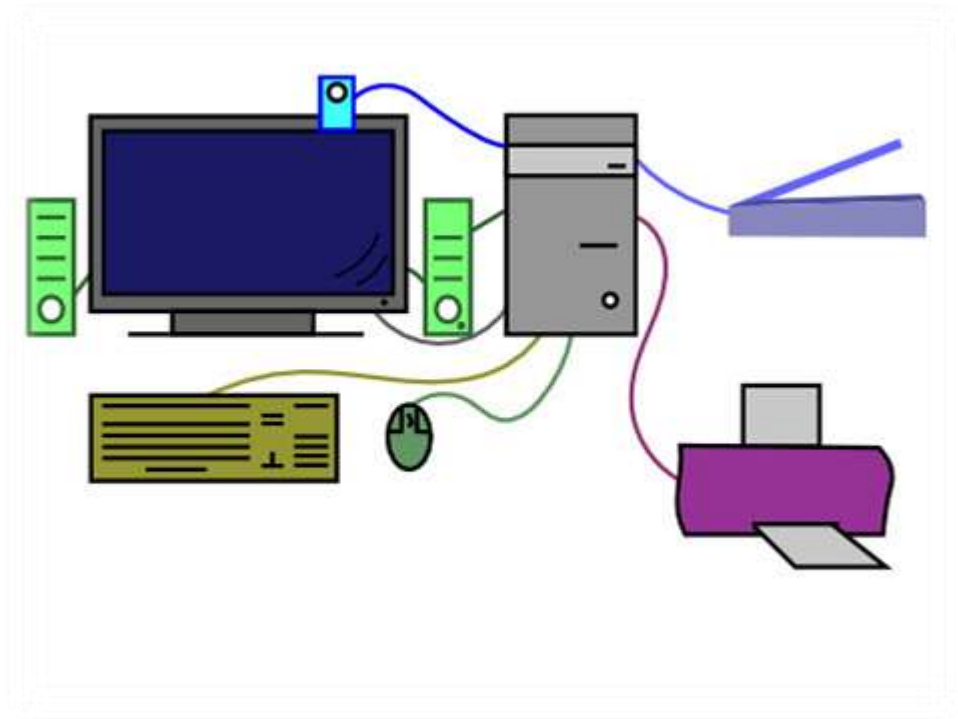## SECTION 2. INPUT/OUTPUT DEVICES

LEARNING OBJECTIVES

- To be able to describe input and output devices.
- To understand what sort of input/output devices disabled people can use.
- To identify different keys on a keyboard.
- To understand basic mouse actions.
- To know the basic features and types of monitors.
- Compare different types of printers.
- To use the superlative form of adjectives correctly.
- To use the comparative form of adjectives correctly.
- To use suffixes correctly.
- To understand instructions and advice for the use of computers.
- Learn and use connectors.

Contenido

1. PERIPHERALS

Peripherals are a generic name for any device external to a computer, but still normally associated with its extended functionality. The purpose of peripherals is to extend and enhance what a computer is capable of doing without modifying the core components of the system. A printer is a good example of a peripheral. It is connected to a computer, extends its functionality, but is not actually part of the core machine.

Do not confuse computer peripherals with computer accessories. An accessory can be any device associated with a computer, such as a printer or a mousepad. A printer is a peripheral, but a mousepad is definitely not one. A mousepad does not extend the functionality of a computer, it only enhances the user experience.

Peripherals are often sold apart from computers and are normally not essential to its functionality. You might think the display and a few vital input devices such as the **mouse** and **keyboard** would be necessary, but certain computers such as servers or embedded systems do not require mice, keyboards, or even displays to be functional.

Peripherals are meant to be easily interchangeable, although you may need to install new **drivers** to get all the functionality you expect out of a new peripheral device. The technology which allows peripherals to work automatically when they are plugged in is called **plug and play**. A plug and play device is meant to function properly without configuration as soon as it is connected. This isn't always the case however. For this reason some people sarcastically refer to the technology as 'plug and pray'.

Still, plug and play was a big deal when it was introduced in the 1990's. Before then, installing a new peripheral could take hours, and could even require changing some jumper settings, DIP switches, or even hacking away at drivers or config files. It was not a fun time except for real hardware geeks. With plug and play technology, all the nasty jumpers and DIP switches moved inside the peripheral and were virtualized into firmware. This was a clear victory for the common, nontechnical person!

Peripherals normally have no function when not connected to a computer. They connect over a wide array of **interfaces**. Some common ones from the past include: PS2 ports,

serial ports, parallel ports, and VGA ports. These are all being replaced by some new standards including USB, Bluetooth, wifi, DVI, and HDMI ports.

