



CONTENTS



1. More About Computers	5	6. Programming in QBASIC	93
Characteristics of a Computer, Components - Software and Hardware, Memory – Primary and Secondary Storage, Units of Memory, Application of computers		About QBASIC Editor, QBASIC Commands, Variables and Constants, Operators – Arithmetic, Logical and Relational Operators, Control Statements – Conditional and Unconditional, Loops	
2. More on Windows	18	Formative Assessment 3	108
Operating System, Control Panel, Adding and Removing Programs, Changing Appearance and Personalization, Changing Taskbar settings, Changing Date and Time settings, Changing mouse settings		7. Internet	109
Formative Assessment 1	34	Web Browser, Website–Hyperlink, Search Engine/ Web Browser, How to Bookmark a Web page, Web Communication, Computer Virus	
3. Advanced ms Word	35	8. Introduction to Flash	122
Formatting MS Word document (Inserting Equations, Spelling and Grammar Check, Drop Cap, Watermark), Mail Merge		Introduction to Flash, Starting Flash Software, Components of a Flash window, Creating a new Flash file, Using the toolbox, Drawing modes in Flash	
4. Making a Powerful Presentation	53	Formative Assessment 4	133
How to plan a good presentation, Creating a design template, Applying slide transition, Applying animation, Adding SmartArt, Adding Multimedia, Tips for delivering a good presentation		Summative Assessment 2	134
Formative Assessment 2	72	Glossary	136
Summative Assessment 1	73	Problem Solving Assessment	138
5. MS Excel	75	National Cyber Olympiad (Practice Questions)	139
Workbook and Worksheet, Types of Data, Entering and Editing Data in a Worksheet, Entering a Formula, Saving a Workbook		International Informatics Olympiad (Practice Questions)	140
		A Story About Mobile Phones	142
		Projects and Lab Activities	144





In this chapter

- Characteristics of a Computer Components - Software and Hardware
- Memory - Primary and Secondary Storage
- Units of Memory
- Application of computers



Rewind



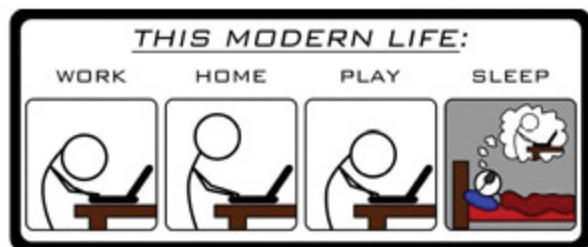
Guess who am I?

Super Computer, Bill Gates, Output, Arithmetic Logic Unit (ALU), Laptop, LCD Projector

1. I am a portable computer which is very suitable for use while travelling
2. I am a computer used in weather forecasting or molecular modeling
3. I am a digital Camera, so what kind of device am I? (input/output)
4. I am the co-founder of Microsoft Co-operation.
5. I perform all the calculations and comparisons on the computer.
6. I am used to project videos, images on a screen.

Introduction

Can you imagine a world without Computers? In today's age and time, is it even possible to do so? Computers help us in so many ways and are a part of so many aspects of our life that imagining a life without computers seems impossible.



Today when you go home, speak with your parents and grandparents and ask them what they did in a time when there were no computers. Ask them how they did their homework and projects. Or how they booked tickets for movies or got money from the bank. When you come back

to class share these stories with your classmates and think how different time was back then.

Let us now try and learn more about this amazing machine called a Computer.

As you know, a computer is an electronic machine that operates by following a set of instructions. It takes the data as input, processes it according to the given instructions and then gives out an output. This process is called IPO, you have studied about in your previous classes. So now fill in the blanks spaces to illustrate the IPO Process.



In short, every computer follows an Input- Process- Output cycle (IPO) cycle.

Computers come in different sizes. The size of a computer determines its functions and processing capacity.

- **Supercomputers, Mainframe and Servers** are bigger and faster computers used in projects like weather analysis and prediction where large quantities of data are used.
- **Personal computers** like workstation, tablet, laptop and netbook are smaller computers.



