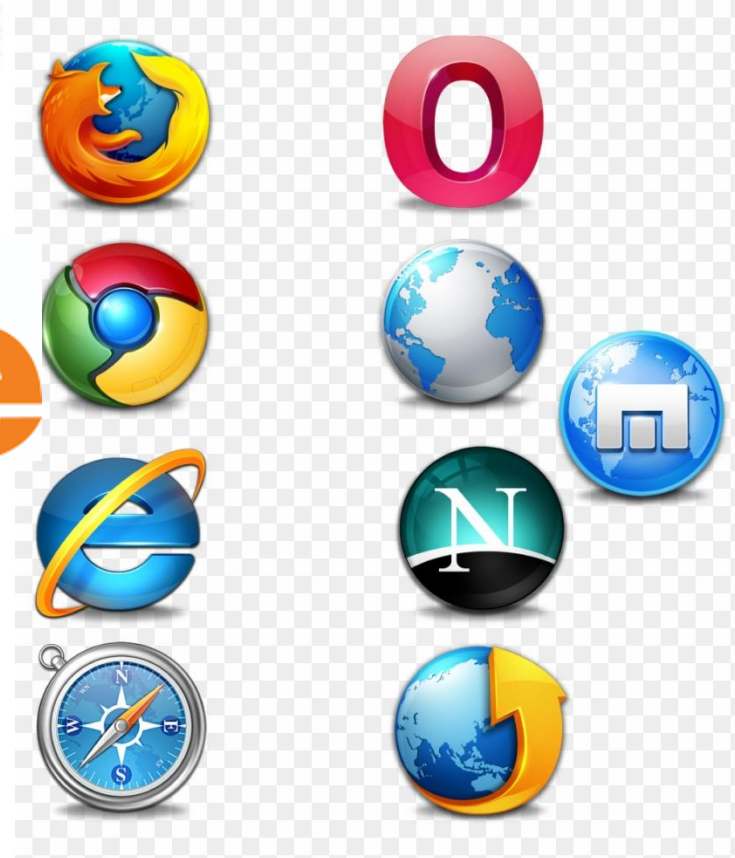
# Activity

Match ICT software tools to their respective functions in a worksheet



Google  
Workspace

moodle



# Assessment



1. Name four software ICT tools.
2. Name a software tool used for spreadsheets
3. Mention software two tools used in communication.
4. How does ICT improve productivity in business?

# Internet-Based Tools

- **Search Engines:**
  - Google, Bing, Yahoo.
- **Social Media Platforms:**
  - Facebook, Twitter, Instagram, LinkedIn.
- **Cloud Computing Services:**
  - Google Drive, Dropbox, Microsoft OneDrive.
- **E-Learning Platforms:**
  - Khan Academy, Coursera, Udemy.
- **Collaboration Tools:**
  - Trello, Asana, Google Workspace.

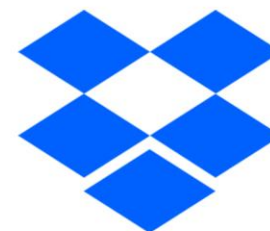


# Activity

Group presentations categorizing Internet-Based Tools ICT tools and explaining their functions







# Google Workspace



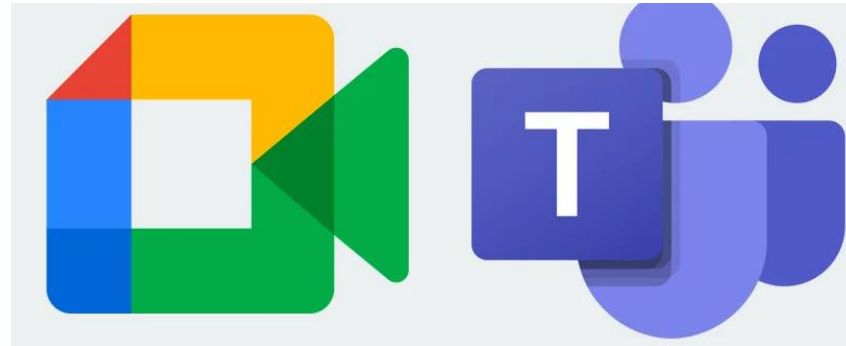
# Communication Tools

- **Email Services:**
  - Gmail, Outlook, Yahoo Mail.
- **Voice over IP (VoIP):**
  - Skype, WhatsApp Calls, Zoom.
- **Video Conferencing:**
  - Zoom, Microsoft Teams, Google Meet.
- **Instant Messaging:**

