

Basic Computer Skills

Module 1

Hardware Concepts

Basic Computer Skills Module 1

Hardware Concepts

Summary	
<p>Goal(s):</p> <p>In this module, transcribers-in-training will explore hardware features in computers, examine the various components of the computer and explain their function, and learn to set up a computer.</p> <p>SMART Objectives: <i>Specific, Measurable, Achievable, Realistic, and Time-sensitive</i></p> <p>By the end of this module, students should be able to:</p> <p>BCS 1.1: Describe the major hardware components of a computer.</p> <p>BCS 1.2: Compare and contrast computer features.</p> <p>BCS 1.3: Set up a computer.</p> <p>BCS 1.4: Identify basic rules for proper operation of a computer.</p> <p>BCS 1.5: Apply basic troubleshooting steps for solving common problems.</p>	<p>Instructor:</p> <ul style="list-style-type: none"> Computer Instructor <hr/> <p>Delivery Methods:</p> <ul style="list-style-type: none"> Lecture Independent study Hands on Group work <hr/> <p>Length: Four Topics</p> <p>Total of 15 – 20 hours</p> <hr/> <p>Any Applicable Business and/or Soft Skills?</p> <ul style="list-style-type: none"> Identify the parts of a computer. Choose computers for different settings. Set up a computer <hr/> <p>Corresponding NLS Lesson #?</p>
<p>Take Away Message(s):</p> <p>Understanding the basic hardware and software components of a computer allows students to be informed consumers when purchasing their own equipment for their career.</p>	



Instructor Preparation

Title of Module: *Hardware Concepts*

The intent of this module is to provide the students with a basic understanding of the internal and external hardware parts of a computer.

The following are potential introductory remarks as well as relevant context or background information that may be useful for the instructor.

Technology is ever evolving. Thus, certain topics/information in this module may change or become obsolete during the course of instruction. It is a good idea for the instructor to review all content for accuracy and relevance, and to be prepared to present updated information if necessary.

Agenda

Topic: Hardware

Time Allotted: 15-20 Hours

- | | |
|------------------------------------|-----------|
| A. Hardware - Internal | (1 hour) |
| B. Hardware - External | (2 hours) |
| C. Laptops and Portable Devices | (1 hour) |
| D. Maintenance and Troubleshooting | (1 hour) |

Materials & Supplies – *items needed in order to carry out the agenda and classroom activities*

1. Desktop PC, with all parts disconnected
2. Computer with CD/DVD drive
3. Office supply catalogs – be sure they include computer equipment
4. A printer that can be installed on one of the computers with software, if possible
5. A laptop, smartphone, and tablet device
6. Handouts and PowerPoints for activities:

Topic A – Hardware - Internal

Hardware Vocabulary Sheet BCS 1.A.1

Hardware Internal Diagram BCS 1.A.2

CPU PowerPoint BCS 1.A.3

RAM PowerPoint BCS 1.A.4

Cooling Systems PowerPoint BCS 1.A.5

Topic B – Hardware – External

External Hardware Anticipation Guide BCS 1.B.1

Storage Devices PowerPoint BCS 1.B.2

Display Devices PowerPoint BCS 1.B.3

Input Devices PowerPoint BCS 1.B.4

Introduction to Printers PowerPoint BCS 1.B.5

Installing a Printer PowerPoint BCS 1.B.6

Printer Project Sheet BCS 1.B.7

Topic C – Laptops and Portable Devices

Laptops and Portable Devices Vocabulary PowerPoint BCS 1.C.1

Laptop Shopping Guide BCS 1.C.2

Topic D – Maintenance and Troubleshooting

Troubleshooting and Maintenance Vocabulary BCS 1.D.1

Computer Maintenance PowerPoint BCS 1.D.2

Classroom Preparation – *steps to follow when setting up the learning environment*

1. Have lab setting with one to one or groups at each station.

Curriculum Content

A. Hardware – Internal (1 hour)

Objective BCS 1.1: Describe the major hardware components of a computer.

Objective BCS 1.4: Identify basic rules for proper operation of a computer.