This picture shown the most common interfaces used in the past and the newest above.
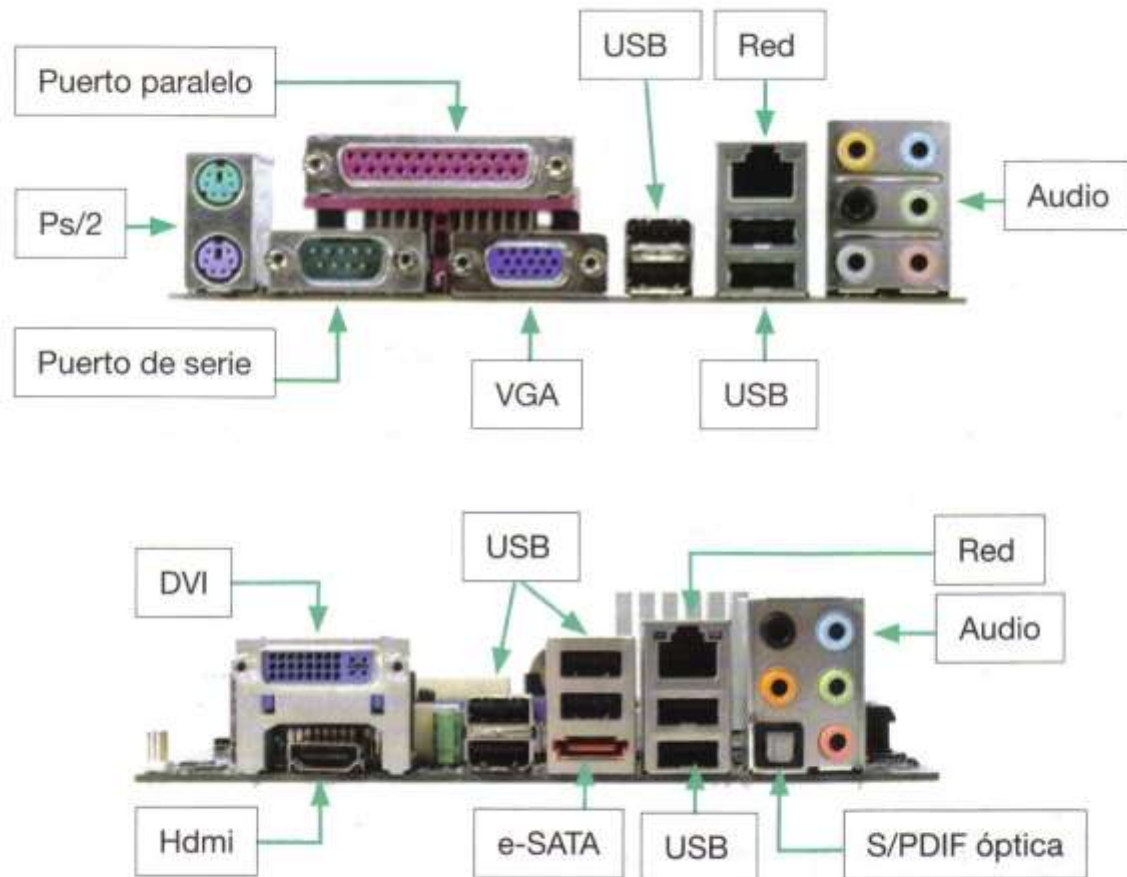
The most common peripheral linking device is probably USB technology. Why? USB is good because you can daisy chain a lot of peripherals together quickly, it is quite fast and growing ever faster in recent editions, and it even provides enough power to supply some smaller peripheral devices like webcams and flash drives.

Some peripherals are even used for security. A good example of this is the dongle. The dongle is often used to protect very expensive applications from software piracy.

1.1. Types of peripherals

There are different categories of peripheral devices exist based on their relationship with the computer:

- An **input device** sends data or instructions to the computer, such as a mouse, keyboard, graphics tablet, image scanner, barcode reader, game controller, light pen, light gun, microphone, digital camera, webcam, dance pad, and read-only memory).

- An **output device** provides output from the computer, such as a computer monitor, projector, printer, headphones and computer speaker).

- An **input/output** device performs both input and output functions, such as a computer data storage device (including a disk drive, usb flash drive, memory card and tape drive).

Furthermore, many modern electronic devices, such as internet capable digital watches, smartphones, and tablet computers, have interfaces that allow them to be used as computer peripheral devices.

2. INPUT DEVICES

We use input devices every time we use a computer. Simply speaking, it is these devices which allow us to enter information. Without them, the computer would not know what we want it to do.

Some of the things we do with input devices are: move a cursor around the screen, enter alphanumeric text, draw pictures, and even enter binary data in the form of graphics or audio wave forms.

Keyboard   Graphics tablet   Trackball   Microphone

Light pen   Game controller   Scanner   Mouse

Most likely in front of you right now are two of the most popular input devices: the **keyboard** and the **mouse**. And instead of a mouse on a laptop computer you normally have a **touchpad**.

As computers evolved throughout the late 20th century, computers became more and more interactive. Input devices came and went. Some lasted and some did not. The **light pen** and the **joystick** are almost unknown today, although they were popular before the mouse and the **gamepad** became well-known. **Touch screens** are already replacing keypads on mobile phones and may come to replace or augment keyboards and mice on PCs and laptops in the near future.

