

GRADE 7 TERM 1
COMPUTER SCIENCE LESSON NOTES

FOUNDATION OF COMPUTER SCIENCE

Computer concepts

Definition

1. Computer

An electronic device that accepts data from a user, Processes the data using given instructions, stores it and presents it in a desired format

2. Data

Raw facts which include numbers, texts, images, audios or videos that input into a computer

3. Information

Data that has been processed and made meaningful to the user

Examples of computers

1. Notebooks

2. Smartphones

3. Macbook

4. PDA

5. Desktop computer

6. Laptop

7. Ipad

8. Tablet

9. Smartwatch

10. Server

- Each examples of computers have different features that enable them to serve different

Characteristics of a computer

1. Speed

A computer works at a higher speed than human beings

2. Storage

Computers have storage space that can hold large amounts of data and information

3. Multitasking

Computers can perform more than one tasks at the same time

4. Accuracy

Computers give information without errors if given the correct data and instructions

5. User dependant

Computer cannot work without instructions from the user

6. Versatility

Computers have ability to perform a variety of task(complex and simple)

7. Reliability

The electronic components in modern computer have very low failure rate. The modern computer can perform very complicated calculations without creating any problem and produces consistent (reliable) results.

8. Diligence

Computers, unlike frail human beings, do not become bored or tired or lose concentration when performing highly repetitive work. If a computer has to perform a certain calculation on

a million numbers, it will calculate the first and the last with equal diligence. This enables trust to be placed in the results generated by computers, and confidence to be replaced in their ability – neither of which can always be replaced in humans!

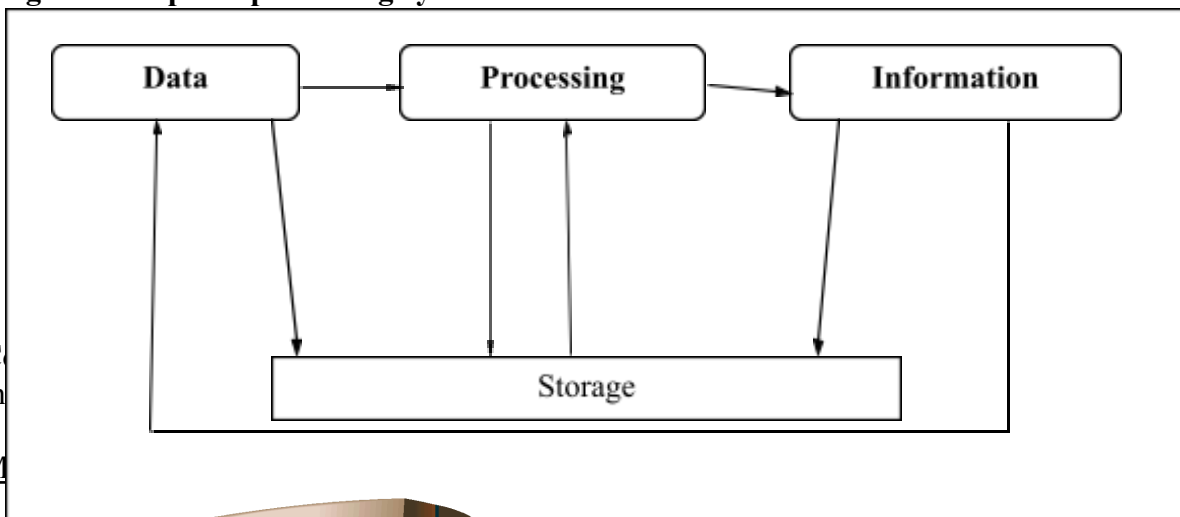
Function of a computer

1. Stores data and information
2. Process data into information using given instructions
3. Accepts data from the user
4. A computer gives out information to the user

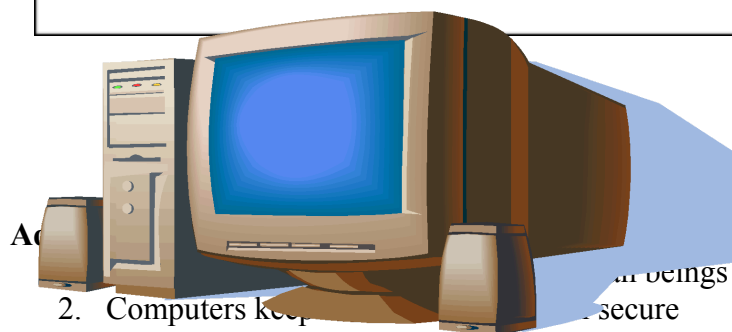
Uses of computers to perform daily activities

1. Accessing internet
2. Paying online bills
3. Home/school tutoring
4. Stock taking
- 5.
- 6.
- 7.

Stages of computer processing cycle



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M



A

2. Computers keep data secure
3. Computers can store a lot of data in a small physical space
4. Computer can do the same repeatedly without getting tires or bored
5. Computer are able to perform different types of jobs at the same time
6. A computer is reliable because it consistently does what it is supposed to do.
7. Computers have a very big storage capacity and can store data and information for a very long time
8. Information given by computers after processing has no error because they work under instructions and are always accurate

Disadvantages of using a computer

1. Use of computer has caused people to lose jobs because computers process data within a shorter time
2. Use of computers for long hours leads to health problem like headaches, eye strains
3. Computer lack intelligence. They cannot determine what is wrong or right. If given wrong data, they give out wrong information
4. People sometimes become too dependent on computers. This affects their creativity and ability to do simple tasks
5. Information and data stored in computers is at risk of theft and misuse
6. People use the internet to perform online crimes and fraud
7. Online threats such as cyber bullying are on the increase with the increased use of computers and the internet
8. Electronic waste from computers contains chemicals that destroy the environment

