

*Unit 02: Computer Systems

Week 05 Lesson 01

* Aims & Objectives

- * Define Ports & Connectors (Serial, Parallel & USB)
- * State reasons for Backing Storage
- * Examine Portable & Fixed Drives
- * Create Cat5 Ethernet Cable
- * Describe the types of printers currently available
- * Describe the installation and configuration process for printers
- * Describe the types of scanners currently available
- * Describe the installation and configuration process for scanners

*Introduction

- Printers produce paper copies of electronic files.
 - Hard copies of computer documents remain important today.
- Scanners allow users to convert paper documents into electronic files.



*Printers

- As a computer technician, you may be required to purchase, repair, or maintain a printer.
- Printer selection criteria:
 - Capacity and Speed
 - Color
 - Quality
 - Reliability
 - Warranty
 - Scheduled servicing
 - Mean time between failures (**MTBF**)
- Total Cost of Ownership (**TCO**)

*Printer to Computer Interfaces

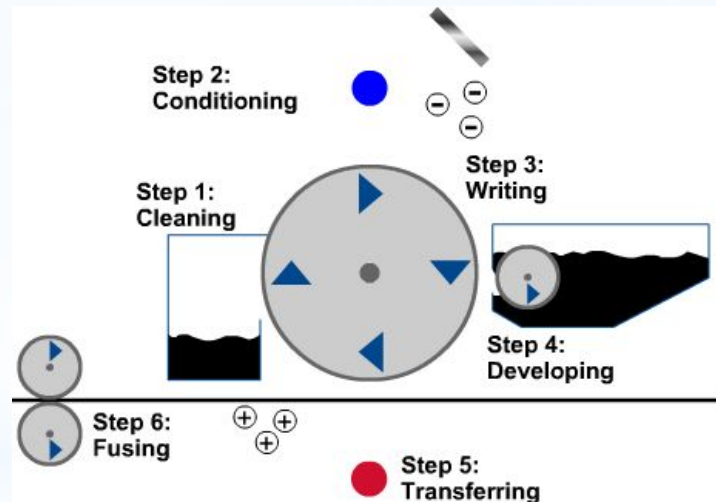
- To access a printer, a computer must have an **interface** with it. The following are common interface types:
 - Serial
 - Parallel
 - Small Computer System Interface (SCSI)
 - Universal Serial Bus (USB)
 - Firewire
 - Ethernet
 - Wireless
 - Infrared
 - Bluetooth.
 - Wi-Fi

* Laser Printers

* A laser printer is a high-quality, fast printer that uses a laser beam to create an image.

* Laser printing process

1. Cleaning
2. Conditioning
3. Writing
4. Developing
5. Transferring
6. Fusing



* **WARNING:** The primary corona wire or grid, or the conditioning roller, can be very dangerous. The voltage runs as high as -6000 volts. Only certified technicians should work on the unit. Before working inside a laser printer, you should make sure that voltage is properly discharged.



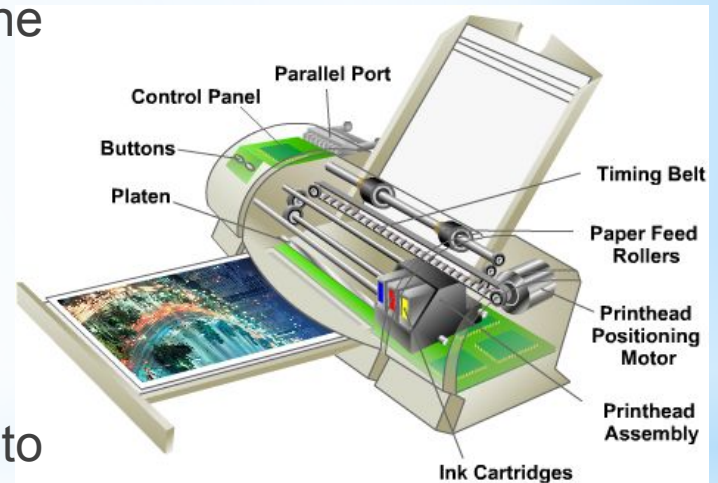
Impact Printers

- Impact printers use a **print head** impacts a printer tape or inked ribbon to create characters.
- There are two types:
 - **Daisy-wheel**
 - **Dot-matrix**
- They use inexpensive consumables and have carbon copy printing ability. Unfortunately they are also noisy, have lower graphic resolution and limited color capabilities.



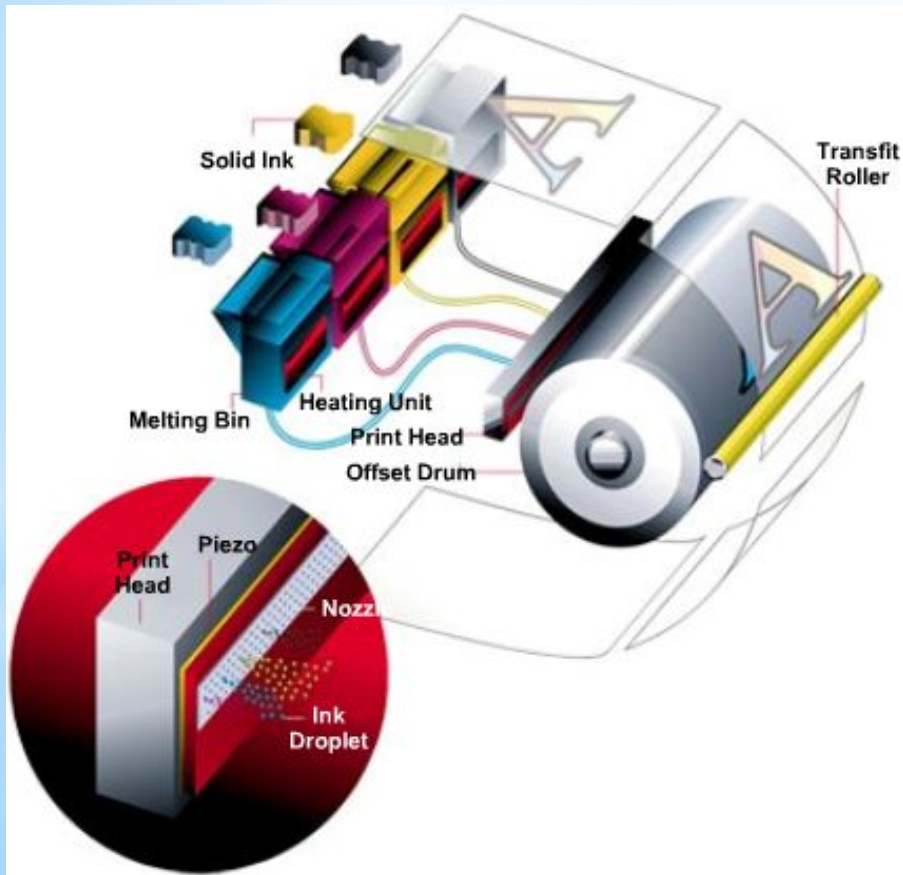
* Inkjet Printers

- Use ink-filled cartridges that spray ink onto a page through tiny holes, or **nozzles**. The ink is sprayed in a pattern on the page, one column of dots at a time.
- Two types of inkjet nozzles:
 - **Thermal**
 - **Piezoelectric**
- They produce high quality print, are easy to use and are less expensive than laser printers. However the nozzles are prone to clogging and the ink is wet after printing.
- A **feeding mechanism** draws paper in and the paper passes by the print head where ink is sprayed onto it.