Different people prefer different input devices for doing same task. For instance, many graphic artists prefer to use a **stylus** and **graphics tablet** rather than a mouse. It might offer them a greater deal of artistic freedom, or precision while performing their work.

Sufferers of carpal tunnel syndrome often prefer a **trackball** or stylus to a mouse. Handicapped computer users have invented a wide array of input devices designed to replace the mouse including devices controlled by foot or even eye movement.

Not only PCs and mainframes use input devices. Almost all computers feature some kind of input device. Special **scanners** are used in many stores and warehouses called **barcode readers** to enter stock and sell items at the cashier. These are input devices as well. Even **microphones** can technically be called input devices as a computer can repond to them and interpret them as incoming data.

Corporations and especially government institutions are already implementing the second generation of input devices to improve security. These include **retina scanners** and/or **fingerprint readers** to replace or improve accuracy of username and password authentication. You will be seeing more of this kind of **biometric authentication** in the coming years as a general remedy for weak passwords or leaked passwords.
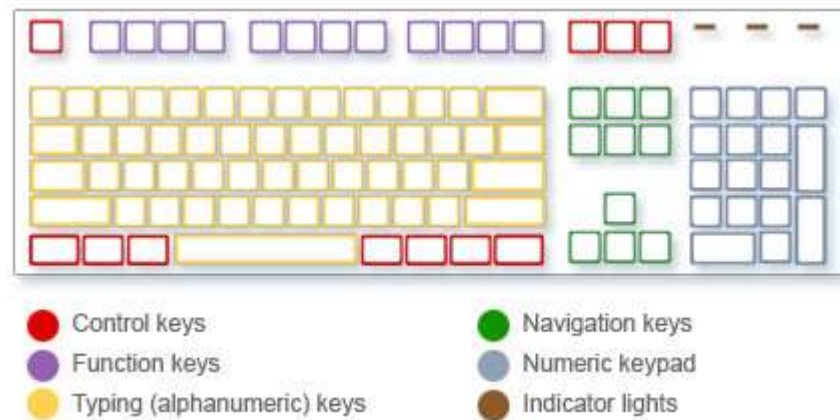
In summary, input devices are how you interact with a computer. The computer responds to your input and hopefully does what you need it to do. It seems really simple, and that's the way it was meant to be!

Now, we are going to describe some of the most important input devices: the keyboard and the mouse.

2.1. The keyboard

The keyboard is the most common input device found on computers today.

A standard keyboard includes the next groups of keys:

Control keys
Function keys
Typing (alphanumeric) keys
Navigation keys
Numeric keypad
Indicator lights

- **The navigation keys** allow you to move the cursor, move around in documents and webpages, and edit text. The following lists shown some common functions of these keys.
  - **arrow keys:** A set of four input buttons on a keypad or keyboard often used for navigation in interfaces or applications.
  - **Pgdn (page down key):** A key which jumps the cursor a preset amount of distance towards the bottom of a document. Because of varying concepts of a 'page', many programs react differently to the page down key.
  - **Pgup (page up key):** A key which jumps the cursor a preset amount of distance towards the top of a document
  - **Home:** Move the cursor to the end of a line or move to the top of a webpage
  - **End:** Move the cursor to the end of a line or move to the bottom of a webpage
  - **Insert:** Turn Insert mode off or on. When Insert mode is on, text that you type is inserted at the cursor. When Insert mode is off, text that you type replaces existing characters.

- **Control keys:** These keys are used alone or in combination with other keys to perform certain actions. The most frequently used control keys are Ctrl, Alt, the Windows logo key and esc.
    - **Alt (alternate key):** A special key which can open toolbar windows, assist other commands, or change the accent over a letter. On Macintosh computers the Alt key is called the Option key.
    - **Ctrl (control key):** A computer key often used in shortcuts or to initiate some action with the help of another key. A popular shortcut in Microsoft Word is to hit Ctrl-s to save a document.
    - **Esc (escape key):** A key normally in the upper left corner of a keyboard labeled with program specific functions such as backing out of a menu
- **Typing keys:** Whenever you need to type something in a program, e-mail message, or text box, you'll see a blinking vertical line called the cursor or insertion point. It shows where the text that you type will begin. You can move the cursor by clicking in the desired location with the mouse, or by using the navigation keys.

    In addition to letters, numerals, punctuation marks the typing keys also include these **symbols**:
    - **^ (caret key):** Often used to denote rising another number to a power; also used in regular expressions to denote the starting point. $2 \wedge 3 = 8$.
    - **# (hash key):** This key is often used to comment out code or signify a number; in the US this known as a pound sign or a number key. Often you must press the hash key on a telephone when entering information with the keypad. Please note: in the USA the 'hash key' is most often called the 'pound sign'. This is very confusing because if you say 'pound key' to a British English speaker he will probably assume you are referring to the British pound currency symbol (£).
    - **& (ampersand):** A key which is used in many languages to mean 'and'. In SQL queries it is best practice to spell out 'AND' and not just use the ampersand (&) as a shortcut.