Application areas of computers

1. Education
 - a. For online reading
 - b. To maintain class notes and registers
 - c. For research and to do assignments
2. Business
 - a. To make payments
 - b. To keep records
 - c. To order for goods
 - d. To sell goods and services online
3. Banking
 - a. To facilitate online and internet banking
 - b. To operate ATM machines
 - c. For money transfer from one bank to another
 - d. To keep account and customer information
4. Health care
 - a. To conduct research
 - b. To store patient data
5. Manufacturing
 - a. To model and design products for example airplane
 - b. To test functionality of machines they are manufactured
 - c. To automatic process in manufacturing companies
 - d.
6. Government
 - a. To offer government services online through platforms such as Nemis and ecitizen
 - b. To store data and information
7. Communication
 - a. To send and receive messages
 - b. For making video and voice calls
8. Engineering design
 - a. To design houses, roads and buildings.
Engineers and designers use programmes like computer aided design for designing

9. Marketing
 - a. Marketing of goods and services
 - b. To design and create marketing content
10. Insurance
 - a. Computers are used to keep records about customers
 - b. Computers are used to manage money transactions
11. Home
 - a. For entertainment like watching movies
 - b. For security purpose like storing and displaying data from CCTV cameras

Evolution of computers

Evolution stages of computers

Computers have evolved from the abacus to digital devices

A. The Abacus

It is believed to have been invented 4000 years ago

It was made of a wooden frame with rods fitted across, with round beads that slide along the rod

B. Mechanical devices

Napier's bones – 1617

Pascaline or pascal's calculator – 1642

Stepped reckoner 1671-1674

Jacquard loom 1801-1804

Difference engine 1820-1822

Analytical engine 1834-1838

C. Electromechanical devices

Tabulating machine 1880-1888

Atanasoff – berry computer ABC 1937-1942

Mark 1 – 1937 1944

D. Electronic digital computers

Digital computers are now classified into five generations with each having improved from the previous one

Tasks performed by computers at different evolution stages

Type	Computer	Task performed
Abacus	Abacus	It performed calculations like addition and subtraction
Mechanical devices	Napier's bones – Pascaline or pascal's calculator – Stepped reckoner Jacquard loom Difference engine Analytical engine	They performed arithmetic calculations like addition, subtraction, division and multiplication. They automated tasks

		The analytical engine had a store processor (mill) and printing components
Electromechanical devices	Tabulating machine Atanasoff – berry computer ABC Mark 1	They solved fairly complex calculations They compiled and analysed statistical information They solved calculations based on instructions given
Electronic digital devices	Personal computer Desktop computer Laptops Smartphones	They performed complex tasks such as mathematical calculations, word processing, data storage and analysis and communications

Difference engine and analytical engine

- The difference engine and the analytical engine were designed by Charles Babbage.
- The difference engine was a simple calculator
- When he was unable to complete the difference engine, he started on the analytical engine which was advancement of the difference engine

Difference between the difference engine and the analytical engine

Difference engine	Analytical engine
Could perform only one mathematical operations	Could perform four mathematical operations
It had no input component	It used punch cards as input component
It had no storage component	Had a storage component
It had no processing component	Had an arithmetic unit called mill
It was a simple mechanical calculator	It was a general purpose computer system that could be fed with instructions to carry out operations automatically
It was faster than the analytical engine	It was slower than the difference engine

Using computer that existed at different evolution stages

Pupil's activity
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Contemporary technology and sustained development of computers

Device	Technology used
Abacus	Decimal number system where each rod represents a column and each column represents a place value Binary digit system used in computers today where a value is either 0 or 1
Napier's bones	Used rods made of ivory, wood, metal or bones to work out multiplication problems using position of a number on a rod

Pascaline or pascal's calculator	Used gears technology to feed data into the computer Had a display bar where the user could see the number entered and the answer It had no storage
Jacquard loom	Used punched cards technology to feed data into the computer Had no storage
Stepped reckoner	used stepped drum gear which mechanised addition, subtraction, division and multiplication employed the decimal number system
Difference engine	Used steam power Used a set of cogs levers and punched cards Had a storage for data Was designed to stamp its answer on set metal Used decimal number system where each number from 0-9 was represented by position on toothed wheels
Analytical engine	It had a processor called the mill and a store It could be given instructions to make the work automatic using punched cards
Tabulating machine	Used punched card technology Used electric current to count data on punched cards
ABC	Used binary digits to represent data Performed calculations using electric current Had storage for data Had processor
Mark 1	Used electric circuits Data was fed in using punched sheets or rolls
Digital devices	Use the binary number system Have larger processors Have large storage Use electrical components

Generation of computers

Computer technology has been advancing in many ways since the invention of the first electronic digital computer

Identifying generations of computers

- A. 1ST generation 1940-1956
- B. 2nd generation 1956-1963
- C. 3rd generation 1964-1971
- D. 4th generation 1971-1980
- E. 5th generation 1980 – present and beyond

Characteristics of different computer generations

- A. **Characteristics of 1ST generation computers** 1940-1956
 - Entered data using punched cards, paper tape and magnetic tape
 - Produced information in form of print outs
 - Were very expensive

- Were very large in size
- Used a lot of power
- Produced a lot of heat
- Were very slow

Examples

ENIAC

EDVAC

UNIVAC

IBM 701

IBM 750

B. Characteristics of 2ND generation computers

- Increased data processing speed
- Were very expensive to buy
- Were more reliable as compared to the first generation
- Consumed less power
- Were smaller in size compared to the first generation
- Used punched cards to enter data