Super Computer



Mainframe



Workstation



Tablet



Laptop



PARAM is a series of supercomputers designed and assembled by the Centre for Development of Advanced Computing (C-DAC) in Pune, India. The latest machine in the series is the PARAM Yuva II. It performs at a peak of 524 teraflops. (TFLOPS)

Computer Characteristics

In your previous classes you have studied about the characteristics of the computer. In this chapter we will try and understand these characteristics in more detail. Let us discuss some salient characteristics of a computer.

Speed: A computer can follow one instruction at a time. Hence, the speed of a computer is measured by the number of instructions the microprocessor can carry out every second. This is measured in Million Instructions per Second (MIPS). Speed of supercomputers is measured in FLOPS (Floating Point Operations per Second) rather than MIPS. FLOPS refer to measure of the computers computing ability. It tells us how many mathematical operations, including decimal fractions, the microprocessor is able to perform in one second.

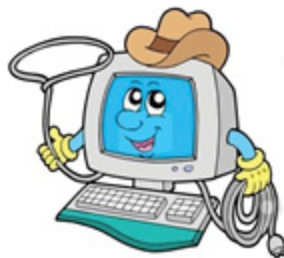


For PCs it is measured in millions of FLOPS (megaflops), for mainframe computers in billions of FLOPS (gigaflops), and for super computers in trillions of FLOPS (teraflops).



Can you list out two supercomputers that have been built in India? Also find the speed of each Supercomputer.

1. 2.



Precision or Accuracy: All computer systems, besides having amazing speeds, generate accurate results. It never commits a mistake while calculating. When the input data and instructions are correct, the result produced is accurate. The errors are actually human errors which may arise due to incorrect input by user. The accuracy with which a computer works denotes its precision.

Diligence: A computer can work continuously without getting bored for long hours with uniform speed and accuracy.



Storage and Retention: Computers can store large amounts of data in small spaces that can be retrieved very quickly.

Versatility: A computer can do different types of jobs in a variety of work areas. Hence, it is called a versatile machine.

Now that you know the characteristics of the computer let us look at some of its limitations that make it just a machine and not a human being.



Limitations of Computer

A computer is a wonderful machine but it also has certain limitations:

No Feelings

A computer is a machine that does not have any feeling or emotions and it cannot make any judgments or decisions by itself.