- **@ (at sign):** The sign often used in email addresses to separate usernames from domain names. The at sign key is often in very different locations on many international keyboards

- **\ (back slash):** A key used for separating files and folders, normally in a Windows file system. The users files were located in 'C:\documents and settings\gregbrady\my documents'

- **Brackets:** The punctuation marks '{' and '}' used in pairs to set apart or interject text within other text In programming languages, brackets are often used to denote blocks of executable code.

- **> (greater than sign) :** The sign which means that the value on the right is less than the value on the left. $5 > 3$

- **< (less than sign):** The sign which means that the value on the left is smaller than the value on the right. $3 < 5$

- **Parentheses:** the punctuation marks '(' and ')'used in pairs to group values or sets of values. Parentheses are often used to group values in an equation.

- **% (percent sign):** the sign meant to show a common measurement based on a fraction of 100. The CEO reported that sales were up 75% over last quarter.

- **square brackets :** The punctuation marks '[' and ']' used in pairs to set apart or interject text within other text. In programming languages, the use of square brackets are sometimes used to show the elements of an array.

- **/ (forward slash):** A key used to separate folders and files, often used in Unix file systems. the user's php binary was located in /usr/local/php.

- **~ (tilde):** This key normally means "approximately" in mathematics; in Unix systems this character is used to represent a home directory. The student learned that his home directory was 'home/~johndoe' and his web directory was 'http://www.university.co.uk/students/johndoe'.

- **_ (underscore):** A character often used in file names to join words without using a space; originally used on typewriters to make underlined text. The long file name "hippy_dippy_string_concatenation.pl" contained many underscores because spaces aren't advised in Unix file names.

In addition, other typing keys are:

- **Del (delete key):** A key which moves the cursor one space to the right deleting any character which might be there. Macintosh laptops do not have a delete key, instead forcing the user to simultaneously press "function" and "backspace".

- **Tab key:** A key that, when pressed, moves the insertion point to the next preset marker. The usability expert showed the office workers how to save time by using tab key instead of the mouse.

- **Shift**: Press Shift in combination with a letter to type an uppercase letter. Press Shift in combination with another key to type the symbol shown on the upper part of that key.

- **Caps Lock:** Press Caps Lock once to type all letters as uppercase. Press Caps Lock again to turn this function off. Your keyboard might have a light indicating whether Caps Lock is on.

- **Enter**: Press Enter to move the cursor to the beginning of the next line. In a dialog box, press Enter to select the highlighted button.

- **Spacebar**: Press the Spacebar to move the cursor one space forward.

- **Backspace**: Press Backspace to delete the character before the cursor, or the selected text.

- **Function keys** appear at the top of the keyboard and they are used to perform specific tasks. They are labeled as F1, F2, F3, and so on, up to F12. The functionality of these keys differs from program to program.

- **A numeric keypad** appears to the right of the main keyboard. The numeric keypad arranges the numerals 0 through 9, the arithmetic operators + (addition), - (subtraction), * (multiplication), and / (division), and the decimal point as they would appear on a calculator or adding machine. These characters are duplicated elsewhere on the keyboard, of course, but the keypad arrangement allows you to rapidly enter numerical data or mathematical operations with one hand.

2.2. The mouse

A computer mouse is a **handheld** hardware input device that controls a cursor in a **GUI (graphical user interface)** and can move and select text, icons, files, and folders on your computer.

The mouse was originally known as the X-Y Position Indicator for a Display System and was invented by Douglas Engelbart in 1963 while working at Xerox PARC. But, due to Alto's lack of success, the first widely used application of the mouse was with the Apple Lisa computer.

Mice originally used a ball rolling on a surface to detect motion, but modern **mice** often have optical sensors that have no moving parts. Mice often also feature other elements, such as touch surfaces and "wheels", which enable additional control and dimensional input.

Nowadays, the term mouse can also refer to other pointing devices, such as trackballs, **touchpads** and pointing sticks built into notebook computers, pens used with touch technology, and, on computers with **touchscreens**, even a user's finger.

A **tracker ball** is an alternative to traditional mouse and favored by graphic designers. Tracker balls often give much finer control over the movement of items on the screen. They may take a while to get used to if you are using a traditional mouse, but offer a lot in terms of added flexibility.

Physically moving the mouse moves the **graphic pointer** (also referred to as the cursor) on the screen. The pointer has a variety of shapes to indicate its current behavior.

A modern mouse typically has a **primary button** (usually the left button), a **secondary button** (usually the right), and a **mouse wheel** between the two. By positioning the pointer and clicking the primary and secondary buttons on the mouse, users can select objects and perform actions on them.

