

LEARNER GUIDE



Concepts of ICT

Unit Standard 117925

NQF level 2 Credits 3

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PERSONAL INFORMATION

<i>NAME</i>	
<i>CONTACT ADDRESS</i>	
<i>Code</i>	
<i>Telephone (H)</i>	
<i>Telephone (W)</i>	
<i>Cellular</i>	
<i>Learner Number</i>	
<i>Identity Number</i>	

<i>EMPLOYER</i>	
<i>EMPLOYER CONTACT ADDRESS</i>	
<i>Code</i>	
<i>Supervisor Name</i>	
<i>Supervisor Contact Address</i>	
<i>Code</i>	
<i>Telephone (H)</i>	
<i>Telephone (W)</i>	
<i>Cellular</i>	

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INTRODUCTION

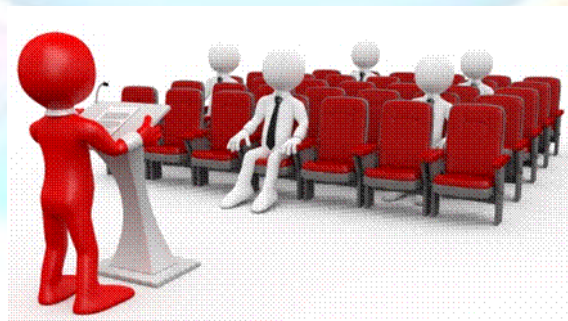
Welcome to the learning programme

Follow along in the guide as the training practitioner takes you through the material. Make notes and sketches that will help you to understand and remember what you have learnt. Take notes and share information with your colleagues. Important and relevant information and skills are transferred by sharing!



This learning programme is divided into sections. Each section is preceded by a description of the required outcomes and assessment criteria as contained in the unit standards specified by the South African Qualifications Authority. These descriptions will define what you have to know and be able to do in order to be awarded the credits attached to this learning programme. These credits are regarded as building blocks towards achieving a National Qualification upon successful assessment and can never be taken away from you!

Programme methodology



The programme methodology includes facilitator presentations, readings, individual activities, group discussions and skill application exercises.

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Know what you want to get out of the programme from the beginning and start applying your new skills immediately. Participate as much as possible so that the learning will be interactive and stimulating.

The following principles were applied in designing the course:

- Because the course is designed to maximise interactive learning, you are encouraged and required to participate fully during the group exercises
- As a learner you will be presented with numerous problems and will be required to fully apply your mind to finding solutions to problems before being presented with the course presenter's solutions to the problems
- Through participation and interaction the learners can learn as much from each other as they do from the course presenter
- Although learners attending the course may have varied degrees of experience in the subject matter, the course is designed to ensure that all delegates complete the course with the same level of understanding
- Because reflection forms an important component of adult learning, some learning resources will be followed by a self-assessment which is designed so that the learner will reflect on the material just completed.

This approach to course construction will ensure that learners first apply their minds to finding solutions to problems before the answers are provided, which will then maximise the learning process which is further strengthened by reflecting on the material covered by means of the self-assessments.

Different role players in delivery process

- Learner
- Facilitator
- Assessor
- Moderator

What Learning Material you should have

This learning material has also been designed to provide the learner with a comprehensive reference guide.

It is important that you take responsibility for your own learning process; this includes taking care of your learner material. You should at all times have the following material with you:

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Learner Guide



This learner guide is your valuable possession:

This is your textbook and reference material, which provides you with all the information you will require to meet the exit level outcomes.

During contact sessions, your facilitator will use this guide and will facilitate the learning process. During contact sessions a variety of activities will assist you to gain knowledge and skills.

Follow along in the guide as the training practitioner takes you through the material. Make notes and sketches that will help you to understand and remember what you have learnt. Take and share information with your colleagues. Important and relevant information and skills are transferred by sharing!

This learning programme is divided into sections. Each section is preceded by a description of the required outcomes and assessment criteria as contained in the unit standards specified by the South African Qualifications Authority. These descriptions will define what you have to know and be able to do in order to be awarded the credits attached to this learning programme. These credits are regarded as building blocks towards achieving a National Qualification upon successful assessment and can never be taken away from you!

Formative Assessment



Workbook

The Formative Assessment Workbook supports the Learner Guide and assists you in applying what you have learnt.

The formative assessment workbook contains classroom activities that you have to complete in the classroom, during contact sessions either in groups or individually.

You are required to complete all activities in the Formative Assessment Workbook.

The facilitator will assist, lead and coach you through the process.

These activities ensure that you understand the content of the material and that you get an opportunity to test your understanding.

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Different types of activities you can expect

To accommodate your learning preferences, a variety of different types of activities are included in the formative and summative assessments. They will assist you to achieve the outcomes (correct results) and should guide you through the learning process, making learning a positive and pleasant experience.



The table below provides you with more information related to the types of activities.

Types of Activities	Description	Purpose
Knowledge Activities 	You are required to complete these activities on your own.	These activities normally test your understanding and ability to apply the information.
Skills Application Activities 	You need to complete these activities in the workplace	These activities require you to apply the knowledge and skills gained in the workplace
Natural Occurring Evidence 	You need to collect information and samples of documents from the workplace.	These activities ensure you get the opportunity to learn from experts in the industry. Collecting examples demonstrates how to implement knowledge and skills in a practical way

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Learner Administration



Attendance Register

You are required to sign the Attendance Register every day you attend training sessions facilitated by a facilitator.

Programme Evaluation Form

On completion you will be supplied with a "Learning programme Evaluation Form". You are required to evaluate your experience in attending the programme.

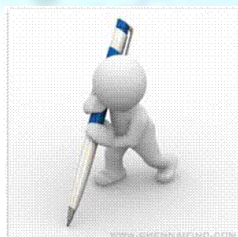
Please complete the form at the end of the programme, as this will assist us in improving our service and programme material. Your assistance is highly appreciated.

Assessments

The only way to establish whether a learner is competent and has accomplished the specific outcomes is through the assessment process. Assessment involves collecting and interpreting evidence about the learners' ability to perform a task.

To qualify and receive credits towards your qualification, a registered Assessor will conduct an evaluation and assessment of your portfolio of evidence and competency.

This programme has been aligned to registered unit standards. You will be assessed against the outcomes as stipulated in the unit standard by completing assessments and by compiling a portfolio of evidence that provides proof of your ability to apply the learning to your work situation.



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How will Assessments commence?

Formative Assessments

The assessment process is easy to follow. You will be guided by the Facilitator. Your responsibility is to complete all the activities in the Formative Assessment Workbook and submit it to your facilitator.

Summative Assessments

You will be required to complete a series of summative assessments. The Summative Assessment Guide will assist you in identifying the evidence required for final assessment purposes. You will be required to complete these activities on your own time, using real life projects in your workplace or business environment in preparing evidence for your Portfolio of Evidence. Your Facilitator will provide more details in this regard.

To qualify and receive credits towards your qualification, a registered Assessor will conduct an evaluation and assessment of your portfolio of evidence and competency.

Learner Support

The responsibility of learning rests with you, so be proactive and ask questions and seek assistance and help from your facilitator, if required.



Please remember that this Skills Programme is based on outcomes based education principles which implies the following:

- You are responsible for your own learning – make sure you manage your study, research and workplace time effectively.
- Learning activities are learner driven – make sure you use the Learner Guide and Formative Assessment Workbook in the manner intended, and are familiar with the workplace requirements.

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- The Facilitator is there to reasonably assist you during contact, practical and workplace time for this programme – make sure that you have his/her contact details.
- You are responsible for the safekeeping of your completed Formative Assessment Workbook and Workplace Guide
- If you need assistance please contact your facilitator who will gladly assist you.
- If you have any special needs please inform the facilitator



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Learner Expectations

Please prepare the following information. You will then be asked to introduce yourself to the instructor as well as your fellow learners



Your name:
The organisation you represent:
Your position in organisation:
What do you hope to achieve by attending this course / what are your course expectations?

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CONCEPTS OF ICT

UNIT STANDARD 117925

Unit Standard Title

Describe the concepts of Information and Communication Technology (ICT) and the use of its components in a healthy and safe manner

NQF Level

2

Credits

3

Purpose Of The Unit Standard

This unit standard is intended for people who need a fundamental understanding of the concepts of Information and Communication Technology (ICT) either as a user of computers or as basic knowledge for a career in the ICT industry.

The performance of all elements is to a standard that allows for further learning in this area.

Learning assumed to be in place

The credit value of this unit standard is calculated assuming a person has the prior knowledge and skills to: Read, write, communicate and comprehend at least at GET level.

Unit Standard Range

Any Graphical User Interface (GUI) operating system.

Specific Outcomes and Assessment Criteria

Specific Outcome 1: Describe the components of Information and Communication Technologies.

Assessment Criteria

1. Types of computers are described in terms of their size, application, and relation to other types of computers.
2. Types - at least five of: mainframes, minicomputers, personal computers, network computers(thin clients), laptop computers, multimedia computers, personal digital assistants (PDA).
3. The components of a personal computer and the role that the component plays in the system as a whole is described: Input, output, storage, peripherals, ROM, Ports (Serial, Parallel, USB).

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- The factors that impact on a computer`s performance are identified and the impact is described:: CPU, RAM, Hard disk, Cache, number of programs running
- Describe the hardware components of a personal computer

Specific Outcome 2: Describe the hardware components of a personal computer

Assessment Criteria

- The Central Processing Unit (CPU) is described in terms of its purpose and functions
- The Memory of a personal computer is defined in terms of memory size, the types of memory and their purpose: At least two of: Memory types: RAM, ROM, ROM-BIOS, Video memory
- Input devices are identified and described in terms of their purpose and functions: At least six of: Mouse, keyboard, trackball, microphone, touchpad, light pen, scanner, joystick, digital camera
- Output devices are identified and described in terms of the variety, their purpose and functions: at least four of: Monitors (Visual Display Units (VDU)), printers, plotters, speakers, speech synthesisers, microfilm (microfiche).
- Input/output devices are identified and described in terms of their purpose and function: Touchscreen, modem
- Storage devices are identified and described in terms of their purpose, capacity and functioning: At least three of: Floppy/stiffy disks, hard disks, magnetic tape streamers, CD-ROM, ZIP drives and cartridges

Specific Outcome 3: Describe software for personal computers

Assessment Criteria

- The types of software are described in terms of purpose: Operating system software, applications software
- operating system software is defined in terms of its function: Including but not limited to: Interface to hardware, interface between application software, interface to printing
- Applications software is defined and examples of applications software and the specific application for each is described: At least 3 of: word processing, spreadsheets, database, presentation, desktop publishing, multimedia applications, internet applications

Specific Outcome 4: Describe information networks in relation to ICT

Assessment Criteria

- The term "data communication" is defined and the different forms of data communication are identified

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- The advantages of networking computers are explained
- The terms LAN and WAN are explained in terms of their scope and usage

Specific Outcome 5: Describe ergonomic principles for computer workstations

Assessment Criteria

- The purpose of ergonomic principles is explained
- The impact of environment conditions relating to ergonomics of computer workstations is explained: At least two of the following: environmental conditions: lighting, ventilation, VDU positioning, VDU glare, seating, position and use of input devices (e.g. keyboard, mouse), breaks away from the computer.