Examples

IBM 1620

IBM 7094

CDC 1604

CDC 3600

UNIVAC 1108

C. Characteristics of 3RD generation computers

- Had faster processing speed than the previous generation
- Consumed less power and emitted less heat as compared to the other generation
- Became relatively cheaper and therefore available for commercial use
- Were smaller in size than the second generation
- Had larger storage for data
- Used a mouse and keyboard to enter data
- Were more accurate

Example

IB 360 SERIES

PDP

IBM 370 SERIES

D. Characteristics of 4TH generation computers

- Were very fast and more reliable
- Were cheap and more easily available
- Were much smaller in size and therefore portable
- Introduced the use of personal computers
- Were able to connect to the internet
- Had very to large storage up to several hundred megabytes
- Used a keyboard and a mouse to enter data
- Used screens and printers to give information
- Produced less heat and could be cooled using a fan

Examples

IBM 308 AND 4300 SERIES, STAR 1000, APPLE II CRAY

E. Characteristics of 5TH generation computers

- Have very large storage capacity
- Can use more than one processor at the same time
- Can perform more than one task at the same time
- Are cheaper and readily available even for personal use
- Are much faster than other generation computers
- Led to development of AI artificial intelligence
- Are easier to use




Examples


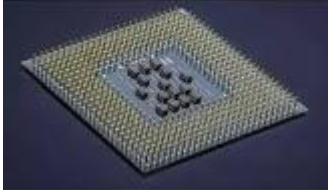
Desktop

Laptop

Tablets

Applying technologies of different computer generations in daily life

Computer generation	Computer Technology used	
First generation	Vacuum tubes 	These computers used thousands of electronic gadgets called vacuum tubes They were used for storage, calculations and control
Second generation	Transistors 	2 nd generation computers used smaller components called transistors They allowed the use of words in specifying instructions
Third generation	Integrated circuits 	The 3 rd generation used IC technology which is a single device containing many transistors
Four generation	Very large scale integration	During the 4 th generation LSI and VLSI technology was used to pack thousands or millions of transistors on a single device

		
Fifth generation	Ultra large scale integration 	The 5 th generation of computers is based on ULSI. Millions of transistors are packed into one small device This has enabled the rise in the use of AI

Classification of computers

Types of computers

There are different types of computers used different purpose

1. Mini computers
2. Mainframe computers
3. Analogue computers
4. Hybrid computers
5. Special purpose computers
6. Micro computers
7. Super computers
8. Digital computers
9. General purpose computers

Analogue Computers:

The word "Analogue" means continuously varying in quantity. The analogue computers accept input data in continuous form and output is obtained in the form of graphs. It means that these computers accept input and give output in the form of analogue signals. The output is measured on a scale. The voltage, current, sound, speed, temperature, pressure etc. values are examples of analogue data. These values continuously increase and decrease. The analogue computers are used to measure the continuous values. The thermometer is an example of analogue device because it measures continuously the length of a mercury column.

Digital Computers:

The word "Digital" means discrete. It refers to binary system, which consists of only two digits, i.e. 0 and 1. Digital data consists of binary data represented by OFF (low) and ON (high) electrical pulses. These pulses are increased and decreased in discontinuous form rather than in continuous form.

Hybrid Computers:

The hybrid computers have best features of both analogue and digital computers. These computers contain both the digital and analogue components. In hybrid computers, the users can process both the continuous (analogue) and discrete (digital) data. These are special purpose computers. These are very fast and accurate. These are used in scientific fields. In hospitals, these are used to watch patient's health condition in ICU (Intensive Care Unit). These are also used in telemetry, spaceships, missiles etc.

Supercomputer

Is the most powerful and fastest, and also very expensive

Mainframe computer

Are large-scale computers but supercomputers are larger than mainframe.

Mini computer

Are smaller in size, have lower processing speed and also have lower cost than mainframe

Microcomputers

Are known as personal computers or simply PCs

Are meant for personal use by single users eg laptop, PDA

Special purpose computer

Computers designed to carry out specific tasks eg ATM

General purpose computer

Computers that can perform most common tasks eg word processing

Criteria used to classify computers

Classification of computers		
By functionality	By size	By purpose
1. Analogue	1. Microcomputer	General purpose
2. Digital	2. Minicomputer	Special purpose
3. Hybrid	3. Mainframe	
	4. supercomputer	

Appropriate computers to use in different situations

Pupil's activity

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Use of embedded computers in daily life

An embedded computer is a computer designed to perform a specific function

Embedded computers are used in different devices for example

1. ATM machines have a computer that facilitates withdrawal of money, cash deposit and checking bank balance
2. Cars have computer system to control the realises of airbags when a sensor detects an accident
Embedded computers also sense when one applies emergency brakes and prevent the wheels of the vehicle from locking and skidding through antilock braking system
3. Microwaves have a computer that commands the heating element to turn on and off. It calculates time, display time and rotates the plate
4. Mp3 and DVD players are able to store, read data and play music and videos
5. Drones have computers that enable user to control them.
The computers in drones enable them to capture images and videos and transmit them to the users
6. Digital watches have computers to display time in numbers and set an alarm clock

Using different types of computers in performing tasks

Pupil's activity

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Computer user environment

Computer user environment is an area equipped with devices, facilities and other components that provide suitable conditions for the use of computers
Examples are cyber cafe and computer laboratories

Factors to consider when setting up a computer user environment

1. Accessibility
Computer user environment should be set up in a place where the intended user can easily reach
2. Good lighting
The room should be well lit
3. Ventilation
The environment should be well ventilated, have free circulation of air and be free from heat, dust and moisture which can damage a computer system
4. Power source
A computer user environment should have a reliable source of power to prevent loss of data and damage of computers
5. Space
The floor space should allow free movement of people using the computer user environment
6. Security
A computer user environment should be secure with strong doors and windows. It should also have system in place to prevent unauthorised access
7. Fire fighting equipment
Should be available at all times in case of a fire
8. User friendly
The computer user environment should be made user friendly by ensuring there is comfortable furniture
9. Proper cabling