① Primary button   ② Scroll wheel   ③ Secondary button

mouse pointers   the mat

Below is a list of computer mouse functions to give you an idea of all the things a mouse is capable of doing.

- **Move the mouse cursor** - The primary function is to move the mouse pointer on the screen.
- **Select** - A mouse also allows you to select text or a file or highlight and select multiple files at once.
- **Click**. Press and release
- **Double-click**. Press and release rapidly the mouse button twice.
- **Drag-and-drop** - Once something is selected, it can also be moved using the drag-and-drop method.
- **Hover** - Moving the mouse cursor over objects with hover information can help discover the function of each object on the screen. For example, hover the mouse over the "hover" link to see an example.
- **Scroll** - When working with a long document, or viewing a long web page, you may need to scroll up or down. To scroll, use the mouse wheel, or click and drag the scroll bar.
- **Perform other functions** - Many desktop mice also have buttons that can be programmed to perform any function. For example, many mice have two **side buttons** on the thumb portion of the mouse the button closest to the palm can be programmed to go back on web pages.

3. Output devices

An output device is a piece of computer hardware that receives data or instructions from a computer. Essentially, the computer interacts with the output device in some way. The most common output devices are the monitor and printer, but there are many others.

An output device converts information into human-readable form. It can be text, graphics, tactile, audio, and video.

Some of the output devices are Visual Display Units (VDU) i.e. a Monitor, Printer, Graphic Output devices, Plotters, Speakers etc. A new type of Output device is been developed these days, known as speech synthesizer, a mechanism attached to the computer which produces verbal output sounding almost like human speeches.

Below you can find more detail for some output devices.

3.1. Display devices

A display device is the most common form of output device. It presents output visually on computer screen. The output appears temporarily on the screen and can easily altered or erased, it is sometimes referred to as soft copy also. The display device for a desktop PC is called monitor.

With all-in-one PCs, notebook computers, hand held PCs and other devices; the term display screen is used for the display device. The display devices are also used in home entertainment systems, mobile systems, cameras and video games.

The most common output device used with computers is the monitor, which displays video images and text. A monitor essentially consists of a screen, circuitry, a power supply, buttons to adjust screen settings, and a casing that contains all of these components. The first monitors used the same technology as early televisions, relying on a cathode ray tube and fluorescent screen, but nowadays they incorporate flat panel display technology. VDT(video display terminal) and VDU(video display unit) are alternative names for monitors.

The basic features of a monitor are:

- **Resolution** refers to the number of dots of colour, |known as **pixels** (picture elements), contained in a display. It is expressed by identifying the number of pixels on the horizontal and vertical axes. A typical resolution is 1024x768.
- Two measurements describe the size of your display:
    - The **aspect ratio**. Historically, computer displays, like most televisions, have had an aspect ratio of 4:3 - the width of the screen to the height is four to three. For widescreen LCD displays, the aspect ratio is 16:9, very useful for viewing DVD movies, playing games and displaying multiple windows side by side. High-definition TV also uses this format.
    - The viewable **screen size** is measured diagonally, so a 19" Screen measures 19" from the top left to the bottom right.
- Inside the computer there is a video adapter, or graphics card, which processes images and sends signals to the monitor. Monitors can use a **VGA** (video graphics adapter) cable, which converts digital signals into analogue Signals or **DVI, HDMI or DisplayPort**, which uses only digital signals.
- **Colour depth** refers to the number of colours a monitor can display. This depends on the number of bits used to describe the colour of a single pixel. For example, an old VGA monitor with an 8-bit depth can generate 256 colours and a Super VGA with a 24-bit depth can generate 16.7 million colours. Monitors with a 32-bit depth are used in digital video, animation and video games to get certain effects.

Besides, there are different display technologies:

- An **LCD** is made of two glass plates with a liquid crystal material between them. The crystals block the light in different quantities to create the image. Active-matrix LCDs use TFT (thin film transistor) technology, in which each pixel has its own switch. The amount of light the LCD monitor produces is called brightness or luminance, measured in cd/m? (candela per square metre).
- In a **plasma screen**, images are created by a plasma discharge which contains noble (non-harmful) gases. Plasma TVs allow for larger Screens and wide viewing angles, making them ideal for movies.

- **Organic Light-Emitting Diodes (OLEDs)** are thin-film LED displays that don't require a backlight to function. The material emits light when stimulated by an electrical current, which is known as electroluminescence. They consume less energy. produce brighter colours and are flexible - i.e. they can be bent and rolled up when they are not being used.

3.2. Speakers and headphones

Speakers and **headphones** are output devices, which means they send information from the computer to the user—in this case, they allow you to **hear sound and music**. Depending on the model, they may connect to the **audio** port or the **USB port**. Some monitors also have **built-in speakers**.

Computer speakers are hardware devices that transform the signal from the computer's **sound card** into audio. Speakers are essential if you want a louder sound, surround sound, fuller bass, or just a better quality of audio. External computer speakers began to appear in stores in the early 1990's when computer gaming, digital music, and other forms of media became popular. Some computer speakers are wireless nowadays, connecting to the computer via Bluetooth.