*Solid-ink Printers

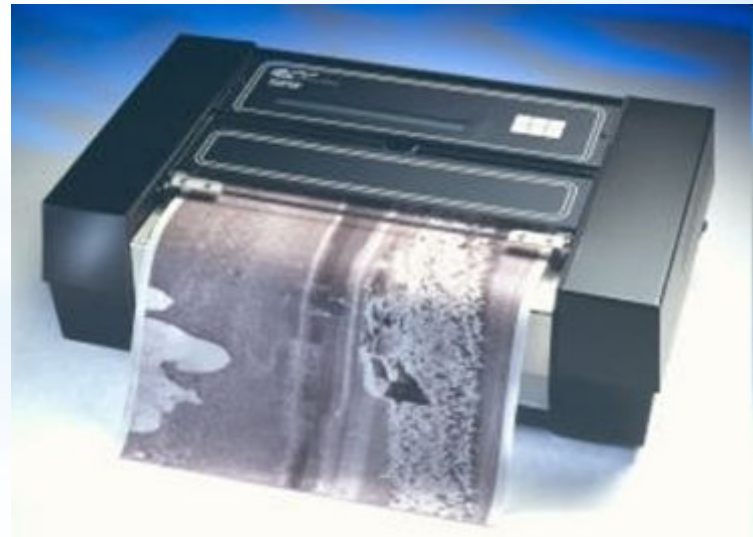
Use solid sticks of ink rather than toner or ink cartridges.



- The printing process:
 1. Cleaning
 2. Spraying
 3. Transferring
- This type of printers produce vibrant color prints and can use many different paper types.
- The printer and the ink used are normally expensive and they are slow to warm up.

*Thermal Printers

- A **thermal printer** uses chemically-treated paper that becomes black when heated.
- A **thermal transfer printer** uses heat-sensitive ribbon, which the print head melts onto the paper.
- Thermal printers have a longer life because there are few moving parts.
- Disadvantages:
 - Paper is expensive
 - Paper has a short shelf life
 - Images are poor quality
 - Paper must be stored at room temperature





* Dye-Sublimation Printers

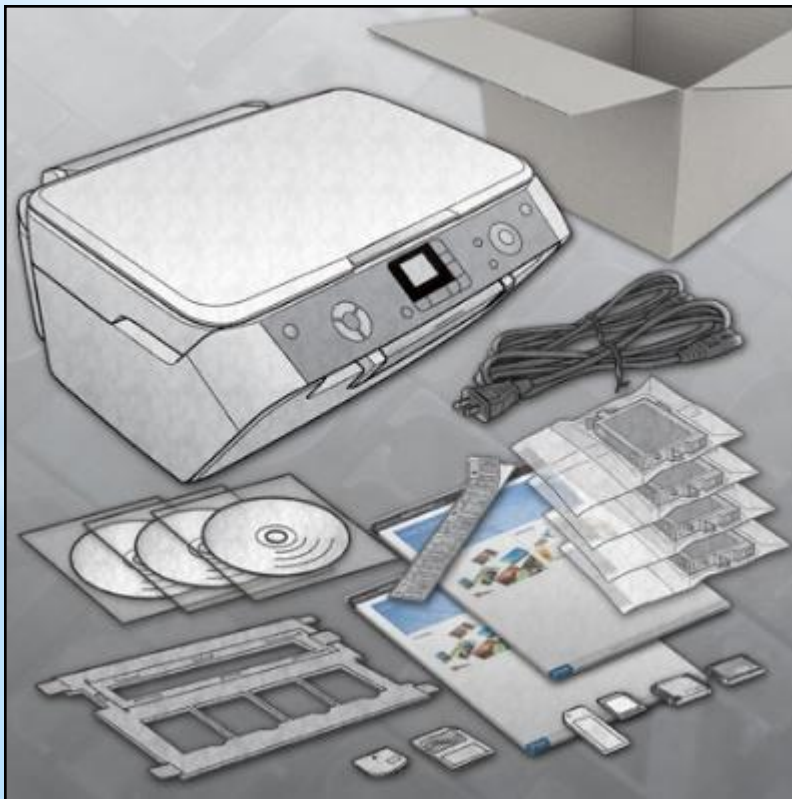
- Also called **thermal dye** printers
- Usually used in producing photo-quality images for graphic printing
- Uses solid sheets of ink that change directly from solid to gas when heated, in a process called **sublimating**
- Advantages:
 - Very high quality images
 - Overcoat layer reduces smearing, increases moisture resistance



- Disadvantages:
 - Media can be expensive
 - They are better for color than for grayscale (black and white)

* Installation and Configuration of Printers

- When purchasing a printer, the installation and configuration information is usually supplied by the manufacturer:



- An installation media that includes drivers, manuals, and diagnostic software.
- Also available as downloads from the manufacturer's website.
- Although all types of printers are somewhat different to connect and configure, there are procedures that should be applied to all printers.

*Types of Scanners

- Technicians may be required to purchase, repair, or maintain a scanner.
- The following are tasks that a customer may request:
 - Select a scanner
 - Install and configure a scanner
 - Troubleshoot a scanner



*Scanners

- Scanners typically create an RGB image that can be converted into image formats such as JPEG, TIFF, Bitmap, and PNG.
- Some scanners can create text documents using **optical character recognition (OCR)**.
- Resolution of a scanner is measured in **dots per inch (dpi)**. Like printers, the higher the dpi, the better the quality of the image.
- Interfaces and cables used for scanners are typically the same as those used for printers: Parallel, USB, SCSI, and Firewire.

* All-in-one Scanners

- An **all-in-one** device combines the functionality of multiple into one physical piece of hardware (scanner, printer, copier and fax).
- Normally this type of devices are not expensive and easy to configure. Unfortunately they are usually no designed for heavy use and a single problem can affect all the functionality.



* Flatbed Scanners

- * Often used to scan books and photographs for archiving.
- * Image is acquired by placing the document face down on the glass. The **scanner head** lies beneath the glass and moves along the item, capturing the image.
- * The glass should be maintained clean and protected from scratching.



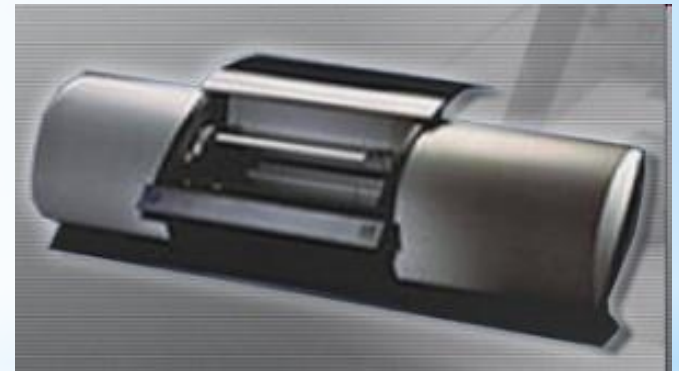
* Handheld Scanners

- A handheld scanner is small and portable.
- Pass the scanner head across the surface you want to scanner.
- When you want to scan an item larger than the head of the handheld scanner, you must make more than one pass to capture the full image.



* Drum Scanners

- * Drum scanners produce a high-quality scanned image, but they are being replaced by lower priced, high-quality flatbed scanners.
- * Still in use for high-end reproductions, such as archiving photographs in museums.
- * To scan an image using a drum scanner you should attach the image to a revolving drum or load it into a supporting canister.



* Installation and Configuration of Scanners

- * An installation media includes drivers, manuals, and diagnostic software will be included with the scanner.
- * The same tools may also be available as downloads from the manufacturer's website.