Should be done from the power sources to the devices

The cable must be insulated and laid away from busy areas of the room to prevent people from getting electrocuted or tripping

Resources for setting up a computer user environment

When setting up a computer user environment, you need

1. Desks and chairs
2. Computer system
3. Extension cards and electrical cables
4. Good lighting
5. Printers
6. Scanner
7. Projector
8. UPS

Safety precautions and practise in the computer user environment

1. Do not eat or drink in a computer user environment
2. Do not touch naked wires
3. Only allow authorised people. Avoid welcoming strangers
4. Organise your desks before leaving
5. Enter and exit quietly from the computer user environment

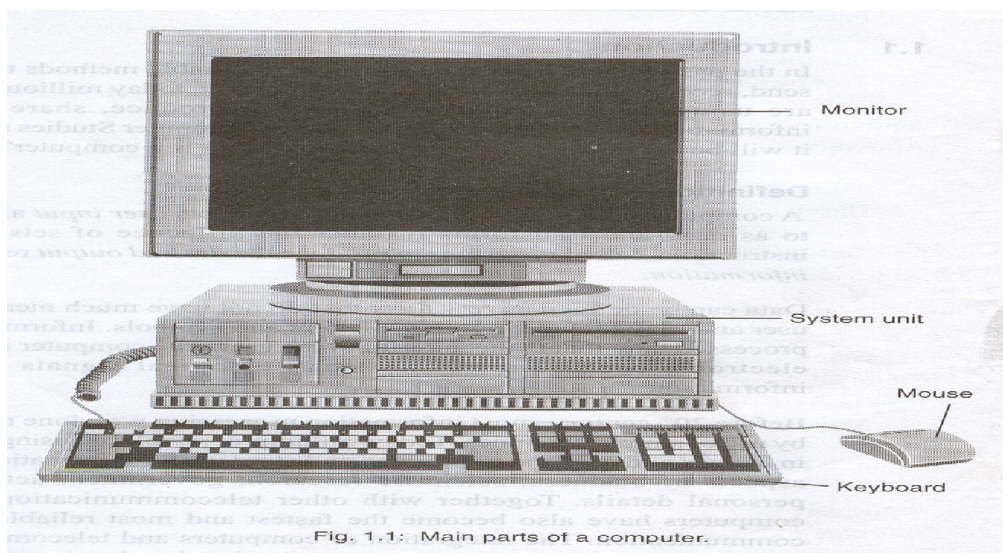
6. Do not rush or push each other
7. Avoid carrying pointed objects near computers
8. Remove shoes entry to minimise dust
9. Always follow the proper procedure for starting and shutting down the computer to avoid loss of data

Emerging trends in computer user environment

- Introduction of smartphones and small portable computers has made it easier for people to access computer services
- This means that the computer user environment is no longer confined within walls. It goes where a person has access to a computing device goes
- Mobile phone companies have made connectivity easy by availing network services to the people. This made it easy to access computer services anywhere at any time
-

Physical parts of a computer

What are the physical parts of a computer?



Functions of the physical part of a computer

1. Monitor
Used to displaying information for example pictures and text
2. Keyboard
Used for typing and giving instructions to the computer
3. The system unit
Contains the devices oof a computer that Process data and gives information such as CPU
4. Speakers and headphones
Are used for listening to music and audio files
5. Printer
Is used for printing text on paper
6. Mouse
Is used for selecting items and giving instructions to the computer by clicking
7. Flash disks

- Is used for storing and transferring information
- 8. Scanner
Is used to take images of paper documents and displaying them on a computer
- 9. Cables
Are used to connect different parts of a computer

Connecting the physical parts of the computer

Pupil's activity

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How to minimise wastage in computer usage

- We can reuse or recycle the physical parts of a computer
For example
 1. If a device is in good working condition but longer in use it can be sold for some money to someone who will reuse it
Such devices can also be donated to people who need them
 2. A computer monitor can also be used as a television screen with little modification
 3. We can transform a system unit to a lockable cabinet by removing the inside components and installing a lock.
 4. Physical parts of a computer can be used to make art for example the keys of the keyboard
 5. The physical parts of a computer can be sent to the manufacturer or sent to a recycling centre where they are taken apart, their components sorted and recycled.

Interacting with physical parts of a computer

Pupil's activity

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Hands on skills concepts

Starting a computer

1. Switch on the power source
2. Press the power button of the monitor then press the power button of the system unit to start your computer
Wait for the computer to finish the booting process
3. Click on your user account. Type your username, enter your password and press enter to sign in to the computer

Shutting down a computer

1. Close all the programs that may still be running
2. Click on the start button and select the power button
3. Click the power button. A window showing power option will appear
4. Click shut down for the computer to undergo the shut down process

Function of the keys on a computer keyboard

1. Delete (**Del**) key. It is used to erase characters to the right of the cursor, (i.e., from left to right).
2. Esc
3. Home
4. Pg up
5. Pg dn
6. End
7. Backspace key - It has a backward arrow (←) marked on it. ✓ Used to erase characters to the left of the cursor (i.e., from right to left on the same line). When pressed, it makes the cursor move one space backwards and the immediate letter or number to the left is erased.
8. Ctrl
9. Tab
10. Caps lock
11. Enter
12. Shift

A **Cursor** is a blinking underscore () or a vertical beam (|) that shows where the next character to be typed will appear.