Headphones, also known as **earphones**, allow you to listen to audio without disrupting other people in the vicinity. They connect via the computer line out, or to the speakers. The first headphones were invented in 1910 for U.S. Navy use. Nowadays, headphones come in all sorts of shapes and sizes, from basic earbuds to the more traditional style with padding around the earpieces and a connecting band that fits over the user's head.

Speakers and headphones aren't just for music, they also allow us to hear computer warning signals and other people when communicating via voice or video calls.

3.3. Printer

Printers are another common output device found in homes in offices. In computing terms, they take electronic data stored on a computer and generates a **hard copy** of it. Usually that means printing images and text onto paper. Modern printers usually connect to a computer with a USB cable or via **Wi-Fi**.

There are many types of printers, including **inkjet**, **laser**, and **photo** printers. There are even **all-in-one printers**, which can also scan and copy documents.

Inkjet printers are output devices usually used in a home or small office for low volume printing. A moving print head sprays **ink** droplets on to the paper from a cartridge filled with liquid ink. Thermal bubble technology is used to fire these microscopic ink droplets from the cartridge.

Because the bulk of the action happens in the high-tech **ink cartridges**, they are priced quite highly in relation to the price of the actual printers (which are often very affordable).

Inkjet printers are now commonly combined with a flatbed scanner to create an all in one solution.

Inkjets are fairly fast, quiet, and not as expensive a laser printers. Nevertheless, you can still expect high quality results because there are some inkjet primers on the market with a resolution of 2.400 dpi.

Laser printers produce output at great speed and with a very high resolution of 1,200-2,400 dpi. They scan the image with a **laser beam** and transfer it to paper with a special ink powder called **toner**. They are constantly being improved. In terms of speed and image quality, laser printers are preferred by experts for various reasons; for

instance, they have a wider range of scalable fonts than inkjets, can emulate different language systems, and can produce high- quality graphics; however, they are still expensive for home users.

Thermal transfer printers are used to produce colour images by transferring a **wax-based ink** onto the paper. They are popular tor printing bar codes, labels and medium-resolution graphics.

Imagesetters produce very high-resolution output (up to 3.540 dpi) on paper or on the actual film for making the printing plates. In addition, they are extremely fast. Imagesetters are most often used in **desktop publishing (DTP)**. Although they produce the highest quality output, they have one important disadvantage: they are too expensive for homes or small offices.

Plotters use ink and fine pens held in a carriage to draw very detailed designs on paper. They are used for construction plans, engineering drawings and other technical illustrations. Nowadays, traditional plotters are being replaced with wide-format inkjets.

Finally, **3D printers** are output devices used to create three dimensional objects from a 3D computer model. The computer model can be created by using a 3D scanner, or by hand using **CAD** modeling software. Using a method called additive manufacturing, 3D objects are created by layering a material, layer by layer, from the ground up until the object is completed.

The most typical applications for 3d printers are home and commercial use, prototyping parts and solutions, human prosthetics and medical aids.

The principal drawback of 3D printers is that they are expensive to buy although entry models are becoming more affordable

4. Devices for the disabled

People with disabilities meet barriers of all types. However, technology is helping to lower many of these barriers. By using computing technology for tasks such as reading and writing documents, communicating with others, and searching for information on the Internet, students and employees with disabilities are capable of handling a wider range of activities independently.

Hardware and software tools (known as **adaptive** or **assistive technologies**) have been developed to provide functional alternatives to these standard operations.

The latest assistive technology is designed to help them use computers and do their jobs in the office, learn at school, of interact with their families at home. In addition, new laws oblige companies to adapt the workplace to accommodate disabled people. For example, the Americans with Disabilities Act (ADA) and the UK's Disability Discrimination Act make it illegal for employers to discriminate against people with disabilities.

Here is a guide to disability groups and the relevant adaptive technology.

To work effectively, most **blind users** need to have their computers adapted with technologies such as Braille, Screen magnifiers, Speech synthesis and Optical character Recognition (OCR).

- **Braille keyboards** have Braille lettering on keyboard overlays, allowing the blind user to easily identify each key.

- For output, there are printers, called **Braille embossers**, that produce tactile Braille symbols on both sides of a page at high speed.
- For someone with limited but usable vision, a **screen magnifier** may be appropriate. This type of software can enlarge text and images appearing on the screen by up to 16 times.
- A **speech synthesis system** is used to read aloud the work on the computer. It has a speech synthesizer, which produces the audio output, and a screen reader - the

program which reads aloud text and menus from word processors, databases and the Web.

- **OCR** uses a flatbed scanner and specialized OCR software to read printed material and send the text to the computer. The PC can then produce a copy of the text in Braille, a magnified copy, or a version that can be read aloud by a speech synthesis system.