Specific Outcome 6: Explain health and safety when working with computers

Assessment Criteria

- Demonstrate knowledge of the legislation related to health and safety in the ICT environment
- Common injuries related to incorrect ergonomics when working with computers are explained: At least two of the following: back pain, neck pain, repetitive strain injury (RSI), eye strain
- Common precautions to ensure a safe working environment with computer are explained: At least two of the following: trailing power leads and/or cables, insecure power leads, worn or frayed power leads, overloaded power points
- Common practices to minimise the effect of working practices on the environment are explained: At least two of the following: recycling paper, recycling ink/toner cartridges, redundant peripheral devices, low power options on devices, use of "standby" or "sleep" modes for devices, digital formats for communication and storage of documents

Specific Outcome 7: Use a computer workstation taking ergonomic principles and health and safety issues into account

Assessment Criteria

- The computer workstation is set up taking ergonomic principles into account: At least two of the following: lighting, VDU position, seating, position and use of input devices (e.g. keyboard, mouse).
- The computer workstation is set up taking health and safety issues into account: Power leads, cables, power points

Critical Cross-field Outcomes (CCFO)

- Identify and solve problems in which responses display that decisions using critical and creative thinking have been made by understanding the impact of using a computer in an unsafe manner.

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- Organise and manage oneself and one`s activities responsibly and effectively by ensuring that the correct ergonomic structures are in place before using a computer
- Use science and technology effectively and critically, showing responsibility towards the environment and health of others by using a computer in a safe and secure manner



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INTRODUCTION TO PERSONAL COMPUTERS

Outcome

Describe the components of Information and Communication Technologies

Assessment criteria

- Types of computers are described in terms of their size, application, and relation to other types of computers. Mainframes, minicomputers, personal computers, network computers (thin clients), laptop computers, multimedia computers, personal digital assistants (PDA).
- The components of a personal computer and the role that the component plays in the system as a whole is described. Input, output, storage, peripherals, ROM, Ports (Serial, Parallel, USB).
- The factors that impact on a computer's performance are identified and the impact is described. CPU, RAM, Hard disk, Cache, number of programs running

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Introduction to IT

All businesses and most people need information on a daily basis. A business has to know:

- Which products are available to sell to customers
- What the prices of the products are
- Where the customers are
- How and where the goods have to be delivered
- Whether the customer has paid the account
- Where to buy raw materials in order to manufacture more products to sell

This is just some of the information that a business needs every day.

People like us also need information:

- What time the bus will arrive to take us to work
- How much we have to pay for transport
- The physical address and telephone numbers of our place of work, friends and family
- How much salary we will be paid at the end of the month
- How much we have to pay for electricity and water, food, clothes, etc

These are only a couple of things we need to know.

We all know that we live in the information age. In fact, we have access to so much information that we at times suffer from information overload. If a big business had to process all the information it needs, it would take many people and many hours and by the time the information reaches the manager, it will be at least a week old, which means that it will be outdated.

This is where IT is invaluable. An information technology (IT) system processes, stores, and/or transfers information. This information includes words and numbers, for example financial statements, payslips, etc. The information can also include sound and / or video such as a sales presentation or a catalogue of products.

The IT system will use

- Computers
- A telecommunications network
- Other programmable devices to process and distribute information.

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Different Types Of Computers

A computer will manipulate according to your instructions and they come in a variety of different shapes and sizes.

The computers we see and use most often are called personal computers. Most of the computers that are advertised are personal computers. There are other types of computers as well.

Mainframe

A mainframe is a large, powerful computer that can serve a large number of users at the same time. Banks use mainframe computers where all the information about their clients is stored. SARS also use a mainframe computer to store the information for all the tax payers.

It follows then that when you work in a bank or for another organisation, you do not sit in front of the mainframe to work. A user will connect to a mainframe through another smaller computer, usually a dumb terminal. This computer will consist of a keyboard, mouse and a screen to enter and display information. The dumb terminal does not process or store any data – it is simply used to gain access to the data. All the processing and storing is done by the mainframe.

When you think of any bank and the number of users that have to access the information at the same time, you will realise that a mainframe needs a lot of processing power and storage capacity – they need a lot of memory and they have to process information quickly. They are therefore very large and very expensive.

Minicomputer

This is a smaller, less powerful version of a mainframe. It costs less than a mainframe but cannot serve as many users at the same time.

Users connect to the mainframe through another smaller computer or a dumb terminal.

Medium-sized companies often use minicomputers as they provide a centralised store of information. An office server is an example of a minicomputer.

Microcomputer

A personal computer or microcomputer is a stand-alone computer system designed for use on a desktop at home or in the office. This is the most common type of computer found in homes and offices. With the development of the microchip it was possible to design a microcomputer to give more computing power to users of the IT system. The development of software also makes it easier for people to use computers without having to know complex programming languages and commands.

As only one person usually accesses a microcomputer at a time, the computer needs less processing power and storage capacity than a mainframe or minicomputer. This then means that the microcomputer also costs less.

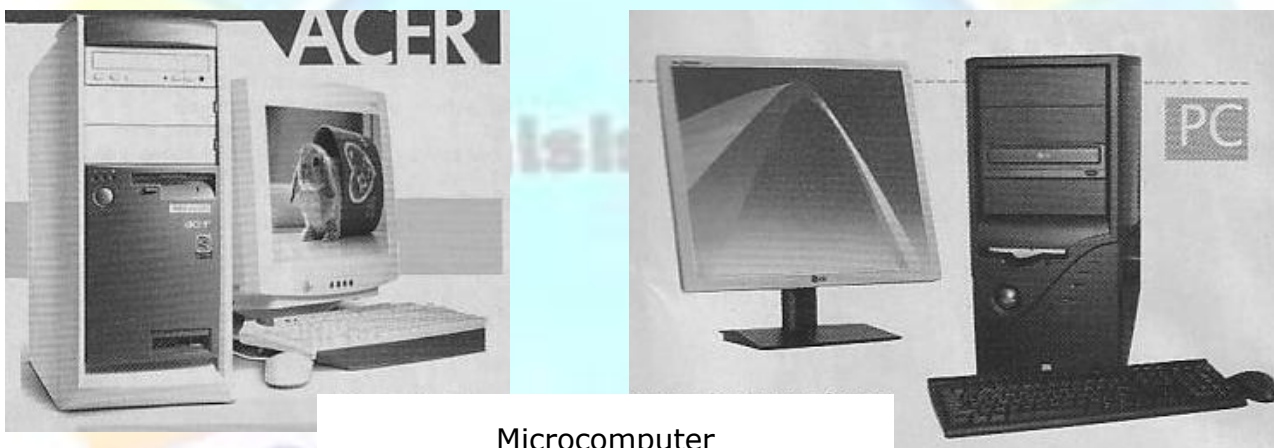
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- There is also more than one kind of microcomputer:
- Desktop microcomputers (usually IBM compatible) are usually called PC's
- Apple Macintosh and Apple iMac computers are also popular desktop computers, used especially by people in the graphic design industry.
- Custom-built workstations are used by computer programmers and scientific researchers . These workstations are also used by the computer animation industry to produce animated feature films such as Lion King and Shrek.

All PC's have a similar basic design and are produced by a large number of manufacturers with different specifications and components. PC's can vary a lot in terms of the sort of tasks for which they are suitable and the performance they are capable of.

When the business has a mainframe or a minicomputer a PC is often used as an intelligent terminal to connect to the mainframe. Some information is processed and stored on the PC and then uploaded to the mainframe or minicomputer later.



Microcomputer

Network computer

This is a low cost microcomputer. It is designed to connect to and be managed by a central computer such as a mainframe.

Each time the network computer is switched on, it retrieves the latest version of the software it needs from the central computer. A network computer would therefore not have a CD-ROM drive or a floppy drive, since it does not need these components to install and upgrade software.

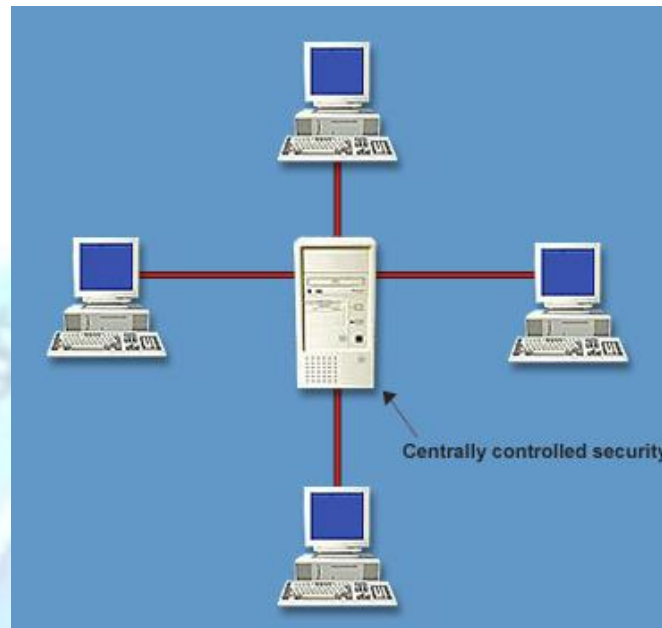
Network computers typically have less processing power and storage capacity than microcomputers, therefore they cost less.

A disadvantage of a network computer is that it has no use if it is not connected to a central computer.

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Call centres and Help desks often use network computers, since users do not need the processing and storage power of PC's but do need access to centralised software and information.



Laptop computers

A laptop computer is a portable computer that can fit into a briefcase. Their processing power and storage capacity is typically the same as a PC, but the technology needed to produce a portable computer is expensive, so a laptop will cost more than a PC with the same features.

A big advantage of a laptop computer to a businessman is that it can be used almost anywhere. Their screens and keyboards are built in and they have a battery which means that the laptop can be used for several hours without needing power.

Disadvantages of laptop computers are:

- The price
- They are less comfortable to use than a PC or desktop computer as the keyboard is built in
- They are more likely to be stolen than desktop computers



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PDA

A palmtop or Personal Data Assistant (PDA) is a hand held device that is used mostly to store contact information and for e-mail and Internet access. They do not have the same features and components as microcomputers.



Formative assessment

In groups, discuss the type of computer that will be most suitable for the following:

You have to make a sales presentation at a client's office, using business graphics software

Create a company newsletter

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Store a sales database for 6 regional offices worldwide
Give 1500 staff access to the sales database plus a word processing application for creating letters, both stored on a server computer
Update client contact details after a sales meeting at the client's offices

Components

Data And Information

To explain the difference between data and information, suppose that you present a cheque for R50.00 to the cashier at your bank. The transaction gives the bank one of the thousands of pieces of data that it processes daily. In addition, your current account has a debit balance of R75,00, but you have an overdraft facility of R100.00. Before the presentation of the R50.00 cheque, the branch manager is unlikely to be aware of the state of your account. You have been operating your accounts within limits set by the bank. When the account is updated with the R50.00 withdrawal, the R100.00 overdraft limit is exceeded and this will immediately be reported to the branch manager. Action may or may not be taken. If it is near the end of the month and your salary is about to be paid in, nothing could happen. If, however, it is the start of the month, the manager may write to you pointing out that the account is overdrawn beyond the agreed limit. Should you have been reminded of this already you may be asked to come into the bank to see the manager. The sooner the manager is alerted to the problem, the sooner action can be taken to control the situation.