* Preventive Maintenance Techniques

- Printers and scanners have many moving parts that can wear out over time or through extended use.
- Also moving parts can be affected by dust and other particles.
- Clean printers and scanners regularly to avoid downtime, loss of productivity, and high maintenance costs.



* Preventive Maintenance Techniques (Continued)

- Printer Maintenance

- Printers have many moving parts and require more maintenance than most electronic devices.
- **CAUTION:** Unplug the printer from the electrical source before beginning maintenance.

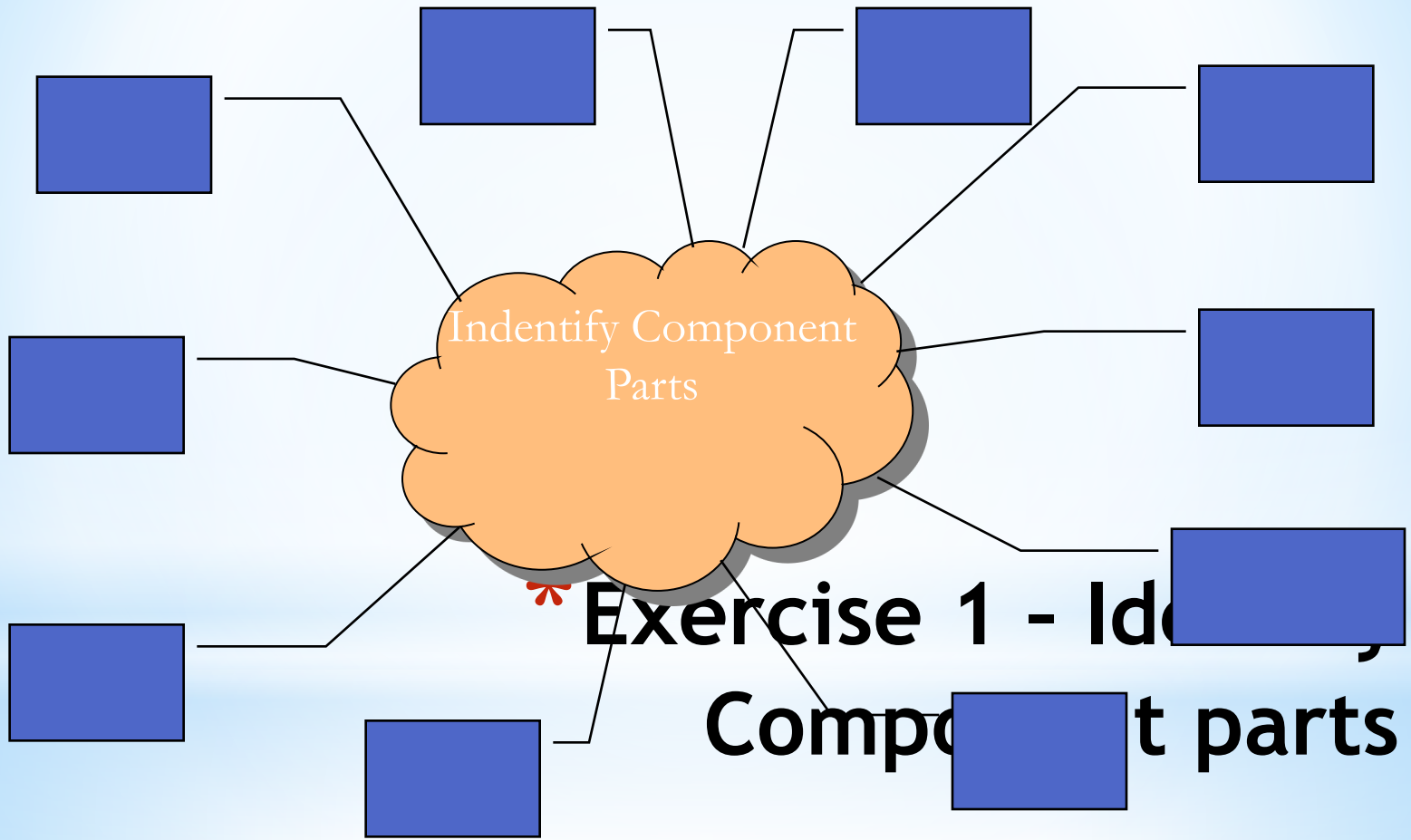
- Paper and Ink

- Using the correct type of paper can help you to ensure that the printer operates longer and prints more efficiently.
- Types of printer paper available include inkjet and laser. Some papers, especially photo paper and transparencies, have a right and wrong side marked by an arrow on the package.
- Manufacturer will recommend the brand and type of ink to use. Do not refill ink cartridges because the ink may leak.

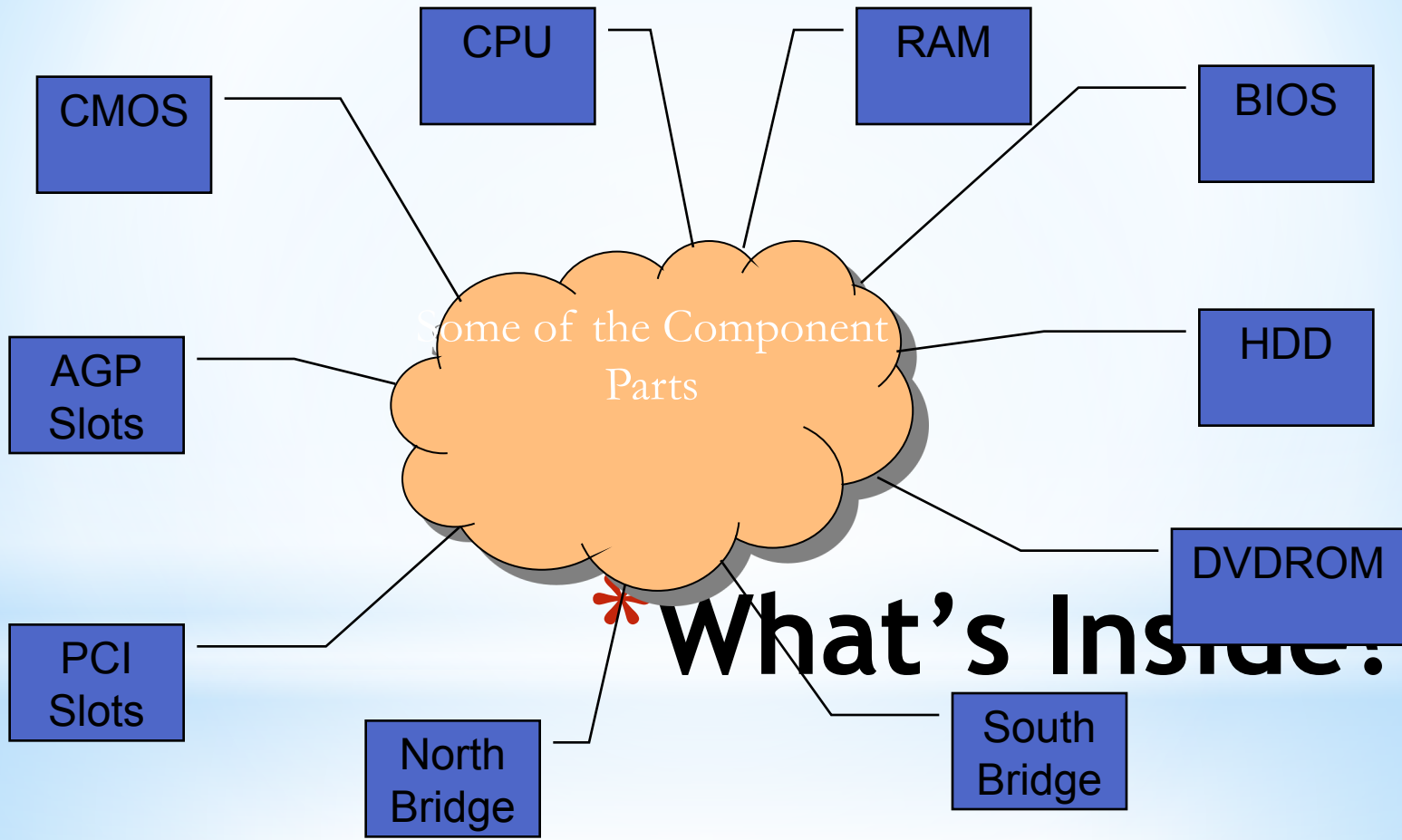
* Preventive Maintenance Techniques (Continued)