Categories of keys of a computer keyboard

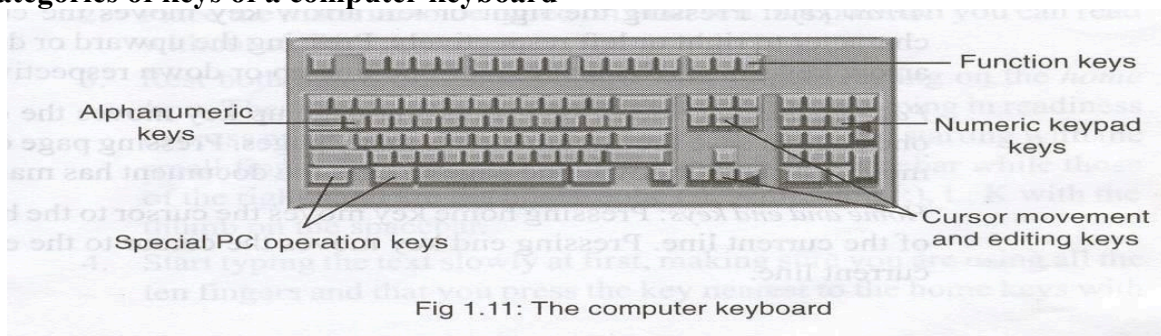


Fig 1.11: The computer keyboard

Alphanumeric keys

Keys are labeled with alphabetic letters A-Z, numbers arranged in a line 1,2,0 respectively and symbols like:?,], % etc. This group also includes the following keys: cap lock, enter tab. space bar and backspace.

Caps lock key: Pressing this key let's the user type in upper case-letters,(capitals) To switch back to lower case letters simply press the same key again.

Enter key (return key): Pressing this key forces the text cursor to move to the beginning of the next line. A cursor is a blinking underscore (-) or a vertical beam (|) that shows where, the next character to be typed will appear. The enter key is also used to instruct .the computer to execute a command that has been selected on the screen.

Tab key: This key is used to move the text cursor at set intervals on the same line e.g. 10 mm, 20 mm etc.

The space bar: This bar creates a space between words during typing.

The backspace key: This key deletes characters from right to left on the same line.

Function keys

Function keys are usually located along the top of the keyboard. They are labeled F1, F2 up to F12. They are used for tasks that occur frequently in various programs. For example pressing F1 key in J most programs starts the HELP MENU.

Navigation and editing keys - Cursor movement

Cursor movement keys are used to move the *cursor* on the screen. These keys are:

Arrow keys: Pressing the right or left arrow key moves the cursor one character to right or left respectively. Pressing the upward or downward arrow key moves the text cursor one line up or down respectively.

Page up and page down keys: Pressing page up key moves the cursor up one page in case the document has many pages. Pressing page down key moves the cursor down one page in case the document has many pages.

Home and end keys: Pressing home key moves the cursor to the beginning of the current line. Pressing end key moves the cursor to the end of the current line.

Editing keys are used to delete or insert characters in a document. These are:

Insert key: This key helps the user to insert or replace a character at the cursor position.

Delete (Del) key: This key deletes characters at the cursor position from left to right.

Special PC operation keys.

These keys are rarely used singly but in combination with other keys to give special instructions to the computer. They include SHIFT, CTRL, ALT and ESC keys.

Numeric keypad keys

The numeric keypad consists of a set of numbers 0 to 9 and the arithmetic signs like + (addition), (minus), * (multiplication) and / (division). They are located on the right hand side of the keyboard.

The keypad is meant to help the user to rapidly enter numeric data. The numbers on the numeric keypad can only be used when the, situated on the numeric keypad, is turned on.

Use of pointing devices in a computer

- Most computers use a mouse as the main pointing devices.
- Laptops use a trackpad
- Other pointing devices that can be used with a computer are
 1. Trackball
 2. Pointing stick
 3. Joystick
 4. stylus

There are 5 common pointing devices operations

Clicking: This means pressing and releasing the left mouse button once. A click often selects an object.

Double clicking: This means pressing the left button twice in quick succession. Double clicking usually opens a file or starts a program

Right clicking: Pressing the right hand side mouse button once displays a list of commands from which the user can make a selection. This list of commands is called a *shortcut menu or context sensitive menu*. It is called a context sensitive menu because the commands on it apply to the right clicked item.

Drag and drop: This is whereby the user drags an item from one location on the screen to another. The procedure to accomplish this operation is as follows:

1. Point to the item you want to drag.
2. Press the left hand side mouse button and hold it down
3. Slide the mouse until the pointer reaches the desired position on the screen.
4. Finally release the mouse button and the item will be dropped in the new location.

Scrolling – the sliding movement of images, videos or text across a display screen either vertically or horizontally

Interacting with the keyboard and pointing devices of a computer

Pupil's activity

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Computer system overview

A system – is a set of things working together to achieve a common goal or objective

A computer system – is a collection of parts that work together to receive, process, manage and present data and information

Identification of computer system components

The computer system consist of 3 components

1. hardware
These are physical components of a computer system that you can touch
Examples: keyboard, mouse, monitor, CPU
2. software
These are a set of instructions that direct a computer on what to do during processing.
They include operating system and programs like MS WORD, MS EXCEL
3. liveware of peopleware
These are the users who command or direct computers to perform given task
This term also refers to the people that develop the software and hardware components of a computer

Functions of a computer components

1. computer hardware
 - ✓ accepts data and instructions
 - ✓ process data
 - ✓ stores data
 - ✓ produces information
 - ✓ communicates with devices and users
2. computer software
 - ✓ manages computer resources
 - ✓ provides computer interface
 - ✓ stores and retrieves data and instructions
 - ✓ does mathematical calculation
3. liveware
 - ✓ designs and develops software and hardware
 - ✓ operates a computer system
 - ✓ enters data
 - ✓ controls computer environment

Using computer system components

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Linkage among components of a computer system

- The liveware uses hardware components to input data and give instructions to software
- The software in turn process the data and executes the instructions then gives the information through hardware.
- The information is then used by the liveware for decision making or fed back into the computer as data

Importance of computer systems in the society

- a. **Business**

Computer systems have enabled efficiency in record keeping, allowing long process to take a shorter time through automation.