No Intelligence

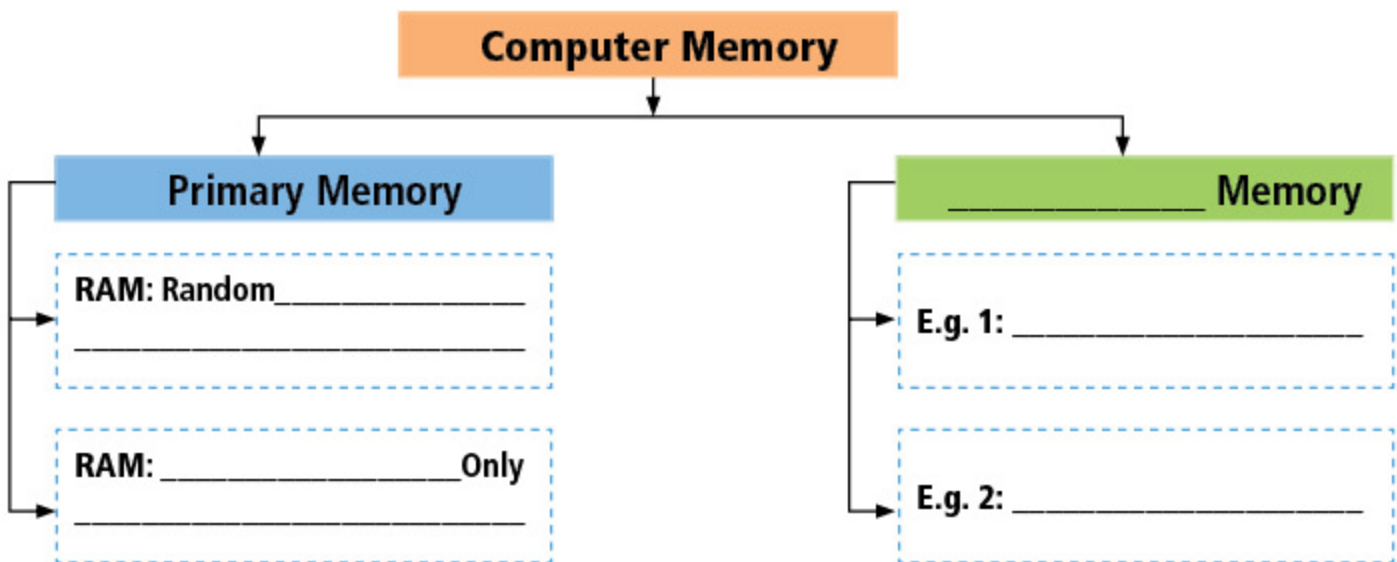


A computer does not possess intelligence of its own. It is dependent on the user for performing a task. It does only what it is told to do by a command.



We learnt about the limitation that computers don't have their own intelligence. However, there is a term called **Artificial Intelligence** or **AI** that we are getting to hear quite often with regard to computers. What is it? And how does it work?

Despite its limitations the computer is an incredible machine and one of the reasons for this is its vast memory. You have studied about the memory of the computer in your previous classes. Let us try and recall. Fill in the blank boxes.



Memory

A computer has memory to store information. It is capable of storing huge amounts of data that can be located and retrieved very quickly. The memory of a computer is classified as Primary memory and Secondary memory.

Primary Memory: This is the main memory of the computer. It comprises the RAM and the ROM.





- RAM or Random Access Memory is the temporary storage memory. The data temporarily gets lost when the computer is switched off.




There are two different types of RAM:

- **SDRAM (Static Random Access Memory)** - It retains stored information only as long as the power supply is on.
 - **DRAM (Dynamic Random Access Memory)** - It loses its stored information in a very short time even if the power supply is on. Therefore, DRAM has to be refreshed periodically.
- b. **ROM or Read Only Memory** is the computer's permanent storage memory. It is non-volatile in nature, as its contents are not lost even when the computer is switched off. Information stored in ROM can only be read. One cannot write or make changes in it.

Geek Rule Do not touch, connect or disconnect any plug or cable without your teacher's/laboratory technician's permission.


Secondary Memory (External Storage): Secondary memory also known as the **Auxiliary memory** is used to store information that is not required frequently. It has a much larger capacity than the main memory. The various devices that are used for storage are listed below. Read the description and, identify and label the image given below:

SECONDARY MEMORY DEVICE	IMAGES
a. Cartridge Tape: Cartridge Tape is a storage medium that is used to store large amounts of data. It looks similar to a video cassette and is available in capacities of 60 MB, 150 MB and 500 MB.	
b. Digital Audio Tape (DAT): It is a type of magnetic tape that is slightly larger than a credit card and can hold 2 to 24 gigabytes of data. It can support data transfer rates of about 2MBps (million bytes per second)	
c. Magneto-optical disk: A rewritable Magneto-optical disc is housed in 3.5" and 5.25" cartridge. These are employed in a variety of storage and archival applications. Capable of up to a million rewrites, the 3.5" cartridges have a capacity ranging till 9.1 GB	
d. Floppy Disk: Floppy disk is a magnetic storage device used for storing the data. The floppies of the size 3.5" have a storage capacity of 1.44 MB.	

<p>e. Hard Disk: Hard disk is the main storage medium of a computer. It is fixed inside the CPU box and contains all the software and data. Hard disk has the capacity to store huge amount of data.</p>	
<p>f. Zip Disk: A zip disk is a computer hardware device that stores data. It is somewhat like a floppy disk drive. Originally, Zip disks were launched to hold around 100 MB but could never match the storage size of a Compact Disc.</p>	
<p>g. Compact Disc (CD): A compact disc is a small, portable, round medium made of moulded polymer for electronic recording, storing and playing back audio, video, text and other information in digital form.</p>	

Cache Memory

Cache memory is a high speed memory used to temporarily store the most frequently used data and instructions. It can be accessed more quickly than RAM. It helps to further increase the speed of the computer.