* Scanner Maintenance

- The scanner surface should be kept clean. If the glass becomes dirty, consult the manufacturer's user manual.
- If the inside of the glass becomes dirty, check the manual for instructions on how to open the unit or remove the glass from the scanner.
- When the scanner is not in use, keep lid closed.
- Never lay anything heavy on a scanner.



Exercise 1 - Identify Component parts



What's Inside:

*Functional Skills Links

*English

*Preparation for

*Reading

*Understanding

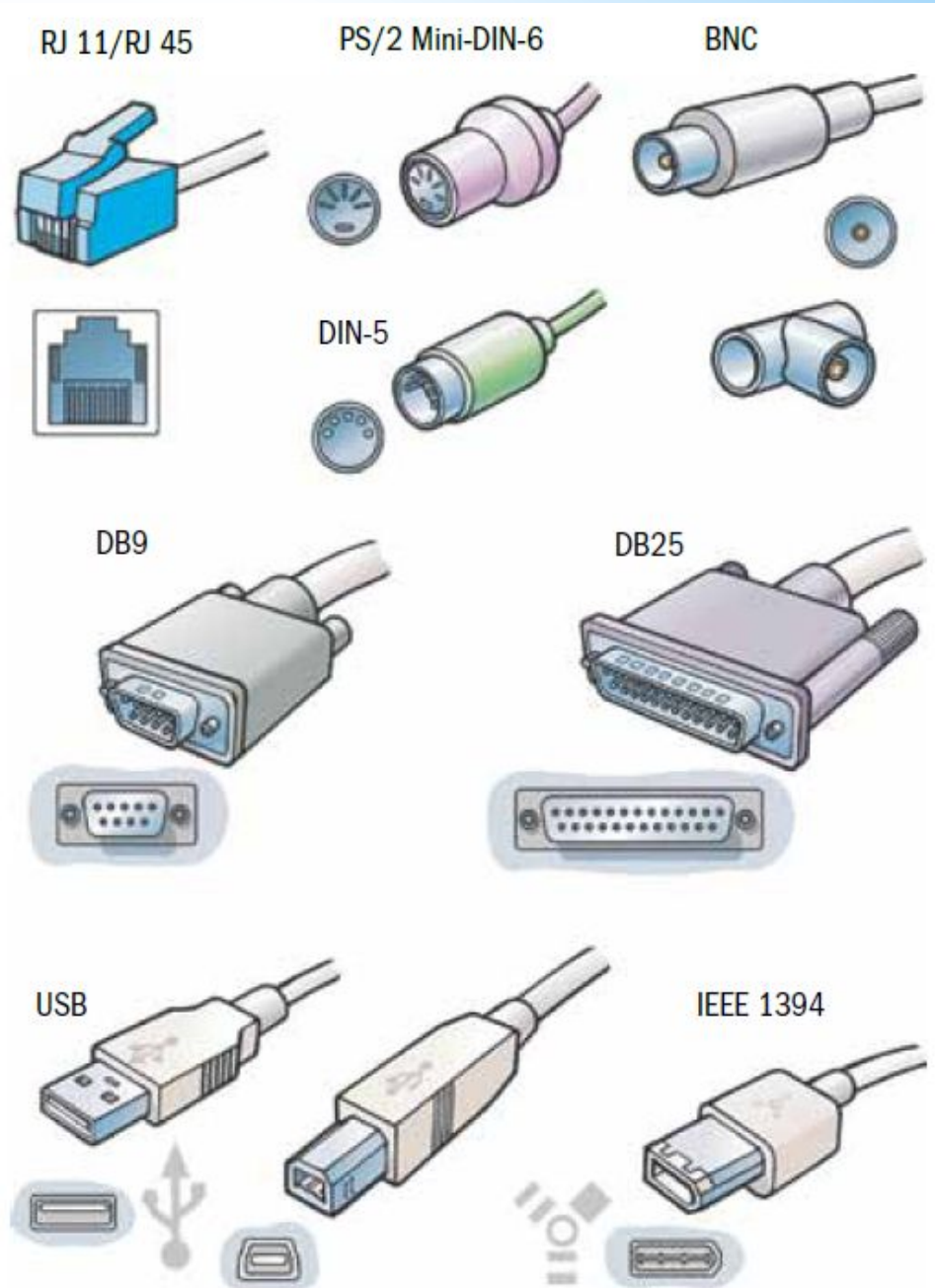
*Expressing yourself clearly

*Maths

*Reading and expressing numerical values

*Ports & Connectors

- * Not all peripherals need a cable to link them to the port;
- * Some use wireless or infrared technology
- * However, a variety of ports are available so that a range of peripherals, each with differing needs, may be attached to the processor



*Ports & Connectors Cont.

- * If cabling is used, the transfer of data to and from the peripheral will be **one of two** types:
- * **Serial transmission** - 1 bit at a time and the cable is usually circular in cross-section
- * **Parallel transmission** - 1 byte (8 bits) at a time, this cabling looks like a ribbon, the wires being laid side by side
- * The simplest devices such as mouse and keyboard only need serial connection, where others, such as printers benefit from the two-way communication of parallel connections
- * What are the speeds of USB 1, 2 & 3?
- * [What is USB 3?](#)