The data regarding the transaction is being processed to provide information allowing the bank's business to be managed with greater effectiveness to ensure that it operates profitably and without the need to write off your debt as a bad one.

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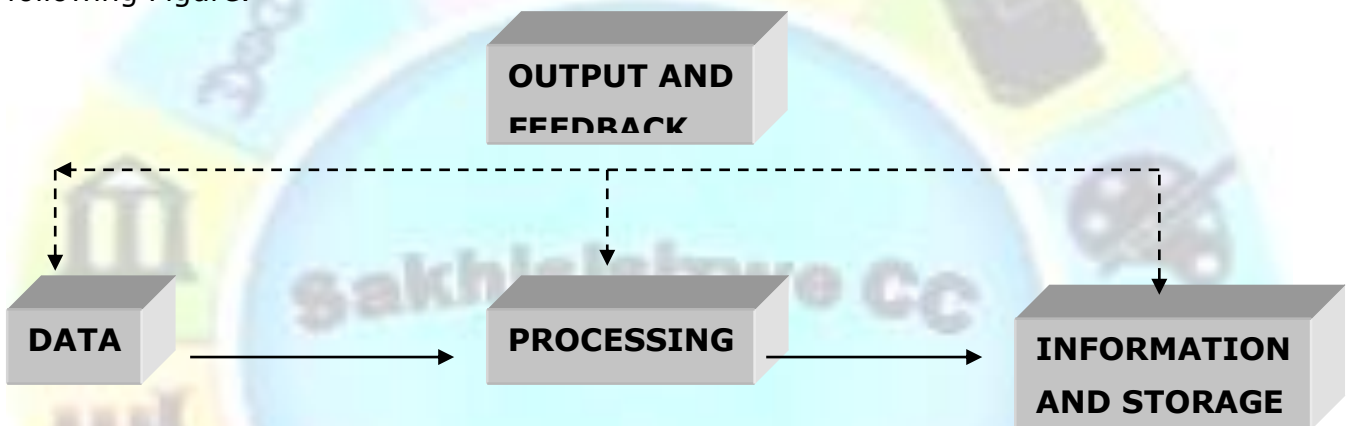
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Data consist of raw facts:

- Your account has a debit balance of R75
- You have written a cheque for R50
- Your overdraft limit is R100

Once the above pieces of data are organised in a way that the raw facts become meaningful, it becomes **information**. The collection of facts have an added value that is more than the value of the facts themselves. Your account is now overdrawn by R25 and the bank can now make an decision as to what action to take regarding your account.

It follows that a process is followed in order to turn data into information. The information processing cycle can be represented schematically as shown in the following Figure.



The process to turn data into information also requires knowledge of ways that the information can be made useful to either support specific tasks or make decisions.

A typical PC set up

Computers are used to process and store data, turning it into information that can be taken out of the computer in the form of outputs. This means that a computer should have the following:

- Input devices
- Processing devices
- Storage devices
- Output devices

The purpose of feedback is to look at the output to find out if the information is useful to your purposes or your manager's purposes.

If we look at our example of the bank account, the output could be a bank statement that is used by your manager to control the way you manage your account.

The Personal computer consists of several hardware components, including:

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- **The box or tower** is the processing plant
- Which contains all the **electronic hardware** that does the work
- As well as **electronic storage space** necessary for the operation of your computer.



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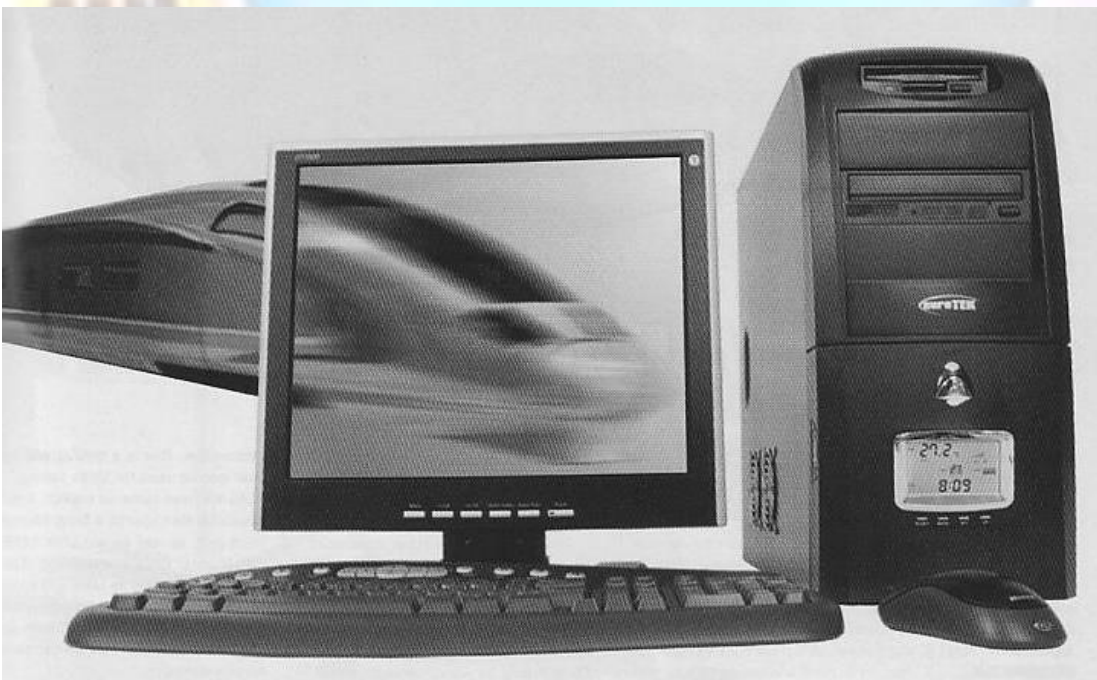
Commonly known as a **monitor** or **screen**, you would use it to view what you are doing

Box or Tower (System Unit):



Visual Display Unit

A Keyboard and a mouse
They are used to enter information into the computer



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In a PC, the input devices include:

- Keyboard
- Mouse
- Scanner used mainly to input pictures and graphics
- Microphone to input sound or music
- Digital camera to input photos and videos

All the above are used to input information

Output devices include:

- Monitor or Visual Display Unit that shows you the information
- Printer
- Speakers that output sound

Input/output devices:

- CD ROM
- Stiffy disks
- Flash drives
- Touchscreen: is a display unit that has a touch-sensitive layer or coating. When a user presses part of the screen, the data input is recorded by the screen and processed by the computer.
- Modem

Storage

When processing data, the computer has 3 storage requirements:

Read-only Memory (ROM): ROM stores the data that is needed to start the computer and identify the components

Random Access Memory (RAM) stores the data while it is being processed. For example, RAM is needed to run software while the computer is switched on.

Storage disks. Disks are used to preserve data when the computer is turned off and to move and backup data.

The tower or processing plant processes the information. The main storage device, the hard drive, is also found in the tower. In order to see it, you have to open the tower to locate the hard drive.

CD-ROM and stifty disks can also be used to store information

Peripherals

Peripherals are devices that can be added to the computer and could include input and output devices:

- Printers

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- Mouse and keyboard
- Scanners
- Plotters
- Speakers
- Modem
- Digital camera
- Microphone
- Speakers

Ports

A hardware port is a socket designed to connect extra devices to the computer, such as the peripheral devices.

The motherboard, found inside the tower, also has internal ports where internal devices are connected.

Ports and the connecting cables are always one of two genders, called male and female. Male connectors have pins, female connectors have holes.






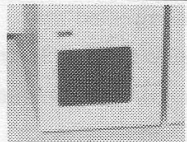
There are several different types of port and each needs its own connector:

You will see the ports at the back of the tower.



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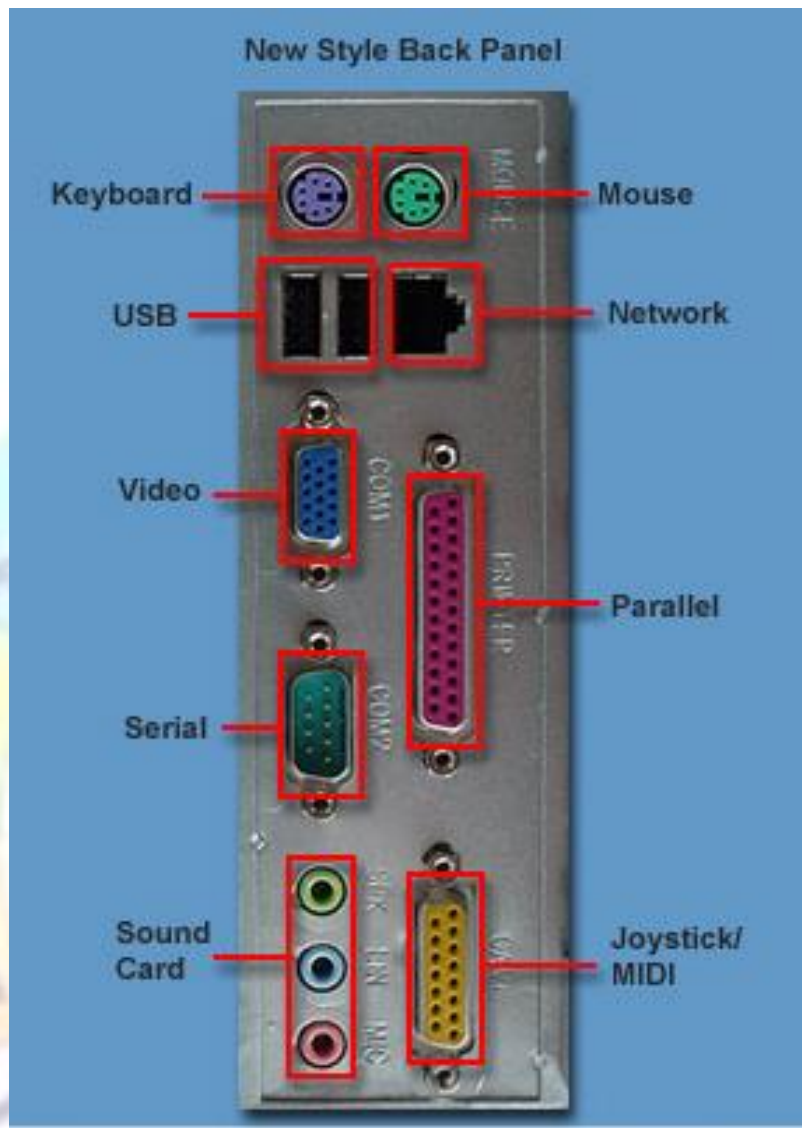
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Port	Use
 <p>PS2 port</p>	<p>Connect a mouse and keyboard. The shape of the port ensures that the connecting cable can only be inserted one way.</p> <p>Older computers use a larger 5-pin plug (AT) to connect a keyboard.</p>
 <p>USB ports (2) and connector</p>	<p>Connect many different types of peripheral device. USB ports are the standard on most new computers as they can transfer data more quickly than parallel and serial ports. You can often connect and disconnect devices without switching off the system.</p>
 <p>Parallel port (DB25)</p>	<p>Usually to connect a printer. Some other types of devices can be connected using a parallel port, such as external drives or scanners.</p>
 <p>Serial port</p>	<p>Usually to connect a modem. Older computers also use a serial port to connect a mouse to the system.</p>
SCSI	<p>Connect a variety of different devices. SCSI ports come in a variety of different connectors, one of which is very similar to the DB25 connector.</p>
 <p>RJ-45 connector</p>	<p>Connect the computer to a network. The network cable (shown) plugs into a square socket (similar to a telephone socket) on the computer's Network Adapter.</p>
Display Adapter Port	<p>Connect a monitor to the graphics adapter. The display adapter port is the same D shape as a serial port, but has 15 holes rather than 9.</p>
 <p>Infrared (IrDA)</p>	<p>Connect an infrared device. An infrared device works like a television remote control, by sending a beam of data that can be detected by the port. The device must be within the "line of sight" of the port.</p>

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ROM

ROM is one of the two main types of memory, the other is RAM. ROM holds permanent information such as the BIOS software that makes it possible for the different computer components to communicate (talk to) with each other..