They have also brought about online advertisement and sales using the internet

b. Communication

Computers are connected through networks allowing for faster cheaper and safer communication across the globe

c. Shopping

People today can shop online for goods and services and pay for them using online channels enabled by computer systems

d. Socialising

Computer systems have made it possible for people to socialise and conduct virtual meetings through various social media platforms

e. Employment

Computer systems have provided employment opportunities

Eg software development and design

f. Entertainment

People can access a variety of music, films and computer games on their computers

g. Education

The internet is a huge information resources that is easily accessible compared to textbooks.

Learners are also able to learn online without the need to attend classes physically

Computer hardware concepts

Categories of hardware in a computer system

Computer hardware components are classified as

1. Input devices
2. Output devices
3. CPU
4. Storage devices

Functions of computer hardware categories

A. Input devices

Enables user to enter data that needs processing and the instructions on how to process it

Examples: mouse, keyboard, touchpad, light pen, joystick, scanner, microphone

B. CPU

Process the data entered into a computer according to the instructions

C. Output devices

Present information that has been processed in different forms for example text, sound and pictures

Examples of output devices: monitor, printer, speakers, projector, plotter, headphones

D. Storage devices

Saves data, information, computer software and running operations

Examples: hard disk, memory card, flash disk

Selecting appropriate hardware for different situations

Consider

1. Reliability
2. Cost
- 3.

- 4.
- 5.

Using different elements of computer hardware

Pupil's activity

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Input devices

Enables user to enter data that needs processing and the instructions on how to process it

Input devices in a computer system

Examples: mouse, keyboard, touchpad, light pen, joystick, scanner, microphone, barcode scanner, digital camera, capacitive and infra-red touch screens, 2D and 3D scanners

Categories of input devices

Keying devices	Pointing devices	Digitiser	Scanning devices	Gaming controllers	Visual and imaging devices	Voice input devices
Keyboard	Mouse	Scanner	Barcode scanner	Joystick	Digital camera	microphone
	Touchpad	Digital camera	2D scanner	Steering wheel	Image scanner	
	Joystick	Microphone	3D scanner		Video recorder	
	Touchscreen					
	Trackball					

Selecting appropriate input devices for different situations

When selecting input devices you can consider the following factors

1. User needs

The device should meet the need of the user

2. Cost

The device should be affordable according to user's budget

3. Functionality

Devices should serve the purpose it was intended

4. User friendliness

The device should be easy to use

5. Compatibility with hardware

Devices selected should be able to connect and work together with other available devices in the computer

6. Level of expertise

Devices selected should meet the technical skills of the user.

Using input devices to perform tasks

Pupil's activity

Reusing input devices to minimise wastage

Input devices which are still functional can be used in the following ways

1. Old and functional keyboards can be sold or donated to be reused with other compatible computer system
2. Input devices which are in good condition and not in use can be donated to people who need them in the community
3. Functional computer inputs can be used to set up other computers
4. Obsolete and dysfunctional input devices can be sent to recycling facility where they will be recycled to make new products.

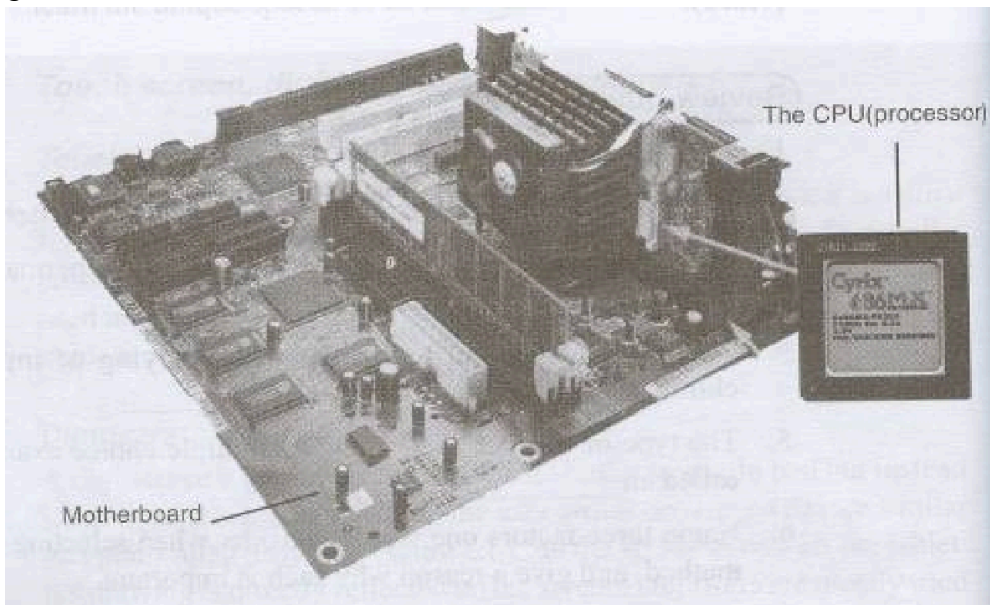
Central processing unit

The CPU is the part of a computer that process data

Locating the CPU in a computer system

Pupil's activity

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NB

Motherboard is a frame which holds and allows communication between the components of the computer system