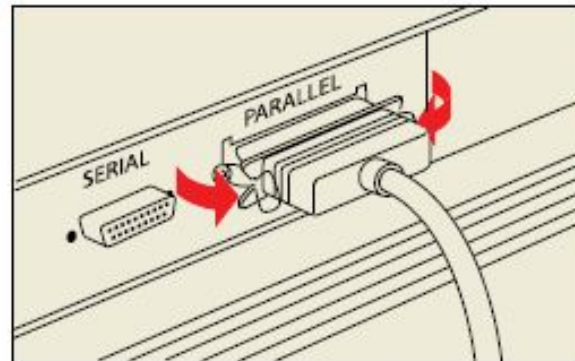
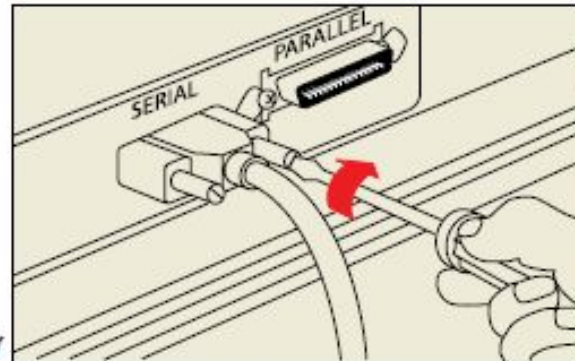
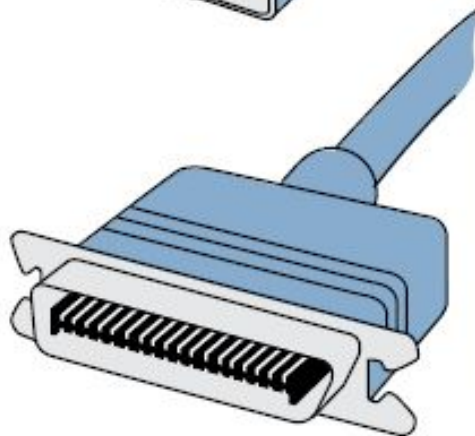
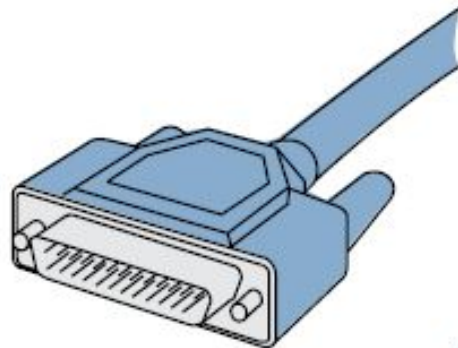
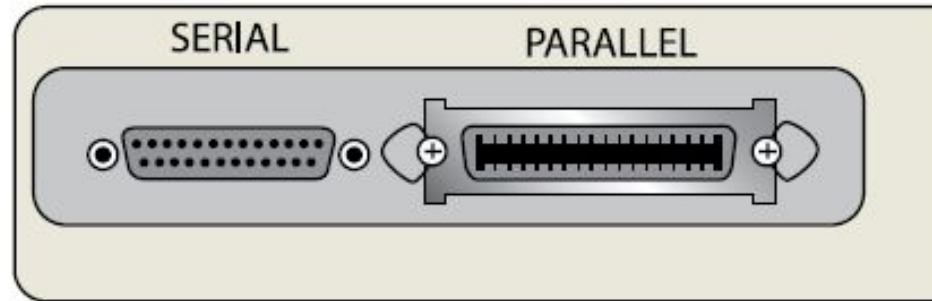
* Serial & Parallel Port

- * The serial and parallel ports on the PC are very different, as are the connectors that fit into them
- * The serial port conforms to the RS-232c standard and requires a 25-pin male port, but PCs only use 9 of these pins so it can be, and often is, replaced by a 9-pin male port.
- * The parallel port on the PC, e.g. for a printer, offers a female 25-pin DB (databus) connector
- * A male 25-pin DB connector on one end of the printer ribbon cable will clip or screw into place.
- * At the other end of the cable, at the printer end, is the 36-pin Centronics connector

*Using two Dictionaries...

*Serial/Parallel Dictionary Activity

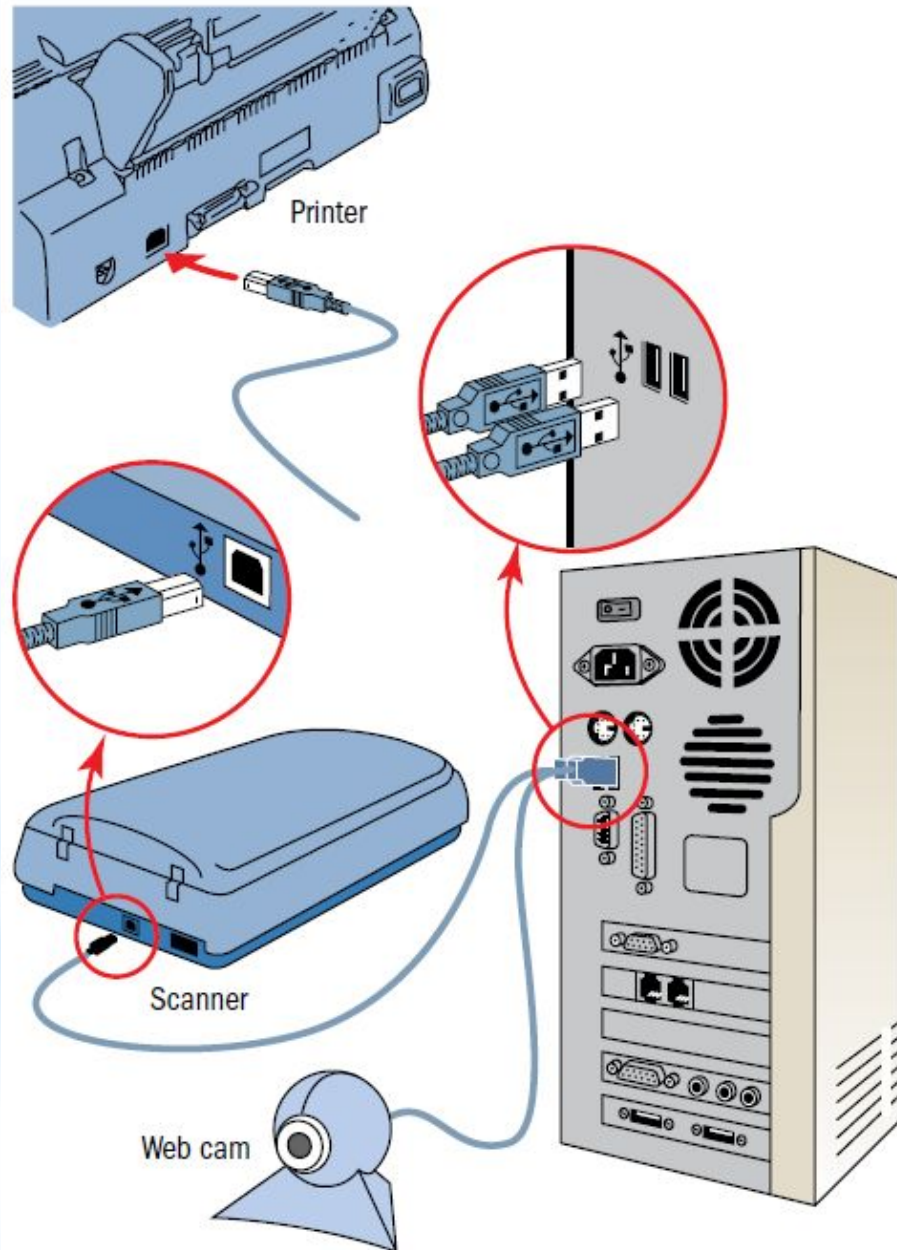
*Serial & Parallel Connectors



*Parallel & USB

- * USB was designed to make the installation of slow peripherals, such as the mouse, joystick, keyboard and scanners, printers, digital cameras and digital telephones as easy as possible
- * Nowadays, the USB host controller is included in the chipset and this recognises when you plug a device into a USB port and allows hot swapping of devices
- * What does hot swapping mean?
- * There may be as many as four or more USB ports supported by a motherboard