Data that is stored in ROM is not deleted when the computer is switched off.

It cannot usually be deleted or overwritten while you are processing data on the computer.

ROM is also called non-volatile or persistent memory.

Formative assessment

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What devices does a computer need in order to process data?

Name 3 devices that are used to input data

Name 3 output devices

Name 3 devices that are used for both input and output

Name the 3 main storage requirements of the computer

Read-only Memory (ROM):

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Computer Performance

The computer is your new workspace. Before computers, we worked with filing cabinets, files, typewriters, telephones, faxes, pens, pencils, paper, rulers, erasers, sharpeners, etc.

Now we usually only have a computer and maybe a telephone on our desk.

If you have too many things on your desk such as open files that you are working on, a typewriter, pens, a facsimile machine, etc., you will find it difficult to work fast as you continually have to rearrange the things on your desk to get to the information or equipment you need. It is the same with a computer – there are factors that influence the performance of the computer; in other words how fast and effective it works.

The operating speed of a computer system depends on the time taken for hardware and software to receive input, process data and display output. If one or more parts of a computer system operate slowly, the entire system can be slowed down.



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CPU

The CPU is the Central Processing Unit of the computer – this is where the work is done.

The clock speed of the CPU is one of the most important influences on the speed of a computer. A higher clock speed means more units of data can be processed each second. The clock speed of a CPU is measured in megahertz (MHz) or gigahertz (GHz).

The type of CPU is also important. Different CPU's may be designed to process larger amounts of data at a time or process certain types of data more efficiently. When comparing different processors, the design can be as important as the clock speed.

For example, an Intel Premium processor running at 233MHz will not be as fast as a Pentium 11 processor running at the same clock speed. This is because the Pentium 11 has a more efficient design.

RAM

Random Access Memory is also called the main memory or system memory. RAM is used to run software applications as well as temporarily store data being entered by the user.

Every piece of software needs a certain amount of main memory to operate efficiently. The amount needed differs from one software application to another – graphics and video editing software need more main memory than word processing software, for example. Modern software also needs more main memory than older software. This means that the amount of RAM installed in a computer is increasing all the time.

If your computer does not have enough main memory, the computer will have to rely more on accessing data from the hard disk and this process is slow.

Think of your desk as working space again. If you have 50 files on your desk, 5 manuals, a typewriter, various pens and pencils and note paper, it will take you longer to find the information you need than it would if you only had 4 or 5 files on your desk, 1 or 2 manuals, etc. Your desk has a limited amount of space available for you to work on.

It is the same with RAM. If most of your work is done through a word processing program where you mostly compose letters and other correspondence, you will need less main memory. When you are editing a video, you will need 3 to 4 times more space, since videos, photos and sound use up a lot of memory.

Cache

Cache is a very fast type of RAM that is directly attached to a particular component such as the CPU, hard disk or even a graphics card. It enables a certain amount of data to be copied from the main memory. Data that is frequently used is kept in the cache so the component can access it more quickly.

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Cache is important because it balances the ability of relatively slow components, such as disk drives, to keep fast components, such as the CPU and memory, supplied with a constant stream of data.

Cache makes the computer's performance more efficient.



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Hard disk

The size of the hard disk, or storage capacity is also important. Computers store most of the files that make up programs and data on a hard disk. The larger the storage capacity, the more programs and data can be stored.

While you work and add files and software programs to the hard disk, more and more space is used on the hard disk. When the disk becomes full, the entire processing of the computer slows down.

Think of a filing cabinet that is full – how difficult it is to get a file out of the cabinet and to put the file back.

Number of programs running

Certain software programs, such as graphics software, use more space than others, such as word processing.

Remember that programs are retrieved from storage – the hard disk – and stored temporarily in RAM – the main memory.

If you start opening programs and you eventually have about 5 or 6 open at the same time, your main memory may be full or almost full and this will slow down the computer.

Formative assessment

Explain how the following components affect the performance of the computer
CPU
RAM
Cache
Hard disk
Number of programs running

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HARDWARE COMPONENTS

Outcome

Describe the hardware components of a personal computer

Assessment criteria

- The Central Processing Unit (CPU) is described in terms of its purpose and functions.
- The Memory of a personal computer is defined in terms of memory size, the types of memory and their purpose: RAM, ROM, ROM-BIOS
- Input devices are identified and described in terms of their purpose and functions. Mouse, keyboard, microphone, scanner, joystick, digital camera
- Output devices are identified and described in terms of the variety, their purpose and functions: Monitors (Visual Display Units (VDU)), printers, plotters, speakers, microfilm (microfiche).
- Input/output devices are identified and described in terms of their purpose and function: Touchscreen, modem
- Storage devices are identified and described in terms of their purpose, capacity and functioning. Floppy/stiffy disks, hard disks, magnetic tape streamers, CD-ROM, ZIP drives

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Inside the tower or case you will find the following hardware components:

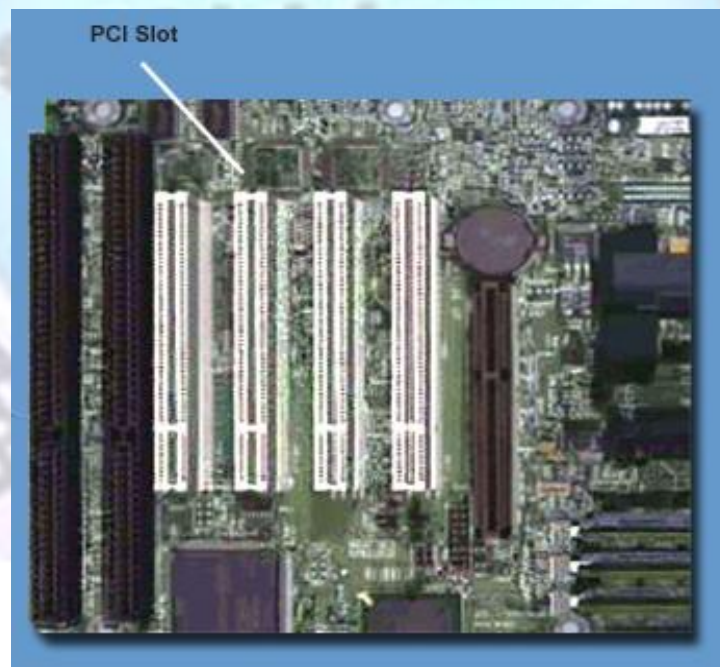
- A motherboard
- A CPU processor chip
- Memory
- Disk drive(s)
- Power unit
- Expansion cards

Motherboard

The *motherboard* (or logic board) is the primary circuit board in the system unit. It supports the electronic components directly related to computation and data processing.

Main components include the central processing unit (CPU), main memory (RAM, ROM, and related chips), math co-processor (if any), and expansion slots.

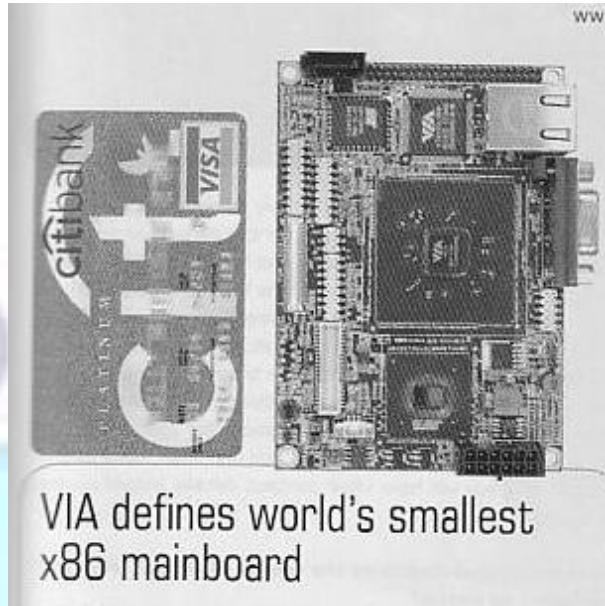
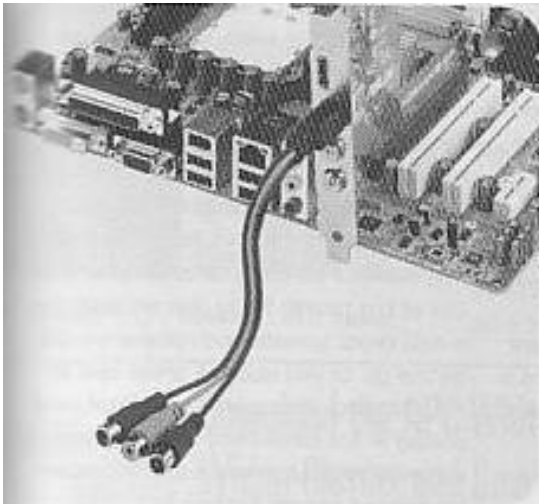
Every piece of hardware in the PC is connected to the motherboard, either by cables, expansion slots or ports



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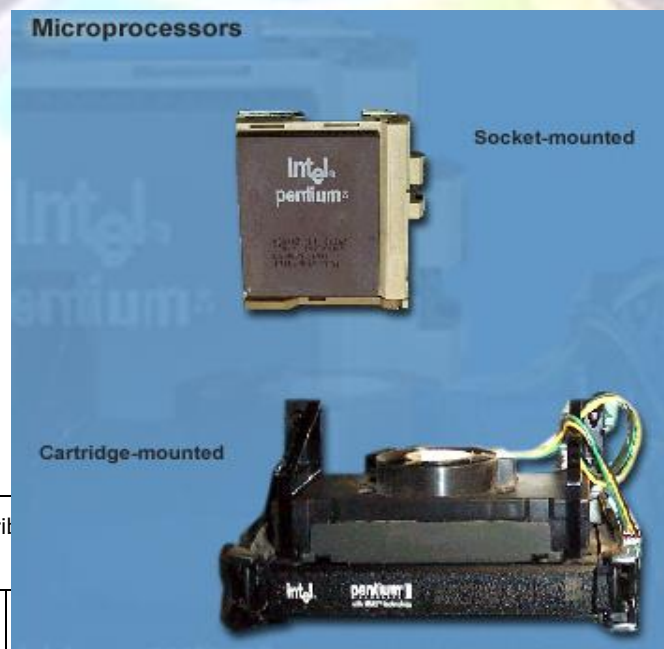
Central Processing Unit (CPU)

This is the *brain* of the computer and is responsible for all the *calculations* and mathematical options.