The CPU is located on the motherboard

Functional elements of the CPU in a computer system

The CPU performs all types of data processing operations in a computer system

CPU has 3 components

1. Control unit
2. Arithmetic logic unit
3. Special memory

Arithmetic and logic unit – ALU

Performs calculations like addition and subtraction

It also performs logical operations which mainly involve comparison of data

Control unit

Coordinates movement of data between the processor and the memory

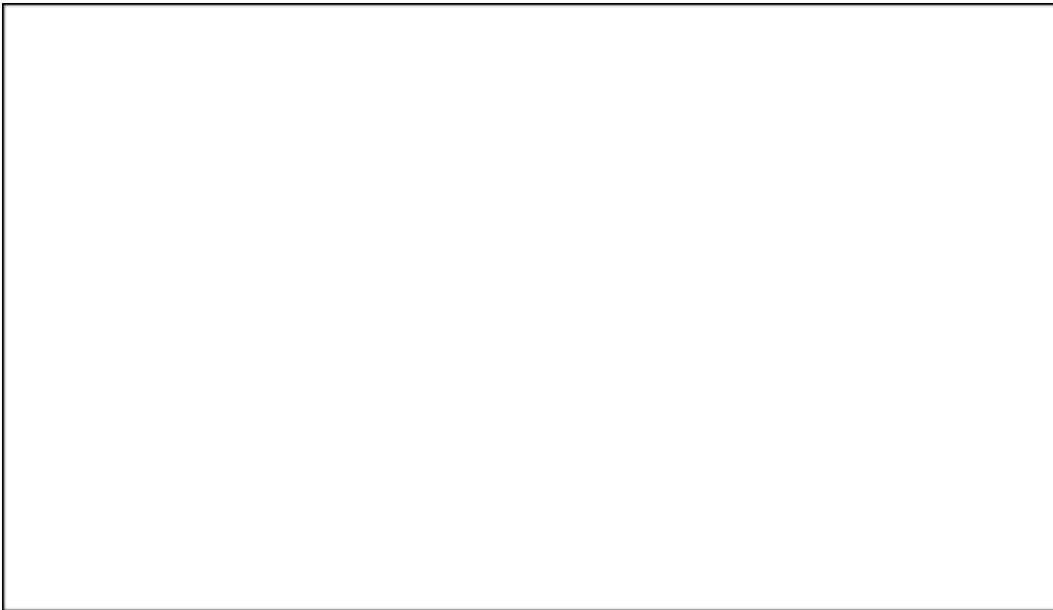
Special memory

Stores data and information required during processing.

Most of the CPU operations are performed by the ALU

The control unit moves data between the ALU and the special memory and also tell the ALU what to do.

The ALU then process data and store the result in a special memory



Types of processors in computing devices

There are 6 types of CPU

CPUs are classified according to the number of cores they have

The core of a CPU receives instructions and perform calculations, or operations to satisfy the received instructions

Type of processor	Number of cores	Examples
Single core	1	Intel 4004
Dual core	2	Intel core duo, AMD X2
Quad core	4	ATHLON II X4, INTEL CORE I3-10100
Hexa core	6	INTEL CORE I5-11400, INTEL CORE I5-11600K
Octa core	8	INTEL CORE I7-11700K, INTEL CORE I7-11700
Deca core	10	XEON SILVER 4114T

Performing tasks using computers with different processors

Pupil's activity

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- Processors receive input data, process it and generates results.

- It computes data and receives instructions in almost all actions carried out in a computer.
- Processor determines the speed with which a computing device processes information
- Computers with fast processors have high processing power and often give information faster

Output devices

Present information that has been processed in different forms for example graphics, tactile or text, sound (audio), video and pictures

Output devices of a computer system

Monitor, printer, speakers, projector, plotter, headphones, Braille embosser

Functions of output devices in a computer system

1. Monitor
Display data in text and graphics
2. Speakers
Gives information in form of sound
3. Headphones
Produce audio information
4. Printers
Produce text or picture information on a paper
5. Projectors
Gives visual information by projecting it on a flat smooth surface like a wall or white board
6. Plotters
Produces digital created graphics and drawings
Plotters use a pen to draw lines on paper
7. Actuator
A part of a device or machine that helps to create physical movement using signals from a computer
8. Braille embosser
A device that presses dots onto paper for people with visual impairment to read using their fingers

Categories of computer output devices

Output devices		
Visual output	Audio output	Physical output
Produces text or graphics	Produces sound	Produce movements
1. Monitor	1. Speakers	Printer
2. Screen	3. Headphones	Plotter
4. Projector	2. Earphones	Actuator
		Braille embosser

NB

- ❖ Hardcopy refers to data printed out on paper
It could be text, photographs, illustrations or any data that can be printed

Advantage of hard copy	Disadvantage of hard copy
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It is considered permanent data as editing and changing is not easy	It is expensive to produce as it requires paper, ink and printer
It does not need electricity, special devices or software to display	It is not easy to move from one place to another
When properly stored it is not easily lost	It requires a lot of physical storage space
It is not subjected to data stealing and cyber attacks	It can be stolen or destroyed through wear and tear or by environment factors such as fire, water

❖ Soft copy is information stored and displayed in a computer

Advantage of soft copy	Disadvantage of soft copy
It is easy to move from one place to another	It is vulnerable to cyber attacks and data theft
It is cheap to produce as it does not require paper or ink	It requires electricity, a device and software to display
Large amount of data and information can be stored without the need for a lot of physical space	It is considered temporary data which can be easily altered or manipulated
It is beneficial to the environment as it reduces the number of trees cut to make paper	