Deaf computer users can overcome many communication difficulties with the aid of visual alerts, electronic notetakers and textphones.

- **Visual alerts** are indicators that alert the deaf user when they receive new mail or when there is a system error. So instead of hearing a sound, the user is alerted by a blinking menu bar or by a message on the screen.

- **Electronic notetakers** use software that types a summary of what is said in meetings onto the computer screen.

- **Textphones** allow the deaf to type and read phone conversations. They are also called TDOs (Telephone Devices for the Deaf) or TTYs (TeleTypewriters). They can be used in combination with relay services, where an operator says what the text user types, and types what a voice phone user Says. Deaf people can also communicate via SMS and instant messaging.

Mobility-impaired people have trouble using the hardware of their computers rather than understanding or interpreting information.

Motor-impaired workers unable to type on a standard keyboard can employ expanded or ergonomic keyboards, on-screen keyboards, adaptive switches and voice recognition systems.

- **Keyboard guards and overlays**: A sheet of thick plastic with holes lets you guide your fingers to just the right key. Useful if you have cerebral palsy or a tremor that makes you depress more than one key at a time, or if too many errant keystrokes precede or follow a correct keypress.

- **On-screen keyboards** are software images of a keyboard that appear on the Screen and may be activated with a trackball, touch screen, screen-pointing device, of eye movements.

- In an **eyegaze system**, the keys on the virtual keyboard are activated by the user's eyes when they pause on a key for two or three Seconds.
  Eyegaze technology consists of a video camera and image processing software, which determines the eye's gazepoint on the screen.

- **Switches** come in many shapes and sizes. They are operated by muscle movements or breath control. For example, a pneumatic switch - known as a sip and puff - allows someone with quadriplegia to control the PC by puffing and sipping air through a pneumatic tube. People with quadriplegia can also use sip and puff joysticks.

- Finally, there's **voice recognition**, which allows the computer to interpret human speech, transforming the words into digitized text of instructions.

5. Language work

5.1. Describing functions

There are different ways of describing a devices function:

- **for + gerund.**
  - This 15 a device for controlling the cursor and selecting items on the Screen.
- **used + to + infinitive**
  - It is used to control...
- **relative pronoun + verb**
  - This is a device which controls..
- **A relative pronoun + used + to + infinitive**
  - This is a device which/that is used to control ...
- **work by + gerund**
  - It works by detecting light from the computer Screen,

5.2. Describing features

We can describe device features like this:

- An optical mouse **has** an optical sensor instead of a ball underneath.
- It usually **features** two buttons and a wheel.
- You **can** connect it to a USB port
- A wireless mouse **works/operates** without cables.
- It **allows** the user **to** answer multiple-choice questions and...

5.3. Instructions and advice

- We use the **imperative** to give instructions.
  - Get an adjustable chair.
  - Don't put your monitor in front of a window.
- We use **should and shouldn't** + **infinitive** to give advice or to talk about what we think is a good or bad idea.
  - You should look down at the monitor, not up.
  - You shouldn't use a monitor that's fuzzy or distorts the image.
- We can also give advice by using **set phrases** like
  - It's a good idea to + infinitive.
  - It's a bad idea to+ infinitive.
  - It's a good idea to have a monitor with a tilt-and-swivel stand.

5.4. Comparatives

- We form the comparative of **one-syllable** adjectives by **adding -er**.
  - Slow →Slower
    - Inkjet printers are Slower than laser printers, but much cheaper.
  Note that if a one-syllable adjective ends in a single vowel letter followed by a single consonant letter, the consonant letter is doubled, e.g. *thin – thi**nn**er,big - bi**gg**er*.
- **Two-syllable** adjectives usually take **more/less**.
  - modern→more modern
    - They're designing a more modern version at the moment.
- Adjectives **ending in -y** (for example, noisy) take **-er** and the **y changes to i.**
  - Dot-matrix printers are noisler than inkjets.
- We form the comparative of adjectives with **three or more syllables** by adding **more/less**.
  - versatile→More versatile
    - They're cheaper and more versatile than standalone products.
- Note the **irregular forms**:
  - good→better
  - bad→worse
  - little→less
    - If you want better results, you'll need specialized software.
- Equality is expressed by using **as ... as**
  - This is as fast as many other printers in its class.
- Difference can be shown by using **not as .. as**.
  - Inkjets are not as expansive as laser printers.

5.5. Superlatives

1. We form the superlative of **one-syllable** and most **two-syllable** adjectives by adding –**est**:

- cheap → the cheapest
- Clever → the cleverest

Note that if a one-syllable adjective ends in a single vowel letter followed by a single consonant letter, the consonant letter is doubled, e.g. *thin/thi**nn**est*, *big - /bi**gg**est*.

2. Some two-syllable adjectives (including those **ending in -ing, -ed. -ful and -less**) form the superlative with the most/least.