PREINSTRUCTIONAL ACTIVITIES

Discuss the objectives for this module. Explain that this lesson will explore hardware features in computers, examine the various components of the computer and explain their function, and assist in learning to set up a computer. Lead a discussion on computer hardware to help assess prior knowledge. Assist students in accessing prior knowledge of hardware concepts. Ask students open-ended questions that will facilitate discussion, such as:

- What are at least 3 things that plug into a computer to help do a particular job?
- What are some of the parts inside a computer and what do they do?
- What is a motherboard? A CPU?
- How are computers kept from overheating?

CONTENT PRESENTATION AND LEARNER PARTICIPATION

Identify and discuss the vocabulary used in this module using the **Hardware Vocabulary Sheet (1.A.1) and Hardware Internal Diagram (1.A.2)**. Discuss the parts and functions listed in each document, clearing up any misconceptions.

Share PowerPoints **on CPU, RAM, and Cooling Systems (1.A.3-1.A.5)**. Lead student in a discussion about these parts.

ASSESSMENT

As a way of reinforcing what they learn, students can label the parts and provide 1 or 2 sentences to describe each part on the **Hardware Internal Diagram (1.A.6)**. You

may allow them to refer to the Hardware Vocabulary Sheet and the Hardware Internal Diagram as needed.

B. Hardware - External

(2 hours)

Objective BCS 1.3: Set up a computer.

Objective BCS 1.4: Identify basic rules for proper operation of a computer.

PREINSTRUCTIONAL ACTIVITIES

Lead a discussion on computer hardware to help assess prior knowledge. Assist students in accessing prior knowledge of hardware concepts by having transcribers-in-training complete the **External Hardware Anticipation Guide (1.B.1)**.

Have students view PowerPoints on **Storage, Display, and Input Devices (1.B.2-1.B.4)**.

CONTENT PRESENTATION AND LEARNER PARTICIPATION

Present students with the following scenario:

Your client is responsible for upgrading all computer display devices for their company. They are familiar with the difference between flat panel monitors and CRT monitors, but not with the difference between LCD and Plasma screens. Create a user-friendly comparison analysis to present to them so that they can make an informed decision.

View the **Introduction to Printers PowerPoint (1.B.5)** to discuss two basic types of printers – inkjets and laser. Next, have transcribers-in-training view the **Installing a Printer PowerPoint (1.B.6)**.

Using the **Printer Project Sheet (1.B.7)**, assist students in brainstorming solutions for one of the 3 scenarios, this involves making a decision about the best type of printer to use.

ASSESSMENT

Work with students to assemble the parts on the computer you have provided for class.

C. Laptops and Portable Devices

(1 hour)

Objective BCS 1.2: Compare and contrast computer features.

PREINSTRUCTIONAL ACTIVITIES

Lead a discussion on popular devices used today to help assess prior knowledge by having asking transcribers-in-training questions such as:

- What are some of the major features of laptops and netbook computers?
- What are some of the most popular types of smartphones used today?
- What are some of the features of a smartphone?
- Describe the major parts/functions of a tablet.

CONTENT PRESENTATION AND LEARNER PARTICIPATION

Display the **Laptops and Portable Devices Vocabulary (1.C.1)** PowerPoint. Allow the students to handle the devices you brought in as you view the PowerPoint.

ASSESSMENT

Using the catalogs provided, have transcribers-in-training complete the **Laptop Shopping Guide (1.C.2)** to compare prices and features of laptops or notebook PCs given a low budget and a high budget. Have them explain which one they chose and summarize reasons for their choice.

D. Maintenance and Troubleshooting

(1 hour)

Objective BCS: 1.4 Identify basic rules for proper operation of a computer.

Objective BCS: 1.5 Apply basic troubleshooting steps for solving common problems.

PREINSTRUCTIONAL ACTIVITIES

Discuss common computer mishaps with students. Invite them to suggest scenarios (if applicable) in which they have personally experienced a disaster or near disaster with a personal computer. If students have no prior experience, be prepared to share an anecdote of your own with them.