The central processing unit (or CPU) is the primary electronic chip on the motherboard. It is responsible for computation and controlling other components. It is an integrated circuit, which means that it is a chip that has its own electronic circuit inside.

CPU chips are responsible for fetching and decoding data, executing instructions, and generally acting as the 'brains' of the computer.

The CPU is installed directly onto the motherboard.



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Intel Pentium 4 processor 1 GHz refers to the model of the CPU as well as the speed at which it processes information. Pentium 4 refers to the model of the CPU, similar to cars. When we started with PC's, the first model was XP, then we moved to XT, then 186; 286; 386; 486 and then Pentium was born, these days a Pentium 6 is the latest model, although a Pentium 1 or 2 can still do most of what we want to do.

Memory

There are two kinds of memory: temporary memory and permanent memory

Random Access Memory (Ram)

RAM is the memory of the computer and all the information going to and coming from the CPU **must pass** through the RAM. RAM is also known as the **main memory**.

It is also referred to as **temporary storage**, as any information is lost with loss of power or when you exit without saving your work to the hard disk.

RAM is found on a small circuit board, which can be plugged into special slots (expansion slots for RAM) on the motherboard. When installed, RAM chips expand the computer's memory. The older computers use SIMM RAM while the latest technology required that DIMM RAM is installed.

We can view RAM as the *working space* in our computer. On your desk you only have so much working space and when you have used up every bit of space on your desk, it slows down the way you work. With RAM it also works like this.

Where wire intersections (called bit-holding junctions) occur, if the wiring is imprinted as intact (and electricity may be transmitted through it) the intersection is read as a closed circuit. If the circuit is not intact, it is read as open. The computer reads open circuits as "zeroes" and closed circuits as "ones". These are translated into binary code. As its name indicates, such chips may be "read-only" and not capable of being written to, by the computer.

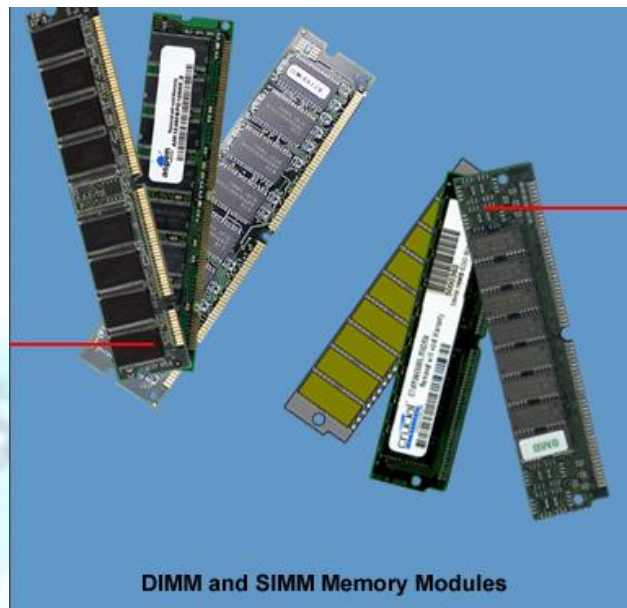
RAM is connected to the motherboard by means of special RAM expansion slots.

RAM is the main memory and the size of the RAM means the amount of memory that you have available to work in. The current standard is about 512MB RAM. The latest computers all have DIMM RAM, while older computers still use SIMM RAM.

Normally, 512MB RAM is good enough for our daily needs. However, if you start working with photos and videos you will soon need more RAM, as colour images use more space. Once you start working with videos, you need even more space, because you now have colour, movement and sound, which require a lot of working space.

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Read Only Memory (ROM)

ROM is memory that *cannot be changed* and is responsible for the *starting* sequence of the PC.

The ROM (read-only memory) chip is a memory storage device based upon semiconductor technology. It consists of a matrix of tiny wires, which are imprinted upon a chip, from a master pattern.

In other words, ROM is permanent memory, in the form of an electronic chip situated on the motherboard.

Input devices

An input device is any device that is used to enter information into the computer.

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Keyboard

The most common input device is the keyboard. The keyboard can be used both for text-based data input and for selecting commands. A typical keyboard is divided into sections, each with its own purpose and function.

The keyboard is connected to the motherboard by means of a port.

Esc and Function Buttons



The Esc key is commonly used to stop programs running, or to close a Windows dialog box. Function keys are to perform special functions within an application. For example, F1 will usually start the Windows help facility.

Navigation, Insert and Delete Keys

The navigation keys (Home, End, Page Up, Page Down) are most often used to move the cursor around within a document. The Insert key switches between insert and overtyping mode, and the Delete key removes a character to the right of the cursor.

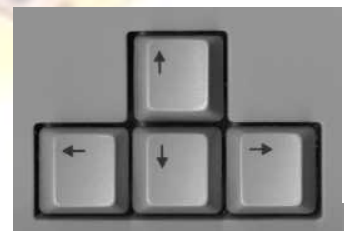
Main Keyboard

This area contains most of the characters, punctuation marks and numbers that you will need when typing in a document.



Cursor Movement Keys (Arrows)

These move the cursor around the screen, typically one character or line at a time.



Numeric Keypad

The numeric keypad contains the numerical symbols 0-9 and the decimal point. The Numeric keypad also has the simple mathematical signs. By pressing the Num Lock key in the numeric keypad, the keys will switch functions to become alternative navigation and cursor movement keys.



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Caps Lock

If the Caps Lock key is selected, all the typing will be typed in capital letters. A green light will indicate that the Caps Lock key is selected.

Num Lock

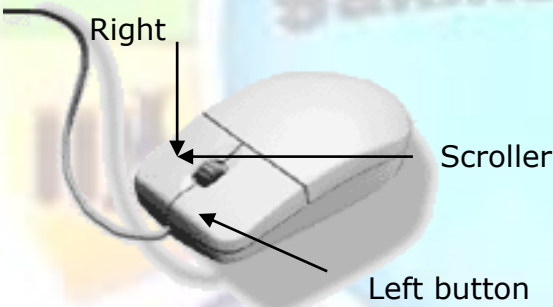
If the Num Lock is selected, a green light on the keyboard will indicate that the keypad is selected. The numeric keypad can be used to type the numeric symbols 0-9 as well as the different operators, e.g. / * - +.

The Mouse

Computers are usually operated through a graphical user interface. This means that the user selects a command from the computer’s screen display by moving a pointer and clicking an icon. A mouse is the device usually used to control the movement of the pointer on the screen.

PC Mouse

Ordinary mouse



The **primary** mouse button, which is generally the left-hand button, is used to select commands from menus, execute commands using icons and select items and text within documents.

The **secondary** or alternate mouse button (usually the right-hand button) is used to display a shortcut menu with the most frequently used commands that are applicable to the selected item.

The mouse may be used to perform many actions. As the mouse is moved, a ball rotates two rollers inside the mouse, these control the position of the mouse pointer on the screen. An infrared mouse uses line of sight technology to track control the position of the mouse pointer.

Between the two mouse buttons a scroller ball is situated. This is used to scroll up and down the documents and graphics you are working on.

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The following table lists the typical actions performed with the primary mouse button:

TERM	MEANING
Point	Move the mouse to that the pointer points to the object or item required.
Click	Move the mouse pointer to the item you want to click on then press and release a mouse button.
Double-click	To press and release a mouse button in quick succession twice, without moving this mouse. This is used to carry out an action, such as starting an application
Drag	Hold down the mouse button at the same time as moving the mouse. This may be used to select a block of text or to move an item that has already been selected.



Scanner

Scanners are input devices used to detect a pattern on paper (pictures or text) and then translate the pattern into computer data.

Hand held scanners are dragged across the page to scan it. The scanners used in shops to scan bar codes are an example.

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Flatbed scanners (pictured above) have the paper placed on top of them, in a similar way to a photocopier. These are more expensive than hand-held scanners but they are usually able to produce higher resolution images.

If a scanner is used to scan a page of text, Optical Character Recognition (OCR) software can be used to convert the scanned image into text data that can be edited using word processing software.



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Joystick



A joystick consists of a base and a stick perpendicular to the base. The stick can be moved in any direction, enabling the user to move an object around the computer screen.

A joystick can perform a similar function to a mouse but is commonly used for playing games.

Digital camera



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Digital cameras work in much the same way as normal cameras, except that the exposure from the subject is recorded onto light sensitive diodes and not photographic film. The image is saved to a flash memory card, for example Compactflash.

Images can be printed directly to a printer, displayed on television or transferred to a computer. Transferring the images to a computer is done either by connecting the camera to a suitable port, such as a USB port, or by inserting the memory card into a card reader.

There are also devices that capture moving images, such as Web Cams and digital video cameras. Web cams record low resolution video images suitable for displaying on a monitor or to send via the Internet. Digital video cameras give much higher resolutions but use more space on the computer and also cost more.

Trackball

A trackball is used in place of a mouse. It has buttons like a mouse, but the pointer is moved using a rotating ball set into the top of device – an upside-down mouse.

One advantage of a trackball is that it does not need a flat area to use it. They are often found in laptop computers.

Output devices

Output devices display information from the computer to the user. The main output devices

- Display data on a screen
- Print data on paper
- Play data as sound

Visual Display Unit (Monitor)

The monitor allows you to what you are doing and also see information stored on your computer. Images that appear on the screen are made up of a collection of small dots called pixels (Picture element). The more pixels a monitor can display, the better the image quality. The maximum numbers number of pixels that the computer can display horizontally and vertically on the screen gives the screen resolution, for example 800 x 600 pixels or even higher, 1280 x 1024.

The higher the screen resolution, the more you will be able to fit on the screen and the smaller each object will look.