*USB Connections

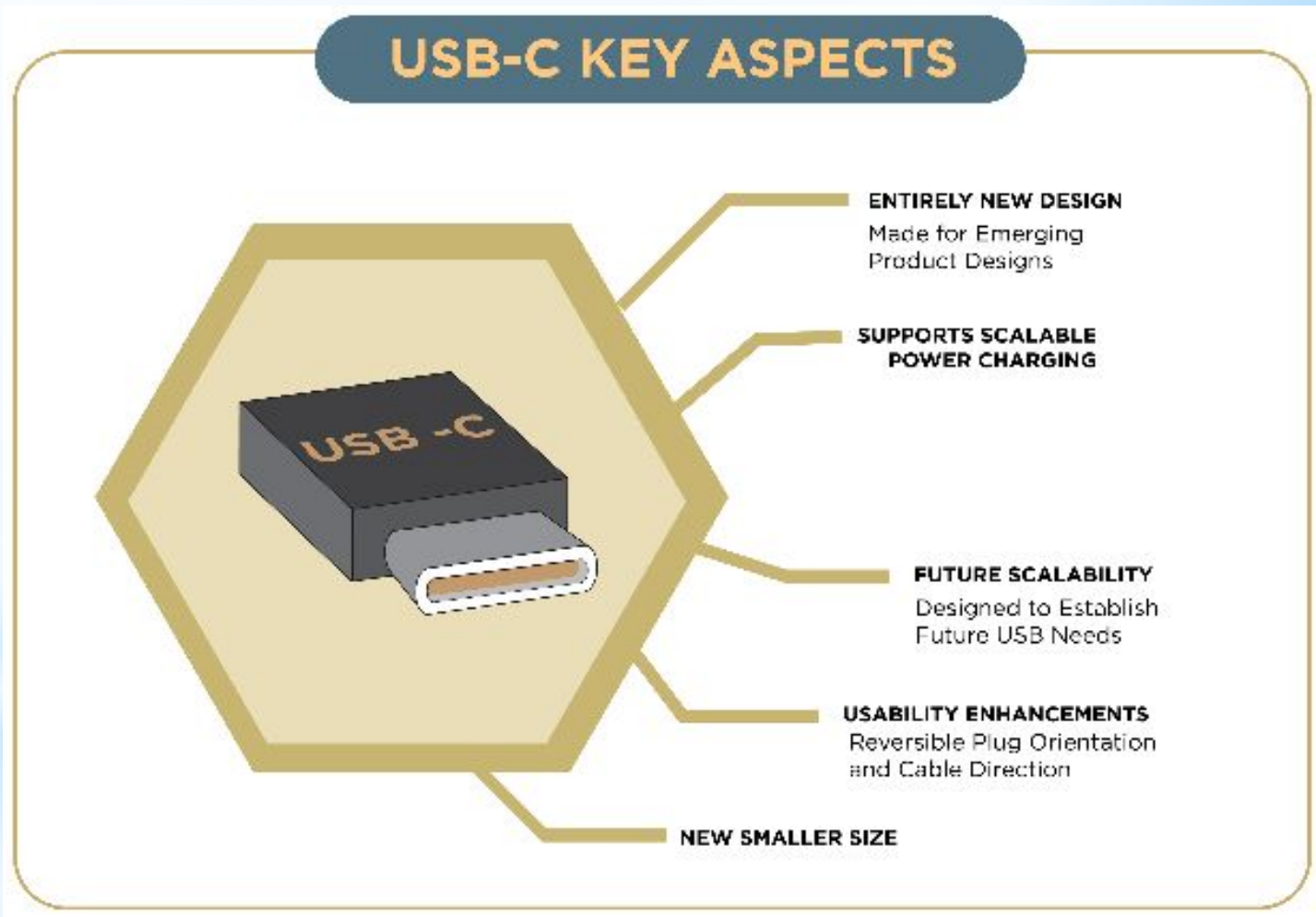


*USB (Cont.)

- * It is also possible to link the devices in a 'daisy chain' so that the PC may have many more devices attached
- * Each device provides the USB port to the next device in the chain
- * Another option is to have a USB hub, into which devices can be plugged
- * For a wireless mouse, a connector (called a notebook receiver) may be attached to a USB port - the mouse is then battery-operated
- * Generally, transmission via a serial port is a slow, inexpensive method of data transfer
- * USB is faster than standard serial
- * So, parallel transmission is faster than serial

USB C

- * USB Type-C is about to be rolled out to a smartphone near you
- * USB C supporting up to 100 watts of power outage, USB-C is one step to banishing the smartphone's biggest frustration
- * Supports Android Marshmallow



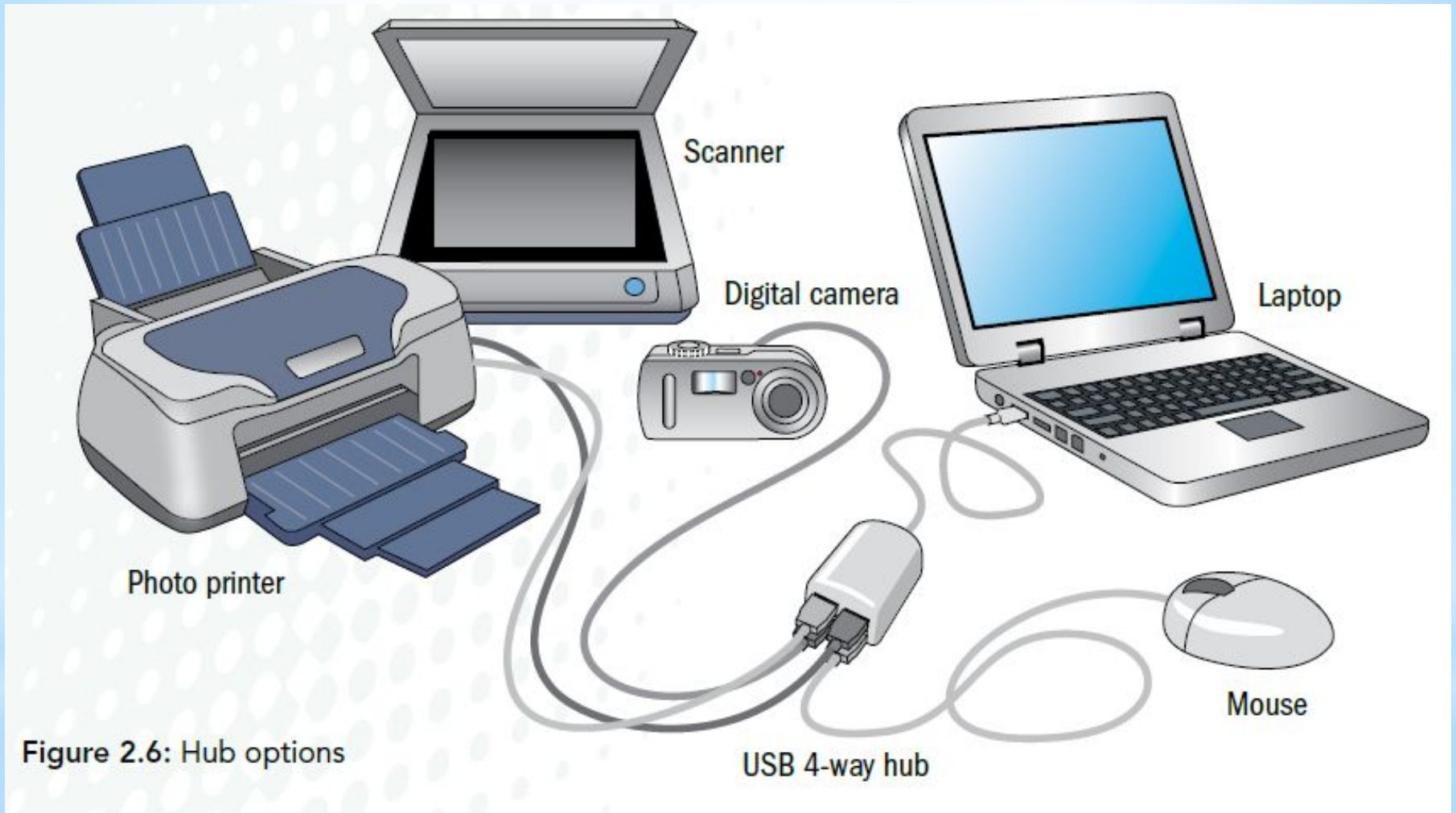


Figure 2.6: Hub options

*Why has SATA and USB been adopted over Parallel communications devices such as IDE? The basic concept of parallel communications surely mean faster data transmission...