CONTENT PRESENTATION AND LEARNER PARTICIPATION

Review and discuss the **Troubleshooting and Maintenance (1.D.1) vocabulary**. Clear up any misconceptions students may have.

Display and discuss the **Computer Maintenance - Hardware PowerPoint (1.D.2)**.

ASSESSMENT

Have students create a poster that discusses safety and accident prevention with computers and other hardware. Allow students to also create a poster with computer lab safety rules.

Basic Computer Skills

Module 1

Hardware Concepts Handouts

Lessons A and B – Hardware – Internal and External Hardware Vocabulary (1.A.1)

Case/Chassis

The case, obviously, houses the PC's innards. There are three main case types - desktop, mini tower and full tower.

A desktop case is rectangular a little like a VCR (remember those?) and users would often place the monitor on top. One of the main drawbacks of the desktop is that they can be cramped inside which limits the amount of expansion cards they can hold. The majority of modern PC cases are tower systems that stand upright. Many people put them on the floor under the desk although some cases are smart enough to stand on top of the desk and be considered furniture!

Smaller cases - often called mini towers - can't hold as much as larger models, naturally. This may not be an issue if you're sure you won't want to expand your PC but such cases may not allow you to add additional disk drives or plug-in large expansion cards, for example, especially the latest generation of graphics cards which can struggle to fit inside a normal tower case. So you need to check a case's capacity if you're planning to add upgrades.

The motherboard in a tower case is usually mounted vertically on one side giving you easy access to components. If you enjoy upgrading or want to build your own PC, you'll want a tower case. But be aware that they are not all created equal by any means. Apart from internal capacity, they vary enormously in what components they come with (fans and so on) and in appearance.

Cooling system

You've probably noticed that your PC gets hot. All those electronic components can generate a terrific amount of heat and need to be kept cool to avoid becoming unstable and crashing your system.

Cooling is traditionally provided by fans and most cases include a fan or several as standard. In some high-end PCs it's not unusual to see half a dozen fans.

All these fans can be very noisy so if you work in a quiet environment you may want to pay careful attention this. There are low-noise fans available (for a few dollars more) and they can be a most worthwhile investment.

Motherboard

The name says it all - the Mother and the heart of the PC. This is the large circuit board in the middle of the case which houses the main components of the computer. These include the BIOS (Basic Input/Output System that determines what the computer can do without accessing programs from a disk), the cache and, of course, the CPU. Interestingly, some high-spec motherboards are starting to appear with built-in water cooling systems.

There will be slots for plugging-in memory (RAM) and expansion slots for plugging in devices such as graphics cards, TV Tuners and so on. There are also connections for various controllers which will vary from board to board. Older boards had a range of serial and parallel ports but, as we said at the start, technology is moving on and the current ports of choice include USB, FireWire, EIDE (for older drive connections), SATA (for modern drive connections, possibly eSATA (for external drive connections), PCI and PCI-E (for graphics cards), keyboard (PS/2) and mouse connections (although some boards omit a dedicated mouse port in favor of USB).

There will usually also be an Ethernet LAN (Local Area Network) port or two and often a modem and a Wi-Fi port. Most motherboards also have built-in sound capabilities, many of good quality, although if you are really into music, you may want to add a dedicated sound card.

Any complete computer system you buy ought to be optimally set up so the motherboard and all its bits are working together in perfect harmony.

However, if you intend to customize, change or add anything to the motherboard, read the manual carefully. Keep it safe. Final words of wisdom - don't mess with the Mother unless you know what you're doing!

CPU (Central Processing Unit)

The processor or CPU controls the computer. This is The Man (or Person if you insist on being politically correct). This is the brains. This does the business and makes your computer run. Essentially it executes instructions and transports data round the computer system. Fast is definitely better!

CPUs have names, too. If you're young you may not remember the 386 or the 486 but Pentium chips are still around. These are all Intel products and the latest chips are the Core 2 series which comprise the Duo, Quad and Extreme. Most current PCs of reasonable spec will host a Core 2 Duo.