Progress Bar 

Match the following:

1. RAM	Gigaflops
2. Cache	PARAM
3. Supercomputer	Primary Memory
4. Mainframe	High speed memory
5. SDRAM	Temporary Memory



A secondary storage device is also known as

- | | |
|---------------------|-------------------|
| a. Auxiliary memory | b. Main Memory |
| c. Available memory | d. Primary memory |

You have learnt that computers have a large memory capacity, but have you ever wondered how they measure computer memory?

Units of Memory

Computer memory is measured in terms of Bytes. Bit (Binary Digit) is the smallest unit of measurement of storage capacity. A byte is a collection of 8 bits. One bit can store only one character. For e.g., to store the word 'COMPUTER' 8 bits or 1 byte are required as the word consists of eight characters. The computer memory is expressed in terms of megabytes, gigabytes or terabytes.

1 byte (B)	=	8 bits
1 kilobyte (KB)	=	1024 bytes
1 megabyte (MB)	=	1024 x 1024 bytes or 1024 KB
1 gigabytes (GB)	=	1024 x 1024 x 1024 bytes or 1024 MB
1 terabyte (TB)	=	1024 x 1024 x 1024 x 1024 bytes or 1024GB



Go to your computer lab and with your teachers or lab in-charge's permission check the memory of RAM and the storage capacity of Hard Disk. Also find out the storage capacity of CD ROM.

Progress Bar

Write T for true and F for false:

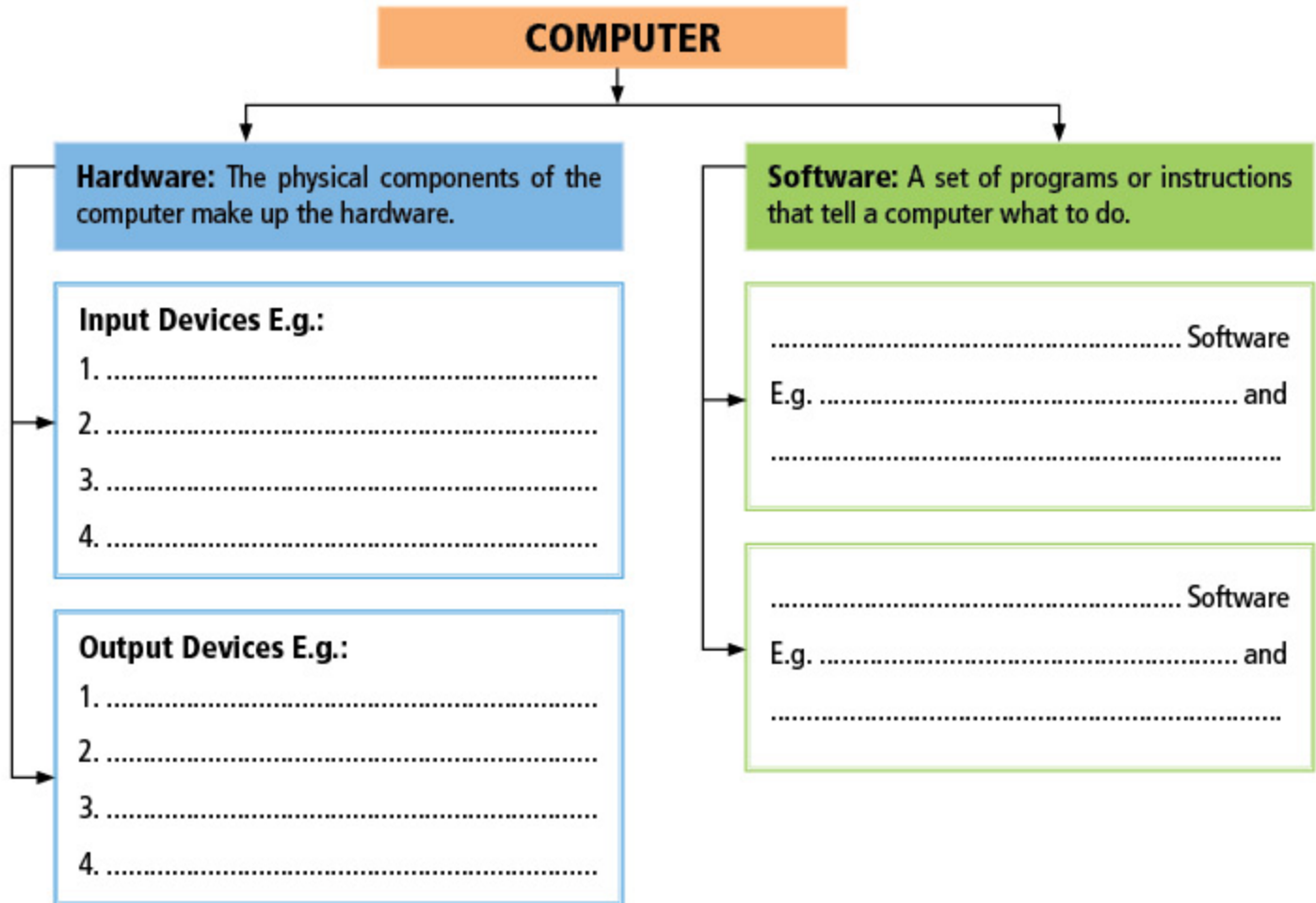
1. Computer is an intelligent machine that can perform any task on its own. T F
2. 1024 KB = 1 Gigabyte T F
3. The accuracy with which a computer works is called its precision. T F
4. The unit of measurement of speed of a computer is MIPS. T F