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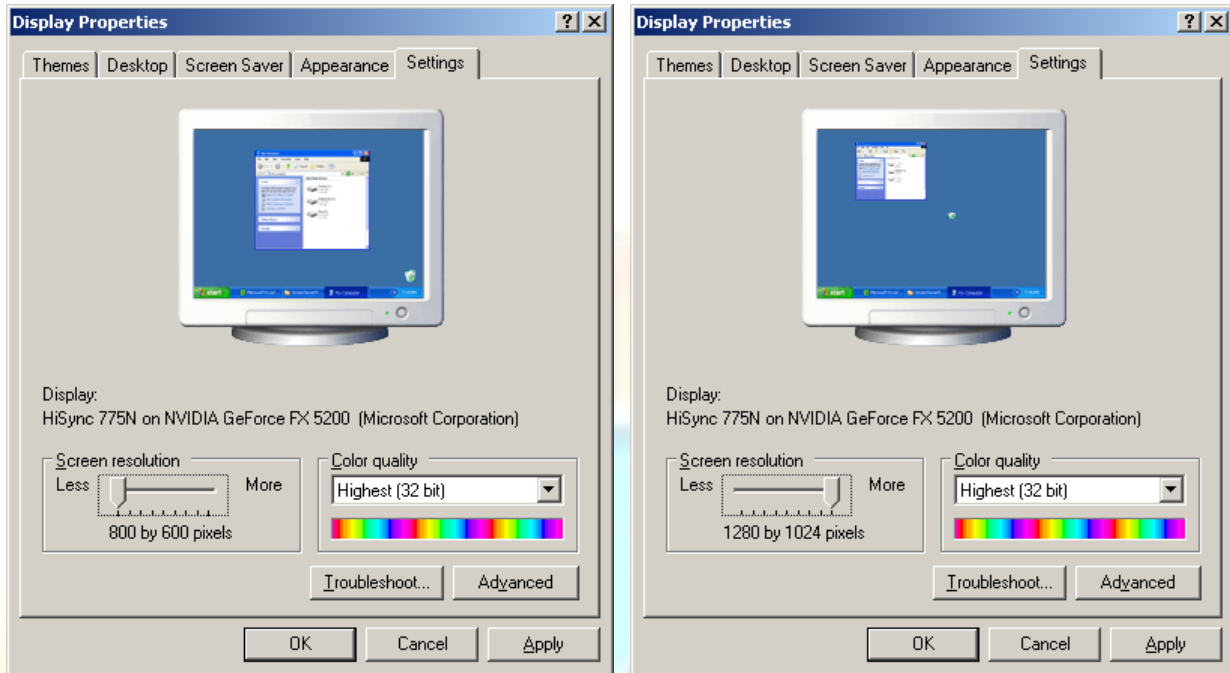
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When personal computing started all monitors were monochrome. Currently, colour monitors are more available. The older type monitor was known as a VGA screen, nowadays the SVGA is more available. SVGA is short for Super Video Graphics Array. SVGA supports high colour depth, resolution and refresh rate.

Monitors vary in size. The monitor is connected to a graphics card in the the motherboard via the VGA port.

The monitor has it's own power switch where you can switch it on and off. You can also change the size, brightness and colour of the display on the monitor. This varies with each type of monitor, so the facilitator will show you where the controls are found and how to change the display of the monitors in the classroom

Most desktop computers use a Cathode Ray Tube (CRT) monitor to display an image. CRT's are also used in television sets.

LCD screens are flat panel displays that take up less space but do not give such a sharp picture. You will find LCD screens on laptops and palmtops

Printers

A printer allows the user to print out on paper a copy of the data that is being processed by the computer. Modern printers will print text and pictures and even photos. Today, printers can print in colour and black and white.

The most common types of printer are:

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Printer Types

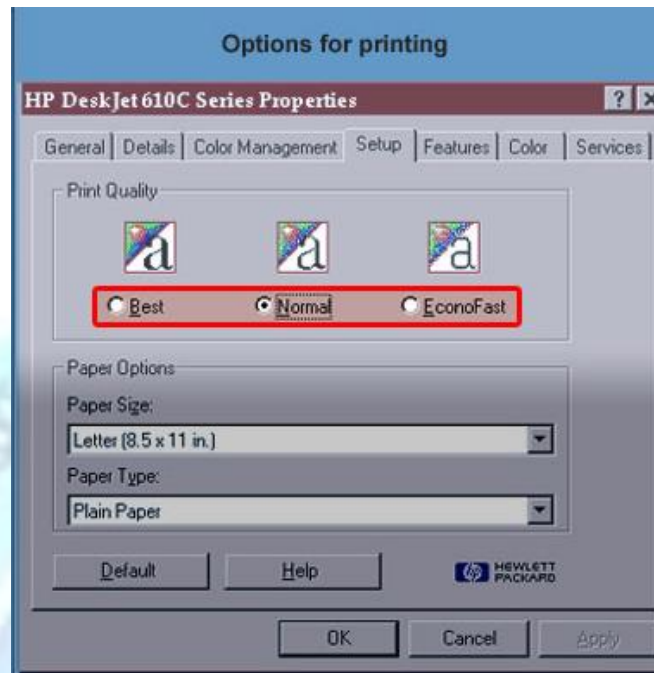
Dot matrix	A dot matrix printer creates an image by having a print wire strike an inked ribbon transferring a dot to paper. Dot matrix printers use movable print heads, typically with 9, 18 and 24 pins. Colour dot matrix printers were produced in the past but are seldom seen.
Character impact	At one time, daisy-wheel printers (and similar variations) were relatively common, but are now seldom seen. Daisy-wheel printers operated much like a typewriter. A print wheel is lined up over the paper with the proper character selected. A striker (sometimes called the hammer) would drive the character against the ribbon and the paper.
Ink jet	Ink jet printers have gained wide popularity in the home market because of their relatively low initial cost and support for colour printing. They are used in business to support colour graphics and document printing.
Laser	Laser printers are by far the dominant type of printer currently in use. A wide range of prices, sizes and capacities are available, making it possible for consumers to find cost-effective laser printer solutions. Both colour and black-and-white laser printers are available.

One key characteristic of dot matrix, ink jet and laser printers is printer resolution. Printer resolution is measured in **dots per inch (dpi)**. A higher dpi value means a higher resolution output. Many printers allow you to select the printer resolution, so that draft documents can be printed at a lower resolution and final documents at a higher resolution.

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Along with deciding on a printer, you must decide how you will connect to the printer. Most printers support both serial and parallel connections. Many newer printers also include a USB port as a connection option. In addition to supporting local connections, many higher-end printers support direct network connectivity as an option

Ink jet printers



Ink jet printers work just as their name implies. They produce an image by shooting jets of ink through very small holes in ink cartridges. Most early ink jet printers were black-and-white devices. Newer ink jet printers are exclusively colour devices. Most will have a black ink cartridge and a three-color (cyan, red and yellow) cartridge.

This separation of cartridges makes it possible to replace the black and colour cartridges separately when either runs out of ink. Ink jet printers are usually very quiet, making them popular in office or home environments where a noisier printer could create a distraction and an annoyance.

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The quality of ink jet printers has improved rapidly over the years with photographic and near-photographic quality printers readily available at a relatively low cost. It has become common for retailers to include an inexpensive ink jet printer as part of a new computer package targeted for the home and small business markets.

Note: A small number of ink jet printers use three separate colour cartridges. With this arrangement, users can replace just the cartridge that is out of ink, rather than having to replace a cartridge containing all three colours. The claim is that the ability to change individual colours will lead to a long-term cost saving.

Laser Printers

Laser printers provide the highest quality print, very quiet operation and higher print speeds than other printers. Printer resolutions of up to 1,200 dpi are available, with 600 dpi supported in even most inexpensive laser printers.

Laser printers are relatively complicated devices. Printer components include:

- Logic and Control Circuitry
- Paper Transport Mechanism
- Photosensitive Drum
- Laser
- Primary Corona and Transfer Corona
- Fuser Rollers
- Erase Lamp
- Toner Cartridge

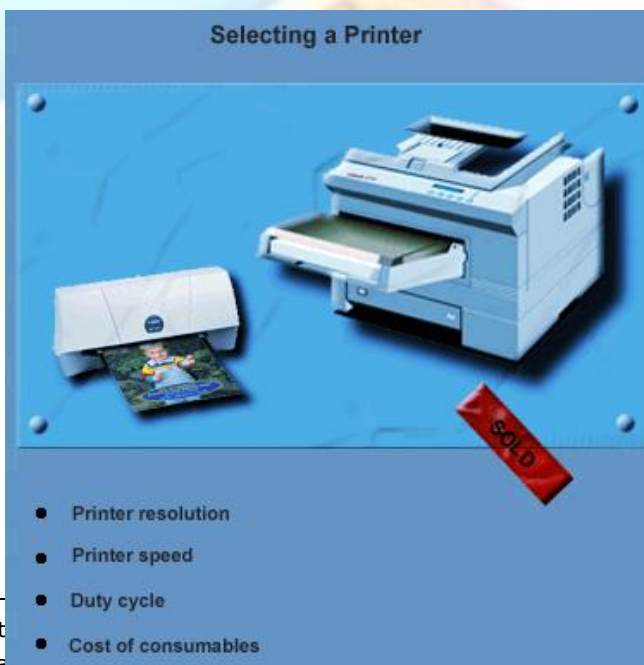
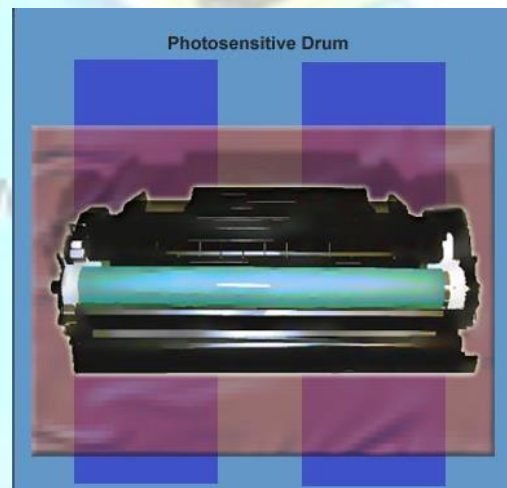
With most laser printers, the photosensitive drum is included as part of the toner cartridge. Take care to avoid touching the photosensitive drum or exposing it to light.

A laser printer combines a very narrow beam of light and a light sensitive drum to fuse particles of toner (a fine white powder) onto the paper.

Selecting a printer

The printer cost is an obvious issue when selecting a new printer, but it is not the only consideration. You need to make sure that the printer will meet your needs. For example, if you are going to be printing on multi-part forms, you will need some type of impact printer.

Some of the specific issues you need to consider when selecting a printer include:



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- Printer resolution in dots per inch
- Printer speed in pages per minute
- Duty cycle in pages per month
- Cost of consumables

Calculating the cost of consumables requires you to look at costs such as paper and ink or toner cartridges.

Just comparing replacement cartridge cost will not tell you what you need to know, however. You need to consider the number of pages the cartridge can be expected to print, so you can calculate a cost per page.

It is not unusual for a more expensive cartridge to cost less to use.



Epson's new A3 photo printer

Epson has launched a new A3+ six-colour photo printer, featuring Claria Photographic Ink. The Stylus Photo 1410 is the successor to the Stylus Photo 1290s and offers more durable photos, improved image quality and faster printing speeds. It also features six individual ink cartridges, so only the colour that is used needs to be replaced. Direct printing onto CD and DVD faces is included. The Stylus Photo 1410 driver has Adobe RGB support, supporting a wide colour gamut, while Epson PhotoEnhance automatically detects and optimises images according to subject type, for example, portraits, landscapes and skylines. In addition, it analyses and improves skin tones, colour casts or light exposure. www.epson.co.za | R4,589

Speakers

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Many computers are equipped with speakers. Speakers take the signal generated by a sound card and convert it into sound.

If your computer has speakers, you can listen to music CD's or hear sound effects generated by software.