AMD CPUs are the prime alternative to Intel chips. Over the years, the two companies battled it out leapfrogging over each other with new developments, but Intel's Core 2 has currently gained the edge in price and performance.

OS (Operating System)

The OS is what makes the PC operate. Windows is the most popular OS ever and we're now seeing a transition, from Windows XP to Vista to Windows 7. But there are alternatives. Linux is the most popular alternative OS for the PC - it's also free! Apple Macs have their own Mac OS as well.

Software applications such as word processors, spreadsheets and games, have to be written for a specific operating system so, alas, you cannot run a Windows game under Linux. However, there are many, many free Linux applications should you want to explore that OS, although there are a great deal more free programs for Windows, too.

Graphics card

Graphics cards are also known as video cards or video adapters and they're responsible for putting the images generated by the computer onto a monitor.

The display can be in a range of resolutions. Common ones are 800 x 600, 1024 x 768, 1280 x 1024, 1680 x 1050 and higher, but there are other resolutions, too. The display can use a range of colors from 16 or 256 right up to 16-bit, 24-bit or 32-bit which supports millions of colors. The greater the resolution and the more colors the card displays, the more memory it requires and the longer it will take to draw the image.

Originally, graphics cards simply plugged into a PC's expansion slot but in order to deliver more power, dedicated graphics connectors were developed. Until recently, the port of choice was the AGP (Advanced Graphics Port) designed as a replacement for PCI, but this has now been replaced by the PCI-Express 16x (known as PEG). Some motherboards have two PEG slots allowing two cards to drive two monitors, and multi-card configurations for die-hard gamers.

For programs which require high-resolution graphics that change quickly such as games, you need a powerful video card. In fact, if you're a games player you will certainly want a high-end card. Applications which rely heavily on the display such as graphics applications and perhaps music applications whose displays need to be updated quickly in real-time will also benefit from a fast graphics card. For less strenuous applications, such as word-processing and surfing (searching) the internet, performance is not such an issue.

Ports

These are the plugs and sockets on the back and sides of your computer. Once upon a time, the main ports were Serial and Parallel which were used to connect printers and scanners but they have been overtaken in the main by USB. This can be used to connect almost anything to your PC including printers, scanners, a mouse, external hard drives, many cell phones, cameras, iPods and iPads, modems, routers and so on.

Another popular port is HDMI which is used for displaying thins digital audio and video content from devices such as computers, digital cameras and video recorders, and other handheld devices onto your television screen. Many computers also have SD card slots, which allow you to simply remove the SD memory card from your devices and insert them directly into the computer.

You'll usually find Ethernet connections round the back, for connecting computers into ports on the wall to create a LAN (Local Area Network) or to allow Internet access when you are not set up to connect on a wireless network. Other ports you may see on older model computers are PS2 for connecting a keyboard and mouse.

Most computers have at least four USB ports. If you want to add a lot of peripheral equipment, it's important that your machine has enough connections although if you're short of USB ports, for example, you can add a USB hub to get more.

Memory

Memory is where data can be stored, retrieved and manipulated. Most people call memory RAM which stands for Random Access Memory. It simply means that the computer can dive in and access any part of the memory, unlike a tape backup system, for example, where you might have to wade through meters of tape to reach a certain item of data.

RAM is volatile which means that when you remove the power, its contents is lost which is why you are taught from an early age to save often.

Memory comes in all sorts of shapes and sizes and it's essential to get the correct memory chips for your system. Most current RAM types will be a type of DDR (Double Data Rate) although you may still come across SDRAM (Synchronous DRAM).

Obviously, the speed of the RAM is important if you want to get the best performance from your PC and, odd though it may sound, the same type of RAM from

different companies does not necessarily run at the same rate. And different companies charge different prices for, what appears to be, similar chips.

To get the most from your PC, If you're running Windows XP you should have a minimum of 1GB RAM and if you're running Vista, 2GB. Windows 7 works well with at least 4 GB. Yes, the systems will run with less but it's like having a car with five gears and not getting out of third.