# Activity



## Practical demonstrations of using ICT tools



# Assessment



1. What is the purpose of email?
2. Mention two tools used in communication.
3. Define the term "digital application."

# Educational Tools

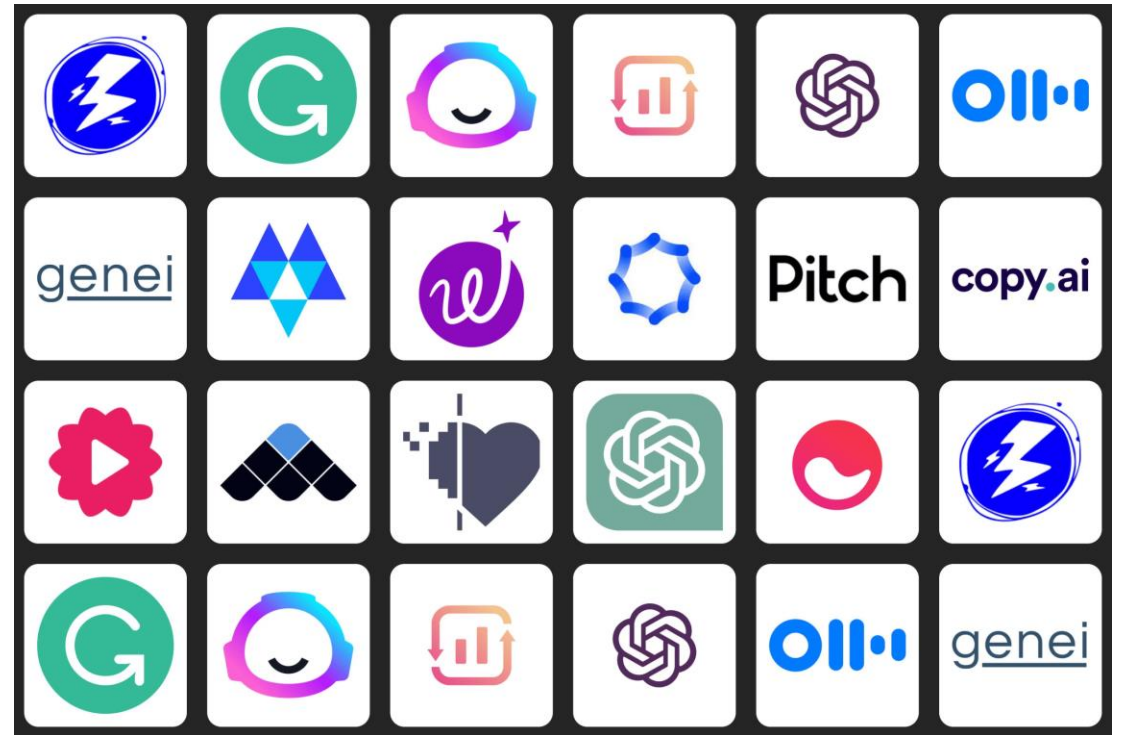
- **Interactive Whiteboards:**
  - SMART Boards, Promethean Boards.
- **Educational Apps:**
- **Virtual Labs:**
  - Simulations for science experiments.
- **Gamification Tools**
- Quizizz, Minecraft Education Edition.
- **Online Assessment Tools:**
  - Google Forms, Quizlet, Socrative.



# Emerging ICT Tools

- **Artificial Intelligence (AI) Tools:**
  - ChatGPT, IBM Watson, Google AI.
- **Blockchain Platforms:**
  - Ethereum, Hyperledger.
- **Virtual Reality (VR) and Augmented Reality (AR):**
  - Oculus Rift, Microsoft HoloLens.
- **Internet of Things (IoT) Devices:**
  - Smart home devices (e.g., Amazon Echo, Google Nest).





# Activity



Match ICT software tools to their respective functions in a worksheet