Having explored the characteristics, limitations and memory of the computer, let us now briefly look at its software and hardware. You have studied most of this in your previous classes and have worked on the computers in your lab sessions. So let us try and fill these blanks:



Teacher can have discussion in the class about the latest areas where the computer is being used, other than the ones given in the chapter. Take the students to the lab and help them understand the types of softwares and the uses of each of them

Hardware and Software



• System Software

System software includes programs that take control of the computer as soon as the computer boots. It controls everything within the computer. The most important system software is the Operating System (OS). The main functions of the OS are managing input and output devices, managing the memory allocation and managing the storage of files. Examples of OS are Windows, Linux, Mac, etc.



• Application Software

Application software refers to programs that interact with the operating system of the computer to perform specific tasks. Application software includes Word processors, Database programs, presentation tools and multimedia applications, for e.g., MS Office.



Differences between System Software and Application Software:

SYSTEM SOFTWARE		APPLICATION SOFTWARE
Enables the Computer to function properly	USAGE	Helps with specific functions like documentation, accounting or presentations
Compulsory - Each computer must have a system software to function	NEED	Optional- Depends on the user's needs. Computer can function without it.
One per computer	NO. OF SOFTWARE	More than one in a computer
Independent- System software can function without application software	DEPENDENCY	Dependent- Application software cannot work without system software
It executes all the time in computer.	EXECUTION TIME	It executes as and when required.

• Utility Software

Utility software is a program that performs a very specific task, usually related to the management of system resources. Operating systems contain a number of utilities for managing disk drives, printers and other devices. For e.g. Antivirus software, Backup software and disk tools.



Explore the System Softwares, Application Softwares, and Utility softwares present in your computer in your lab and make a list.

System Software

Application Software

Utility Software

.....

.....

.....



Computers that were developed in 1940s were the size of a large room.



Which of the following is NOT a type of monitor?

- a. Cathode Ray Tube
- b. Flatbed Thermal
- c. Light Emitting Diode
- d. Liquid Crystal Display

Advances in technology have widened the scope of application of computers. Let us explore some latest applications.