Other types of memory include ROM or Read Only Memory. This is a better acronym and it means that the computer can retrieve data from it but it can't write to it. There are lots of ROM chips in a computer, used to store set-up data and information which doesn't need changing. Data in ROM is permanent and remembered after switching off.

Flash memory lets you change its contents and remembers it after switching off. This is popular in modems, cameras and, of course, USB flash drives.

There are also storage devices known as SD (Secure Digital) memory cards which are small, easy-to-use memory storage devices made for a broad range of devices. The SD card makes sharing data between different computers easy, and they are compatible with a wide variety of makes and models of computer. The format is already supported by over a thousand companies around the world. The SD Memory Card is the standard flash memory card for digital connectivity. SD cards have expanded to the SDHC card format, offering new levels of storage capacity. SD Cards unlike CDs and DVDs cannot be scratched.

Hard drive

The technical description of a hard drive would probably go something like this - a collection of hard platters coated with magnetic material to which data can be written and read using a series of read/write heads.

A drive might have up to eight platters (although the current trend is to use a smaller number of larger platters) which rotate, typically, at speeds of 5420 or 7200

rpm. The whole unit is sealed inside a case which prevents dust getting inside. The heads fly above the platters at a distance of from 10 to 25 millionths of an inch and a speck of dust could cause serious damage.

Hard drives have been getting cheaper and their storage capacity larger over the years. Rare now is the PC which comes with a drive smaller than 80 GB (other than laptops), and 250 GB and 500 GB drives are the norm.

Modern drives connect to the motherboard via a SATA interface. The eSATA interface was designed for adding an external drive and there are also very affordable USB drives if you need additional external storage.

Optical drive

Optical drives read CDs and DVDs. Most computers come equipped with a drive that can both read and write CDs and DVDs and the drives are quite cheap.

The main difference between them is the speed at which a drive writes to a disc, typically 16x although the speed varies depending on the media (CD or DVD).

Sound system

Most motherboards feature a built-in sound system with audio in and out sockets. For many people this is fine. The quality of on-board sound has improved over the years and you may find it very acceptable for listening to MP3s, video presentations and VOIP calls. But if you want higher quality, there are a vast number of audio expansion cards available for all types of user from the gamer to the music fan and the dedicated computer musician.

Monitor

Monitors have come on in leaps and bounds over the past few years, principally thanks to the development of TFT (Thin Film Transistor) screens. In fact, it would be rare now indeed to see a PC bundled with a CRT monitor.

Screen size has also increased with 17" being the current usual smallest size. Many systems now come with a 19" screen with a resolution of 1280 x 1024 and larger screens are becoming increasingly popular. A 22" screen, for example, can typically show a resolution of 1680 x 1050. As TFTs take up less room and are much lighter, bigger screen sizes are easier to accommodate.

Larger screens can run at higher resolutions (see Graphics cards) so you can see more on the screen. However, unlike CRTs which can display a range of resolutions, most TFTs are designed to work at one specific resolution. You may be able to change resolutions but the display will likely not be as sharp.

Another consideration with TFTs is the viewing angle. Move too far away from a "square on" position and the screen may become more difficult to read. This varies from monitor to monitor.

Many TFTs above basic models also have a digital input (which requires that the graphics card has a digital output) which should produce an even sharper image.

Given the smaller size and weight of TFTs, and the fact that prices are still coming down, they are the monitor of choice unless you need crystal sharp displays at more than one resolution.

PSU (Power Supply Unit)

The PSU drives the whole system. It's the most important part of the computer. The more parts inside the PC, the more power you need to drive it.

Manufacturers are trying to reduce the power consumption of many parts but it's still important to have an efficient PSU to keep the system stable.

A typical off-the-shelf PC may have a PSU rated at 250W which might be enough to power the computer's current configuration but it may not leave much room for expansion. 350W would be better. A high-end PC could easily use a PSU with a rating of 600W or higher.

Another thing you might want to consider with a PSU is the noise produced by its fan. Some PSUs are quieter than others.

This has been a brief overview of the main parts you'll find inside your PC. Specific items mentioned here will change, but the core items that make up a PC are likely to remain the same for quite a while yet.