Microfilm

Some companies have to store many paper records. These can be transferred to microfilm. I microfilm is series of page images miniaturised onto 35mm film. Special scanners are available to prepare and read microfilm using a computer.

Input/output devices

Modem

Computer systems work with digital data. In a digital system, every unit of information is reduced to a combination of bits. Each bit can have one of two values: **On** or **Off**. (or **0** and **1**).

Many data transmissions, such as a telephone line, use analogue transmission. An analogue transmission uses variations in a signal wave to represent data. When someone speaks to you, you hear a sound wave, and interpret the data as words depending on the variations in tone and pitch.

This means that, in order to send information via a telephone line, digital data has to be converted into analogue data on the side of the sending computer and back into digital data on the side of the receiving computer.

This is why you need a modem to connect to the Internet – it converts digital signal into analogue signals so that you can send information via a telephone line, and on the other side it converts the analogue signals into digital signals.

A modem is therefore regarded as an input/output device.

Touchscreen

This is a display unit that has a touch-sensitive layer or coating. When a user presses part of the screen, the data input is recorded by the screen and processed by the computer.

Disk Drives or Storage Space

Disk drives of various kinds are used for storage purposes and to transfer information from one computer to another. When data is entered into a computer, it must be saved as a file to preserve it when the computer is switched off. Also, software applications need to install files on the main disk drive in the computer in order to run.

Hard Drive

The main filing cabinet (storage space) of your computer is the **hard drive**, also known as the **hard disk**, which is inside the

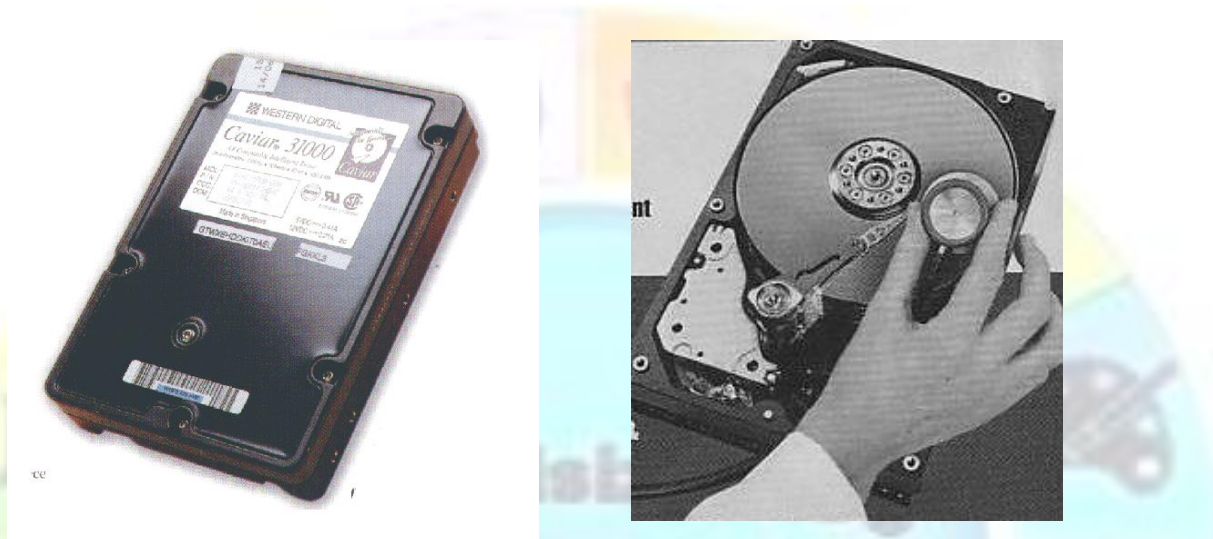
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computer and cannot be seen without taking off the cover. Of course, you also get external hard drives that can be carried around and connected to a different computer.

The hard drive is a stack of round magnetic disks on which information is stored. The hard drive uses read-write heads to recognize and manipulate the magnetic data stored on it. A motor spins the disks so that the read/write head can access the data stored on it in sections.



The hard drive is the **main storage space**. This is where your files are stored, so the hard drive is like a filing cabinet.

You use a filing cabinet to store **files** and in the files are **letters and documents**, which we call information. On your hard drive, which is a lot smaller than the filing cabinet, you also store information in files.

Hard drives can store a lot of information, from 400MB to a couple of hundred Gigabytes.

The hard drive is connected to the motherboard by means of a cable.

Floppy (Stiffy) Disk Drives

Floppy disks were the first disks introduced. These disks have a very limited storage capacity. A floppy disk is a soft, round magnetic disk on which information can be stored.

Hard drives were only introduced later A large amount of data can be stored permanently on the hard drives.



The floppy disk drive reads and writes data to floppy diskettes. The drive may be internal, fitted into a system drive bay, or external, housed in its own small case and connected to the system by a cable.

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The drive uses read-write heads to recognize and manipulate magnetic data on the drive. In the past, floppy disks were used to input information such as new software into the computer. Floppy disks are also be used to export data for archive purposes or to share information between computers. .

Floppy drives support two standard sizes of floppy disks, 3 1/2", more commonly known as stiffies and 5 1/4", which are the old floppy disks, not used much any more.

A stiffer is also a round magnetic disk, housed in a stiff outer casing to protect the disk from damage. It can typically store about 1.44MB of information.

Floppy and stiffer drives are connected to the motherboard by means of cables.

Zip drives

This is also a form of magnetic disk that stores less than a hard disk but much more than a stiffer disk. The disk can also be removed and transferred elsewhere.

Tape drives

Tape drives (also called cartridge drives) can be used to store large amounts of data. Retrieving information from a tape drive is slower than for some other storage devices, because the tape drive has to work its way through the tape to access the relevant information.

Magnetic tape cartridges are removable and easy to transport. Tape drives are used mainly to backup data on computer networks or to backup databases.

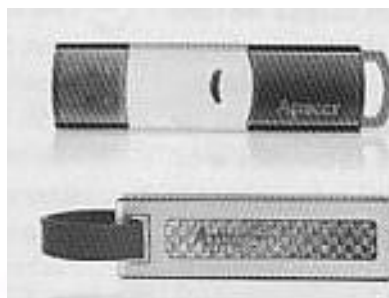
Flash memory Disk

A Flash memory disk is similar to a stiffer. It is a removable disk that stores approximately 100 stiffies' information on a single 128kb memory disk. It is much easier to transport and much more reliable than stiffies. It is inserted via a USB port on a computer. Because Windows XP is plug and play, it will automatically pick up the inserted flash memory disk.

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CD-Rom Drives

Because of the ever-increasing need for storage space, a CD-ROM drive was invented.



This is similar to the normal music CD. A CD-ROM (short for Compact Disc-Read Only Memory) drive will read, but not write, data from CD-ROM disks.

CD-ROM technology allows the storage of large amounts of information, typically around 650 to 700 Mb on a single disc.

These days we use CD-ROM's and CD-ROM drives to input new software in the computer.

They are ideal for storage of large databases, such as encyclopaedias or libraries, which do not require changing of data.

CD ROM drives are connected to the motherboard by means of cables

How are Data Recorded on a CD-ROM ?

Data are recorded in segments and tracks, similar to a long-playing record. This recording is done when the head 'writes' to the disk surface. An index or file allocation table (FAT) ensures that the head knows exactly where every bit of data is written too. This is similar to the index of a book

Drive Letters

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The first computers only had a single drive. This drive was assigned drive letter A. When addressing a drive you always designate it with a double colon (:). For example

A:

The next drive was assigned **B:**

and the hard disk drive became **C:**

A CD-ROM drive is normally **D:**

Storage Capacity

To get a better perspective of the relationships between the data storage capacities of various recording media, it is helpful to consider their equivalents in pages of written text. Comparing the commonly used formats of a decade ago to those in common use today reflects the rapid advancement of data recording technology.

Byte

One byte is one character, e.g. 1 or a or m

One Kilobyte is one thousand bytes, approximately one A4 page typed with double spacing

Kilobyte

One Megabyte is one thousand kilobytes or one novel

One Gigabyte is one thousand megabytes

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Megabyte

Gigabyte



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Maintain Hardware Components

The electronic parts of a computer should always be treated with care.

Do not:

- Remove the cover of the computer, as it protects the hardware inside against dust
- Drop the computer, as the electronic hardware inside is very sensitive and may sustain damage
- Remove hardware parts from inside the computer
- Spill liquids on the hardware, as this may affect the way they function
- Spill liquids or food on the keyboard or mouse
- Drop or throw the mouse or keyboard around
- Leave the hardware (or software) components of your computer in the sun or rain
- Move the system unit around while the CD-ROM drive is open
- Drop the monitor

Always:

- Keep the computer and other hardware components in a cool, dry place
- Remove the CD from the CD-ROM drive
- Close the CD-ROM drive after use
- Remove the floppy from the floppy drive

Identify Simple Hardware Faults

If your computer does not go on when you switch it on, first check the following before calling a technician:

- Check that the power cord is connected to the computer as well as a power supply
- Check the power supply is switched on
- Check that the monitor connector cord is properly connected to the computer and the monitor.
- Check that the monitor is switched on
- Check that the monitor power supply is connected to the monitor as well as a power supply or the computer.

Your computer will not work properly if the keyboard is not connected properly. If you receive an error message during start up that a keyboard is connected and then press the required button.

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If you do not have a mouse connected at the time of start up, you will receive an error message stating that Windows could not detect a mouse. Connect the mouse. You will have to restart the computer for Windows to recognize the mouse.

Ensure that the floppy drive does not have a floppy inside it when you start the computer.

If there is a floppy in the floppy drive, you will receive an error message. Remove the floppy and then press the key as required by the error message. The start up sequence will continue.

The flow of information in a PC

ROM is responsible for the start up sequence of the PC. The start up sequence ends when Windows appears on the monitor.

Once you start working on the PC, for example to open a file:

- Instructions are sent from the mouse and keyboard to the CPU, for the file to be fetched from the drive
- This can be the hard drive, floppy drive or floppy drive
- The file is then placed in the RAM, which is the main memory of the computer. Remember, this is your working space.
- As you work, instructions are sent from the keyboard and mouse, through the CPU, to the monitor, or printer or other hardware component and software program, in order for your instructions to be executed.
- Once you save the file, the instruction to remove the file from the RAM and place it back in the drive, is done through the CPU.

In short, you work on the RAM, store in the drives and all the processing is done through the CPU.

Formative assessment

What is the difference between RAM and ROM?

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What is the purpose of the CPU?
When would you need a modem?
How is information stored in a computer?