Selecting appropriate output devices

Factors that you consider when selecting output devices are

1. Output quality
2. User friendliness
3. User needs
4. Suitability to the function it is supposed to carry out
5. Compatibility with the available devices
6. The cost of purchasing and maintaining the output devices

Uses of output devices

We care and use output devices safely by

1. Keeping the devices away from water and dust
2. Avoiding exposure to foods and fluids
3. Always powering off the devices after use
4. Connecting only with compatible devices
5. Cleaning and servicing the devices regularly
6. Ensuring secure connection of the devices before use

Technological trends in development of output devices

Output devices have constantly been replaced with new devices due to improved technology from innovators

Technological trends enable fast evolution of output devices which suit user needs better, are cost effective, friendly to the environment, secure and able to multitask

- ✓ Computer displays which are used to create clear, high quality, digital displays
- ✓ Wireless speakers and headphones which are more portable, have noise cancelling capability and produce better sound quality

- ✓ Better Braille embossers that give better quality Braille while producing very little noise. They also recognise speech and give speech feedback, making them user friendly
- ✓ Printers which produce better quality hardcopies, can be secured using passwords, are compact, cost effective and easy to use

Ports and cables

Port

A physical slot of a computer through which peripheral devices are connected.

All input and output devices of a computer are connected on the ports

Cable

A chord that connects and enables transfer of data or power from one device to another

A computing system has ports and cables that enable communication between the different components of a computer

Identifying cables and ports

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Types of cables and ports used in a computer

There are 2 types of cables

1. Power cables

These allow for power transmission and distribution from the source to all computer hardware components

2. Data cables

These carry data and allows for communication between devices in a computing system

Data cable	Description
1. USB cable and port	The universal serial bus is used to connect all devices to PCs like printers, keyboards, external hard disk, mice, scanners, cameras, and many more
2. PS/2 cable and ports	This is used to connect the keyboard and mouse to the computer.
3. Serial cable and port	This is used to connect hardware components such as mouse, doem and printer. It can also connect old models of computers together to allow the transfer of large files
4. Parallel cable and port	Parallel ports and cables connect computers and peripheral devices
5. Ethernet	This cable and ports connects the computer to a network and the internet
6. VGA cable and port	The VGA port and cable connects most computer models to their monitors
7. Audio cables and ports	This cable connects computers to audio devices such as speakers, headphones and microphones

8. RCA connectors	Digital output devices produce better quality audio. This is achieved using the RCA connectors
9. Digital video interface DVI cables and ports	DVI connects video source, such as a video display controller to a display device such as a computer monitor
10. HDMI port and cable	High definition media interface connects a computer to high definition and ultra high definition devices like computer monitors, HDTVs, BLU-RAY players, gaming consoles and high definition cameras

Relate cables to their corresponding ports in a computer

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Connecting cables to their corresponding ports

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NB

- ❖ Ports enable the connection of output and input devices to a
- ❖ Ports allow computers to connect to networks

Computer setup

Setting up a computer is connecting all the hardware devices and preparing software programmes for a computer to function properly.

Problems experienced when setting up computers

1. lack of skills in setting up computers
2. difficulty matching cables to their respective ports
3. inability to identify and correct failed connections
4. lack of skills in installing operating systems
5. lack of reliable power source to power devices
6. damaged or broken cable pins due to improper fixing
eg forcing a cable to a wrong port
7. damaged hardware devices that do not work
8. computer and monitor not turning on due to faulty power cables or improper fixing of cables to the power supply

How to set up a computer

1. setting up a new computer
2. setting up a laptop

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Setting up computers

The following are tools and equipments need for computer set up

1. system unit
2. Monitor
3. Screwdriver

4. Speakers
5. Cables
6. UPS
7. Keyboard
8. Power tester
9. Surge protector
10. Mouse
11. Power extension cables

Some ways of ensuring safety when setting up computers include

1. Ensure there is a stable power supply that can power on a computer before the connection
2. Use a UPS or surge protector for power connection to the CPU and monitor
3. Make sure your hands are completely dry to avoid electric shock and damaging any computer parts with moisture
4. Handle all the parts of a computer with care. Place each component carefully on a hard flat surface. Be careful not to drop any parts
5. Ensure your computer has enough room to allow for proper ventilation. If there is no free flow of air the computer can be damaged or cause fire.
6. Be sure to connect all cables to the appropriate ports
7. If a cable does not connect easily to a port, don't forcefully push it in to avoid damaging it. Check that you are connecting it to the right port and that the pins and holes align
8. Manage cables properly when setting up a computer. Ensure nothing is pressing on them and that they are not located in a place where they can be stepped on or tripped over
9. Do not spill foods or liquids on the computer
10. Always switch on the monitor before the CPU to display any errors or messages while booting

Setting up computers for use

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Overcoming challenges experienced when setting up a computer

1. Researching and learning how to set up a computer properly
2. Researching and learning how to match cables to their respective parts checking that all connections are properly made
3. Replacing or repairing damaged parts
4. Ensuring that there is a reliable source of power
5. Observing safety precautions when setting up a computer

Practising booting computers

- ❖ To tell that a computer is properly setup, we must switch it on and see if all the components are working well. This process is called booting up a computer
- ❖ The steps of booting a computer are as follows
 1. Switch on the main power supply on the socket
 2. If the computer is connected to the UPS, switch its power button on.
 3. Switch on the monitor by pressing the power button
 4. Switch on the system unit by pressing the power button

5. Upon switching the system unit on , the computer performs a power on self test where the computer checks hat al components are connected and functioning well
6. The computer then displays the name of the operating system followed by a display of icons on the computer monitor