***SERIOUS
QUESTION!!!?!**

* There are many different Output devices but the most commonly used are:

1. Monitors
2. Printers
3. Speakers / Headphones
4. Lights
5. Plotters



* Output Devices

* Monitors

* Monitors display the information on a screen.

* You can get 2 main types of monitors: CRT's: Cathode Ray Tube monitors are fairly large and they are not as common as LCD's nowadays. CRT's work by using an electron gun situated at the end of the tube.



* LCD's: Liquid Crystal Display monitors are thin and are more commonly used. They work by using electronically charged crystals.



*Which Monitor do I need?

- *For anyone who owns a desktop PC, you're going to need a monitor
- *It's no good investing in a top of the line tower PC, only to see it ruined by a monitor that is sub-standard or not quite right for your main system
- *Acting as the face of your desktop, the right monitor is essential for maximising the potential of your PC ecosystem
- *As monitor tech develops at breakneck speed, it can be tricky to find the right balance of size, resolution and connections
- *Never fear, we've broken down all your buying choices so you don't have to

*Size



- * Let's begin with size. Depending on exactly what you'll be using your new monitor for will likely influence the size you inevitably plump for
- * PC monitors tend to start around the **17 inch** mark, aligning itself with a large laptop display
- * For that however, you're unlikely to find an aspect ratio excelling 5:4, and for those of us who are used a widescreen display, a 17 inch monitor is unlikely to do the trick
- * At the opposite end of the scale, general consumer monitors tend to rise as high as **27 inches**

*Size Cont.

- * Ultimately, you need to consider what you'll be using your monitor for
- * Perhaps you're looking at purchasing two monitors, in which case you need to consider the size of the desk you'll be housing them on
- * If you want to use your monitor for gaming or streaming movies, consider a larger display for the best possible entertainment experience
- * Similarly, large displays are usually associated with creative designers, who need every inch of a big, rich display to optimise their productivity
- * Whichever screen size you're comfortable with, an increasingly hectic market will no doubt oblige with a number of available products

*Resolution

- * One careful consideration to make, and one which is closely linked to screen size, is resolution
- * Essentially, the greater width to your chosen monitor, the more attention needs to be paid to its resolution
- * If you're sticking to a monitor of 21 inches or below, resolution will rarely exceed **1600×900**
- * Given the small monitor size however, the pixel density will still be numerous enough to produce a decent image

* Refresh Rate



Refresh Rate:

144mhz (Megahertz)

- * Another feature gamers should pay particular attention to is a monitor's refresh rate which is measured in hertz (hz), this is the rate at which a monitor refreshes the image it is displaying every second
- * The industry standard was 60hz per second, but the progression towards 120hz (and beyond) is gaining momentum, the greater the refresh rate equals a smoother the image and reduces the chance of any blur
- * As with resolutions, refresh rates also demand that you consider your gaming build as a whole
- * Frame rates are a point that gamers obsess over, and their monitor's refresh rate plays a huge roll in rendering a good FPS
- * Frames per second is how many frames your graphics card is churning through each second, which then passes onto your monitor to be displayed
- * If you settle for a 60hz monitor, it won't be able to process anything above 60fps from your machine and

* Response Time

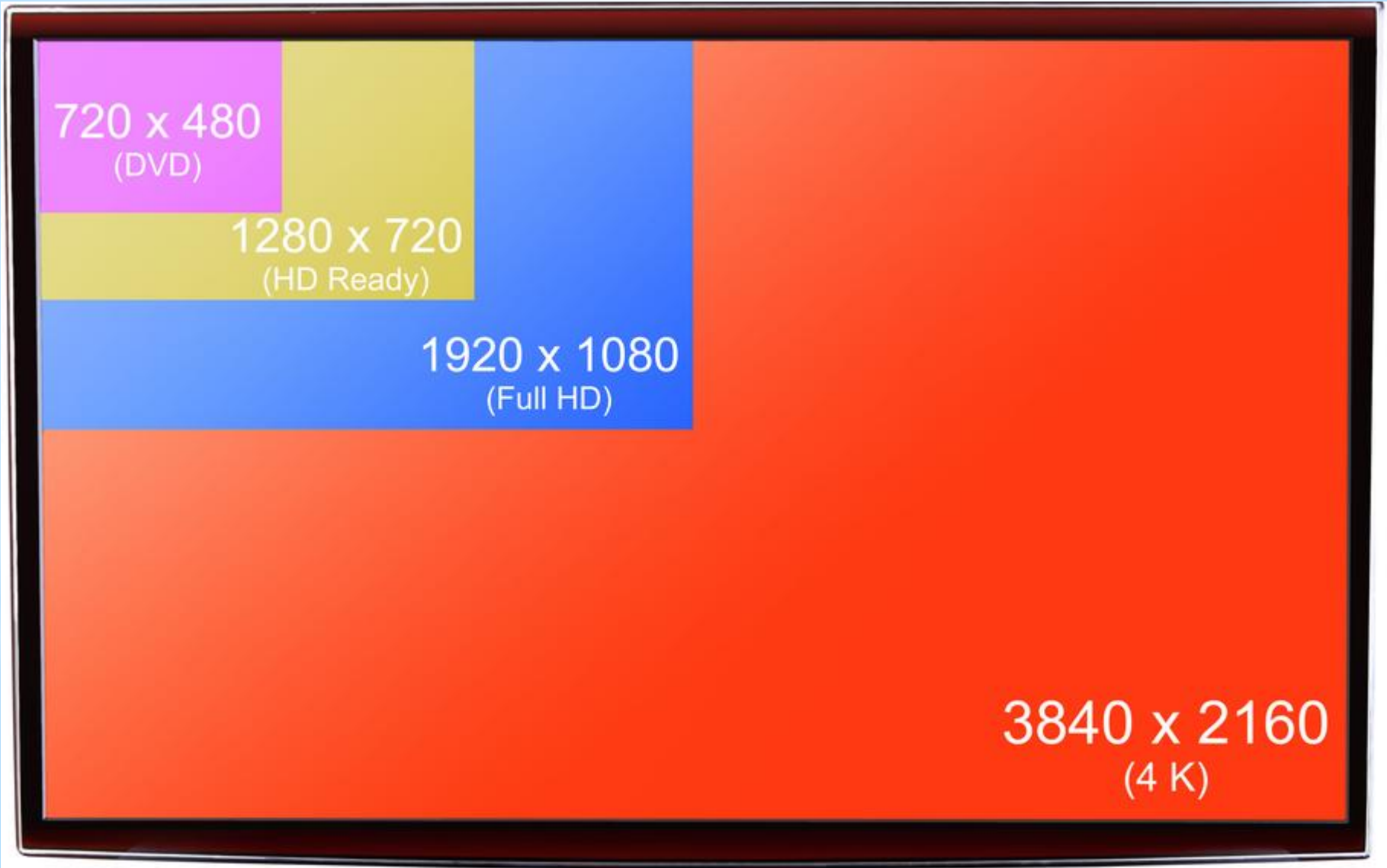


Response Time:

1ms

- * Response time concerns the amount of time (measure in milliseconds) it takes the pixels in a monitor to change colour
- * Gamers are concerned with response rates more than most, particularly if you're playing high-paced titles where the images change frequently
- * The lower the response time, the better your monitor is equipped to deal with the challenges of high-spec gaming
- * Typically, a response time of 4ms is fine for most gamers, but lower times such as 2 or even 1ms will allow your monitor to avoid the pitfalls of a slow response time completely
- * For the record, the main problem that might occur is ghosting, where a previous image can still be seen as a blur after the image has changed

*Resolution Cont.



a massive 3840×2160 resolution, for an eye-melting amount

* Panel Type

* C and TFT technology

* In-Plane Switching (IPS)

monitors are becoming more common at the top end of the market, but again, there is a trade-off. IPS panels will produce the best all-round image quality. Viewing angles are impressive and colour recreation will outshine that of a TN or VA panel. On the other hand, longer pixel response times than both TN and VA and a tendency for input lag does leave an IPS panel as an expensive, and risky, purchase.

a standard in today's market, LCD, there are still a few choices

Plane-Line Switching (PLS)

panels are an emerging fourth option in the market. Similar to IPS on viewing angles, PLS panels offer higher brightness and a lower power output. As with any emerging tech however, PLS remains expensive and lacks a range of available products. Watch this space.

a superior contrast and brightness, in particular to their ability to display deep blacks

*Gaming Monitors

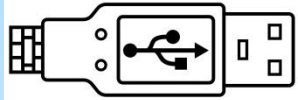
- *You may have noticed a lot of talk of response times and refresh rates in the panel comparison above
- *Unless you'll be using your monitor for gaming however, you can largely ignore this section
- *Low pixel response times and a high refresh rate are high on a gamers list of monitor requirements
- *Pixel response is the time it takes the display to respond to a user's input



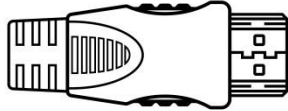
*Gaming Monitors

- * For a gamer then, it's vital to enhancing their gameplay
- * As such, a response time of less than 3ms (milliseconds) can ensure no compromise is made on gaming experience
- * You may be familiar with refresh rates from your TV set
- * 60Hz is an industry standard, meaning the screen will refresh 60 times per second
- * PCs able to run the latest games at their best, ultra-spec resolutions however, will look for higher refresh rates
- * Even if your PC is able to run games at 70 frames per second, if the monitor is only a 60Hz display, then 60 FPS is all your eyes will be able to feast upon
- * If you're big on PC gaming, it's imperative you get the right quality of screen to match your power-based PC

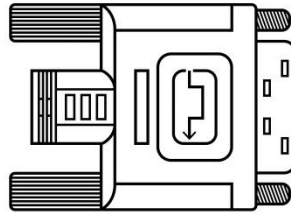
*Connections



USB



HDMI



DVI

- *Your final major consideration revolves around connections and ports
- ***HDMI** has grown into the most popular source on the market, so expect almost all monitors above 21 inches to sport HDMI capabilities
- *Able to connect to pretty much any high-definition device, a HDMI port can hook your monitor up to Blu-ray players, games consoles and TVs
- *Indeed, we would recommend a dual-HDMI monitor, allowing you to keep more than one media device attached at all times

*Connections

- * DisplayPort connections are becoming increasingly popular, but are generally limited to a computer connection
- * Capable of high pixel resolutions at impressive refresh rates, DisplayPort cables tend to be similar in price to HDMI
- * If you're connecting a tower-PC to your monitor, there is no reason not to use the DisplayPort connection
- * Either way, it's always handy to invest in a DisplayPort-to-HDMI cable

*Connections

- *Some newer monitors are opting for DVI connection, often alongside HDMI. Again, if this is the case, get yourself a DVI-to-HDMI cable for HDMI devices
- *Whichever port you plan to predominantly use, ensure the video card in your PC has the appropriate capabilities
- *Choosing the right method of connection is relatively straightforward. Just take a look at the ports on the back of your external devices, and align your connections accordingly
- *Also, consider how many USB drives you might need, as peripherals such as keyboards and mice can soon see a monitor's ports fill up

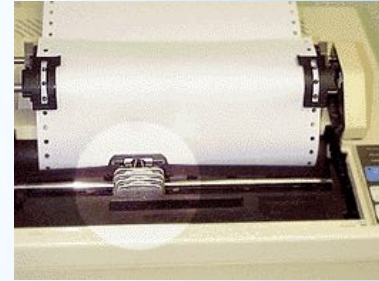
*Price

- * As computing technology moves ever forward, components such as monitors will continue to fall in price
- * Even today, you can get hold of a sufficiently impressive display for increasingly reasonable outlays
- * Obviously, greater size and resolution will drive up the cost of your chosen display
- * Typically, Full HD 22 inch monitors start for as little as **£100**
- * 4K monitors, still struggling to gain enough traction in the market, are currently priced at **£300** and above

* Printers

* There are 3 types of Printers:

* **Dot Matrix** : This printer is the oldest of the three and is not used much now because it doesn't give as good results as the other two. It uses Carbon ribbon and pins.



* **Ink Jets** : This printer has become cheaper and is commonly used at home as they are perfect for small quantities of work. The ink jets use ink cartridges that are heated up and droplets are then dropped on to the paper forming a small part of the overall image.



* **Laser** : This printer is more expensive than the others however it is excellent for use in work as it is quiet, quick, can be stocked with a lot of paper and produces high-quality work.



* Plotters

- * These devices produce high quality lines diagrams on paper. (Architects, Engineers and Scientist often use plotters)
- * The plotter uses a pen that can be lifted on and off the paper which is how this device adds text and images to the paper



* Speakers / Headphones

* There is usually a small speaker within the computer however to increase the volume and quality of the sound we plug in external speakers which allow us to hear the music better.



* Headphones can be plugged into almost all computers and they enable you to listen to your music without disturbing others.



* Backing storage

- * Primary storage, located within the computer, is relatively small and the majority of it is lost when the computer is switched off
- * To create a more permanent store for data (including software), a secondary storage device or backing store is needed, such as a hard drive
- * To create a portable store for data, offline storage devices are needed: CD-ROMs, DVDs, memory sticks, etc
- * Carryout some research on the different sizes of backing store items (CDRom > 700MB)
- * There are a variety of types of backing store now available to the PC user
 - * Magnetic discs and optical discs
 - * Pen drives
 - * Flash memory cards

* Backing Storage



* Portable and fixed drives

- * In the design of early computers, the drives (i.e. The readers) were located within the casing
- * Hard disks were fixed within the casing but other media formats (such as magnetic tape and floppy disks) provided portable ways of storing data
- * More recently, external hard drives have been developed and this has brought with it the option to move a hard drive (and the hard disk within it) from one computer to another
- * Similarly, pen drives and card readers, both of which plug into the USB port, provide a portable solution to data Storage
- * With the increased capacity and compact format of these devices, it is now possible to enjoy portability for large amounts of data

*Key terms

- *Primary storage - the memory of the computer
- *Secondary storage - a backing store that remains with the computer and provides a greater capacity than the processor can offer
- *Pen drives - small devices that can be used to transfer files between USB-compatible systems and provide a high capacity alternative to CD-ROMs
 - *They are plugged directly into the USB port and need no batteries for power
- *Flash memory cards - a portable medium for data
 - *Commonly used in digital cameras, they can hold your photos until you upload them to your computer or output them to a photo printer

*Performance factors

- *When deciding what storage device to use, a number of factors need to be taken into account.
 - *How much data will the device hold? What is its maximum capacity?
 - *How fast can the data be stored on (written to) the device?
 - *How fast can the data be retrieved (read) from the device?