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SOFTWARE

Outcome

Describe software for personal computers

Assessment criteria

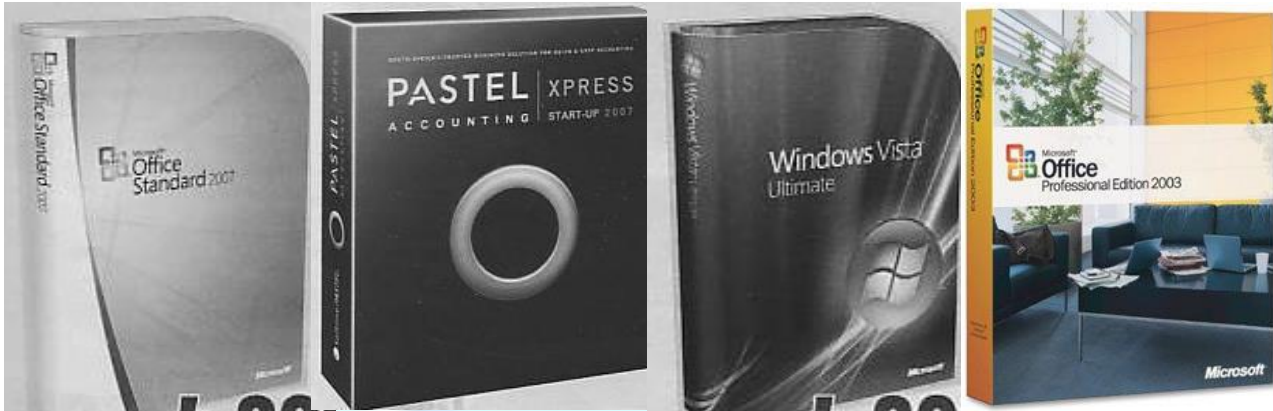
- The types of software are described in terms of purpose: Operating system software, applications software
- Operating system software is defined in terms of its function. Including but not limited to: Interface to hardware, interface between application software, interface to printing
- Applications software is defined and examples of applications software and the specific application for each is described. At least 3 of: word processing, spreadsheets, database, presentation, desktop publishing, multimedia applications, internet applications

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Software



Is a set of electronic instructions that tell a computer what to do.

You cannot see or touch software, but you can see and touch the packaging that software comes in. Hardware is anything you can see and touch, software is loaded onto the computer and stored in the hard drive, so you cannot see or touch it.

There are two kinds of software: operating software and application software.

Operating System Software



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This software controls the overall activity of the computer. Previously, we used MS-DOS software; today most computers come with Windows 98 or Windows 2000. Other examples of operating system software are: Linux and Unix

Operating System Software is the link between the hardware and the software. It allows the hardware and software to talk to each other. Windows is operating system software. Without it, or some other kind of operating system software, your PC will not work.

The hardware of your computer would be the components described in the previous section: the monitor, the keyboard, the mouse, the CPU, etc.

Microsoft Windows XP is a Personal Computer (PC) **operating system** from Microsoft. An operating system:

- Provides a **Graphical User Interface** to PC **hardware components** (such as the hard disk, floppy disk, CD-ROM drive, or modem).
- Allows different **software applications** (word processors such as Microsoft Word or spreadsheets such as Microsoft Excel) to work together in a common environment.
- Manages the **data files** you create when using applications.

A **Graphical User Interface (GUI)** means that commands are selected from **icons** and **menus** on-screen using the **keyboard** and the **mouse**. Applications run in **windows** on the screen. You can open several windows at once and switch between them, allowing you to use several applications at the same time.

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Windows XP comes in two versions. The **Home** version is aimed at domestic users; the **Professional** version is aimed at business users. The **Professional** version contains several extra features, mainly for use in company networks. Otherwise, the two versions share the same features, look, and feel.

Windows XP can be installed on desktop computers and portable laptop (notebook) computers.

Application Software

Lets you accomplish specific tasks, such as writing a letter (Microsoft Word), or adding a column of figures Microsoft Excel). This is the software that you do your work in.

The are different software programs for different work applications:

- MS Word is used for general business and private correspondence: letters, faxes, memos, CV's, etc. This kind of software is called word processing software. Corel Word Perfect is another example of a **word processing** program
- MS Excel is used by accountants and auditors to add columns of figures and do bookkeeping transactions. Excel is an example of **spreadsheet** software. Other kinds of spreadsheet software include Lotus 1,2,3 and Quattro Pro.
- There is also software that enables you to build a **database**, such as a client contact list. Doing a database on the computer has many advantages. Think of a telephone book where you can look up a person's telephone number by using either the address, the first three digits of the telephone number, the area in which the person stays, the surname or initials, rather than only according to surname as in our printed telephone books That is what a database can do. MS Access is database software.
- CorelDraw is an example of software. This allows you to draw pictures on the monitor or change pictures and photos. Paint, which is found on most computers, is also an example of graphic software. However, Paint cannot do as much as CorelDraw.
- **Desk Top Publishing** is software that enables you to print brochures, business cards, newsletters, banners, etc. MS Publisher is an example of this kind of software.
- Internet Explorer and Outlook Express are software programs that allow you to **communicate** over the Internet.
- And, of course, games are also software application programs.

Software programs are electronic instructions, written by people called programmers. There are various programming languages available today. When people start learning about programming, they usually start with C+ or Visual Basic.

It follows then, that C+ and Visual Basic are **computer programming** languages.

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Formative assessment

Explain the purpose of operating software

Explain the purpose of application software

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What is a graphical user interface?



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ERGONOMIC PRINCIPLES

Outcome

Describe ergonomic principles for computer workstations.

Assessment criteria

- The purpose of ergonomic principles is explained
- The impact of environment conditions relating to ergonomics of computer workstations is explained. At least two of the following: environmental conditions: lighting, ventilation, VDU positioning, VDU glare, seating, position and use of input devices (e.g. keyboard, mouse), breaks away from the computer



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Working Environment

Ergonomics is the study of factors affecting the performance of people at work. It is well established that a bad working environment can cause certain health problems.

Eyestrain and Headaches

Looking at a monitor for long periods without a break can make your eyes tired and cause headaches. Using a good quality monitor that produces a clear image on the screen may help reduce this problem. Adequate lighting should also be provided.

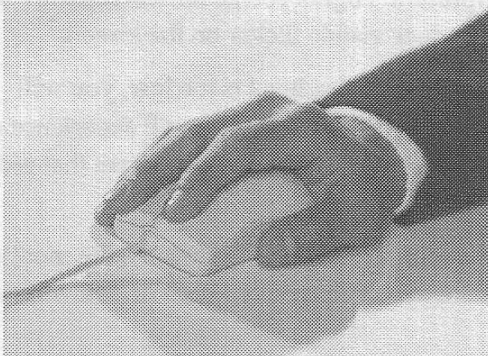
Repetitive Strain Injury (RSI)

RSI is a complaint that occurs when the same task is carried out repeatedly for a long period, making use of the same muscles continuously. Using ergonomically designed, angled keyboards and moulded mice may reduce the risk of strain injury:

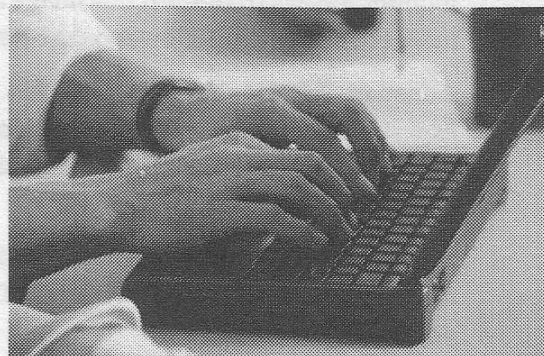
- When you use a mouse, keep your wrist straight and rest your palm on the body of the mouse.
- When using a keyboard, keep your forearms parallel with the keyboard.

With both devices

- avoid working with your wrists bent,
- do not hunch your shoulders or bend forwards,
- and take frequent breaks (to stretch or walk around for instance)



Using a mouse



Using a keyboard

Back Pain

Sitting at a desk in a poor position can cause lower back pain. This is especially true if you sit for a long period without getting up. To help prevent back pain:

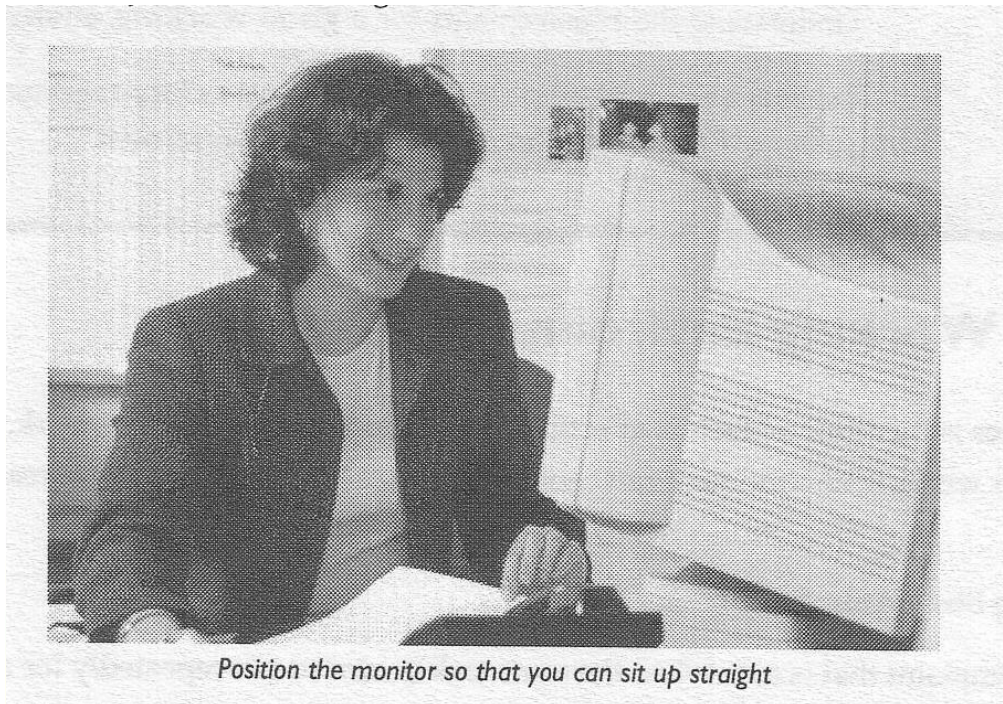
- A monitor and workstation should be positioned at the correct height.
- Chairs should provide support for the back and neck.

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- You should be able to sit up straight with the screen at slightly below eye level. You should be able to rest your feet on the floor comfortably.
- Your wrists should be supported as you type with your forearms parallel with your legs.



Ventilation

Adequate ventilation is also important when using computer equipment. Computers and monitors give off a lot of heat and make the surrounding air very dry. This can cause your eyes and throat to become dry and uncomfortable if there is an insufficient supply of fresh air.

Use and Care of Computer Equipment

Many organisations have an IT support department to take responsibility for the management of computer systems and the training of users. If something goes wrong with computer hardware or software, you should usually contact them in the first instance.

Remember to supply details of the problem, including any error messages or codes that are displayed on the screen and exactly what you were doing with the system at the time of the error.

Taking care of your computer

- Never move the computer when it is switched on

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- Never obstruct the ventilation holes in the monitor or the computer's case
- Never eat or drink near the computer
- Never store floppy disks near magnetic fields, which are created by monitors, speakers, microwaves and other electrical devices
- Always keep your computer in a clean, dry, cool and dust free place and away from radiators or hot lamps



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Formative assessment

What is meant by ergonomics?
How can you avoid RSI?
How can you avoid eyestrain and headaches?
What can cause back pain when you are working on a computer?

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