Application of Computers



Computers are the foundation of daily life today. The quick service that we get in banks, supermarkets and on the internet is dependent on the speed of the computers. Computers find their applications in many areas. Some of the latest applications are given below.

Touch screen

Computers nowadays have a touch screen facility. This means that a person using a computer does not have to type commands using a keyboard. All options appear on the screen as graphic images. You just need to touch an image on the screen to select the option. The computer then decides what to do next. This is commonly used in mp3 players, mobile phones and tablets.



ATM

ATM or Automated Teller Machine helps us to take out money round the clock. To do transactions through an ATM, we need an ATM card. The card has a thin magnetic strip which is interpreted by the computer fitted inside the ATM machine. Inputs are given by pressing buttons or sometimes by means of touch screens.



Visit an ATM with an adult and see how it works and understand how money is withdrawn or a cheque can be deposited.

Voice Recognition

To be able to talk to a computer by speaking out the commands has been a dream come true. Computers now have voice recognition capability. There are special programs that convert human speech into electric codes. We have to speak very slowly and clearly. The software takes the input through sound waves. The only limitation of this application is that the accent in which the voice command is given has to match the one that has been recorded in the software. This technology is very useful for people with physical disabilities.



Biometrics:



Biometrics is a term used for the technology of measuring and analyzing data based on the physical characteristics of a person. Biometrics analyzes specific characteristics of the human body, such as DNA, fingerprints, eye retinas and irises, voice patterns, facial patterns and hand measurements with the purpose of authentically identifying a person. Biometric verification is being increasingly used as a security measure among corporations, government and defense establishments.

These are just some of the latest applications of computers. Explore some more and see what other advances are being made in computer application. Have a discussion with your classmates about what you have learnt.

Megabytes

- ❖ The main characteristics of a computer are speed, accuracy, diligence, retention, storage and versatility.
- ❖ Primary memory is the main memory of a computer system which comprise RAM and ROM
- ❖ Secondary memory refers to devices which store data that is not required frequently.
- ❖ Bit (Binary Digit) is the smallest unit of measurement of storage capacity.
- ❖ Software is a program that instructs a computer what to do.
- ❖ System software includes programs that take control of the computer as soon as the computer boots
- ❖ Application software is designed to help the user perform specific tasks like word processing, spreadsheet, etc.
- ❖ Utility software is a program that usually is related to managing system resources.

- ❖ Some recent applications of computers are touch screens, ATM and voice recognition systems
- ❖ Biometrics is a term used for the technology of measuring and analyzing data based on the physical characteristics of a person

Vocabulary: Accuracy, Retention, Precision, Versatility, Magneto-Optical Drive, Cache memory, Automated Teller Machine(ATM), Diligence, FLOPS, MIPS, Biometrics.

Exercise

I. Fill in the blanks:

1. and are primary memory.
2. Speed of a computer is measured in
3. The of an ATM card is interpreted by the computer inside the ATM machine.
4. Voice recognition software takes input in the form of
5. The accuracy with which a computer works denotes it's
6. 1 gigabyte = megabytes.
7. A byte is a collection of bits.
8. Linux is a type of software.
9. FLOPS stands for
10. The technology of measuring and analyzing data based on the physical characteristics of a person is

II. Give the full forms of the following:

1. MIPS -
2. RAM -
3. ATM -
4. LED -
5. USB -

III. Answer the following:

1. What are the five main characteristics of a computer?

.....
.....
2. What is the difference between RAM and ROM?

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.....
.....
.....

3. What are the different types of software? Explain.

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.....
.....
.....

4. Name some application areas of a computer. Explain in brief one of the application area of a computer.

.....
.....
.....
.....

5. Write a short note on

a. Voice Recognition:

a. Biometrics:



Project Work

1. Make a chart on:

- Things that can be done only by humans.
- Things that can be done only by a computer.
- Things that can be done by both computer and human beings.

2. Find out about some recent development in the field of computers. Also find out about the different speeds at which different computers work.