- advanced →the most advanced

3. Adjectives with **three or more** syllables also take the most/least

- Fantastic→ the most fantastic
- powerful → the least powerful

4. But **two-syllable** adjectives **ending in -y** (for example, noisy) take **-est** and the **y** changes to **i**.

- nosy → the noisiest

5. Note the **irregular forms**:

- good → the best
- bad → the worst
- little → the least

5.6. Suffixes

Suffixes change the class of the root word. For example, by adding the suffix **-al**, the noun digit is changed into the adjective digital.

Suffixes can help you tell if a word is a noun, an adjective or a verb.

- Common **adjectival suffixes** are: -**y, -able, -ible, -ive, -al, -ed, -ful. -ic, -less, -ing**

- Common **noun suffixes** are: **-er, -or, -ton, -tion, -ation, -ment, -ness, -ity, -ant, -logy, -ing, -y, -ure, -sion**

- Note that if a word ends in a single vowel letter followed by a single consonant letter, the consonant letter is doubled, e.g.

    o Scan→Scanner (double n)

5.7. Noun phrases

A noun phrase is a phrase that has a noun as its head. This noun can be accompanied by a modifier that gives information about the head.

modifier	head
Speech	recognition
compatible	computer

A noun phrase can function as the subject or object of a verb. It can contain the following range of modifiers:

- adjectives

    o I have a portable computer.= a Computer which is portable

- present participles

    o I use this drawing program.= a program that draws

- 's genitive

    o The files are on the director's computer. = the computer which belongs to the director

- Nouns

    o I need to buy a colour scanner. = a scanner which uses colour.

5.8. CONNECTORS

We can link the sentences and the discourse using CONNECTORS (and, or, but, because) and SEQUENCERS (then, before/after breakfast, ...).

Check out the following examples:

	Connectors	Function
Giving reasons	and	Is used to add another idea or concept.
	or	Introduces one or more alternatives.
	but	Introduces an exception or a contrast.
	because	Demonstrates the reason for something.
Listing/Sequencing	first	Introduces the first of a sequence.
	then	Introduces the next action or concept.
	later	Introduces the next action or concept.
	after	That also introduces another action or concept.
	before	Demonstrates a previous action or concept.
	finally	Demonstrates the last action or concept.
Exemplification	For instance Such as	Introduces an example referring to the last idea.
	For example	Introduces an example referring to previously stated ideas.

As you can see in the information above, each connector has a specific function (addition, to introduce new ideas, give a reason etc.); connectors of sequence will help you express the order in which things happen.

6. SELF-ASSESMENT

Select the correct answer for each question:

1) What is the superlative form of fat?
   a) fattiest
   b) the fattest
   c) fattest
2) 'plug and play'
   a) a term used to describe the technology where a peripheral device is automatically recognized and configured when it is detected
   b) any specialized video camera designed to transmit video over the internet
   c) a device which converts digital signals into analog signals, and back again when needed
3) 'printer'
   a) a device for capturing a binary digital image from a hard copy
   b) a hardware device that plugs into a parallel or a USB port, acting as copy protection for a particular software application.
   c) a peripheral device that produces a hard copy, normally paper, from data stored in a computer
4) 'scanner'
   a) a peripheral device that produces a hard copy, normally paper, from data stored in a computer
   b) a device for capturing a binary digital image from a hard copy
   c) An internal or external device which converts electrical impulses into audible sound.
5) 'OCR' or 'optical character recognition'
   a) an input device or mouse alternative using a sensitive rectangular surface and a stylus
   b) To press and release the primary (left-side) mouse button
   c) the ability of a computer to determine standard letters and numbers based on fuzzy logic
6) 'input device'
   a) any peripheral used primarily to show data
   b) any peripheral used primarily to enter data into a computer
   c) a hardware peripheral designed to 'scan' products into an inventory tracking system.

7) 'touchpad'
   a) a display that also acts as an input device by allowing a user to navigate a program by pressing specific locations of the screen.
   b) a handheld input device used to move an onscreen pointer by means of sliding on a flat surface
   c) an input device consisting of a sensitive rectangular area in which one uses a finger to move a cursor on a display.
8) 'speech recognition'
   a) A special icon (normally an arrow) which indicates the current location of the mouse on the desktop screen.
   b) an input device consisting of a sensitive rectangular area in which one uses a finger to move a cursor on a display.
   c) the ability of a computer to convert spoken words from a user into usable data.
9) 'trackball'
   a) a part of an input device resembling a pen used to draw on the surface of a graphics tablet
   b) a pointing device consisting of a ball on top of a base that is rotated to move a cursor on the computer screen
   c) any peripheral used primarily to enter data into a computer
10) 'touchscreen'
   a) any peripheral used primarily to enter data into a computer
   b) a part of an input device resembling a pen used to draw on the surface of a graphics tablet
   c) a display that also acts as an input device by allowing a user to navigate a program by pressing specific locations of the screen.

ANSWERS

1	2	3	4	5	6	7	8	9	10
b	a	c	b	c	b	c	c	b	c

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