Chipsets

Chipsets are like the motherboard's traffic cops. They direct the flow of data from one point to another. Each chip in the chipset has its own particular job. The chips in the chipset are referred to as bridges, because they bridge the components together and ensure that the data flow is directed to the proper place. The better chipsets are those that can handle data the fastest and most efficiently.

Lessons A and B – Hardware – Internal and External

Hardware Internal Diagram BCS (1.A.2)



Case (Internal View)

1.A.2



Empty Case

1.A.2



Case Front Panel

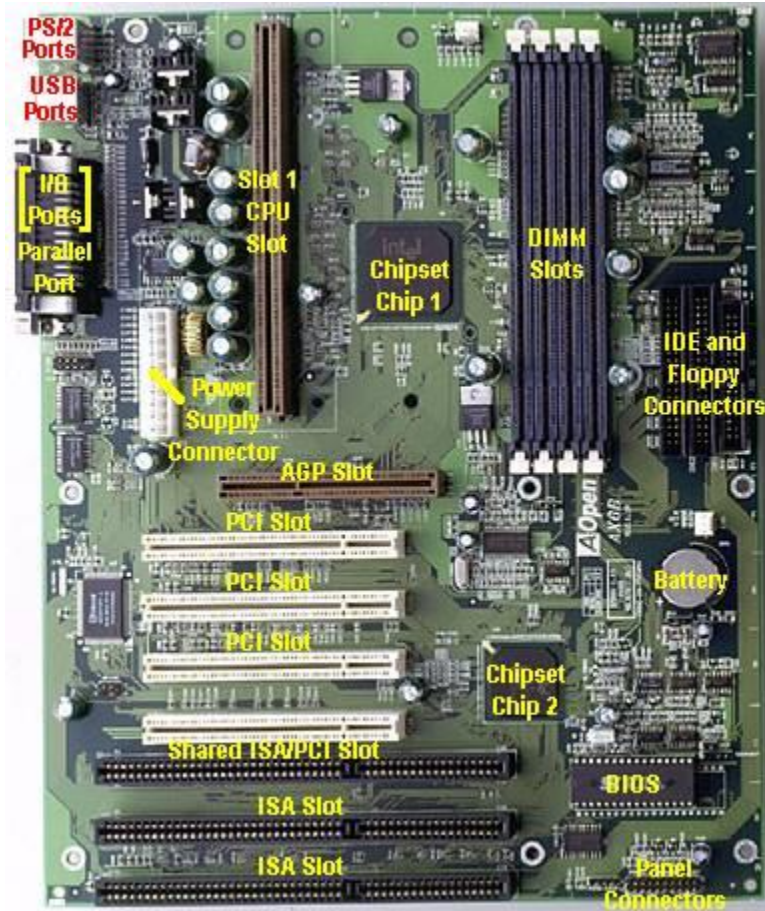


DVD Drive

1.A.2



CD Drive

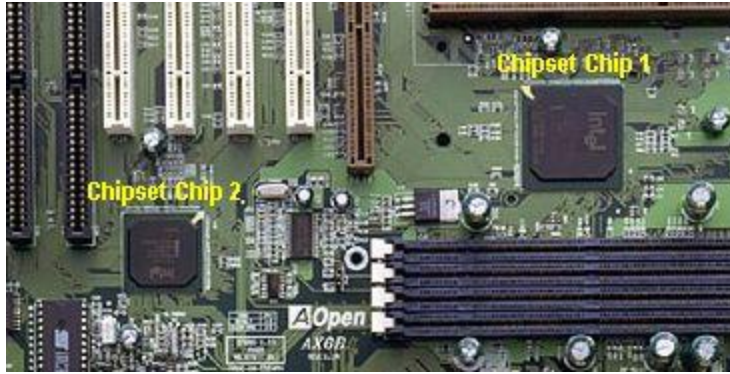


Motherboard



Motherboard Battery

1.A.2



Motherboard

Chipset on



Power Supply

1.A.2



Power Cables



Power Cable Connectors

1.A.2



System)

Case Fan (Cooling

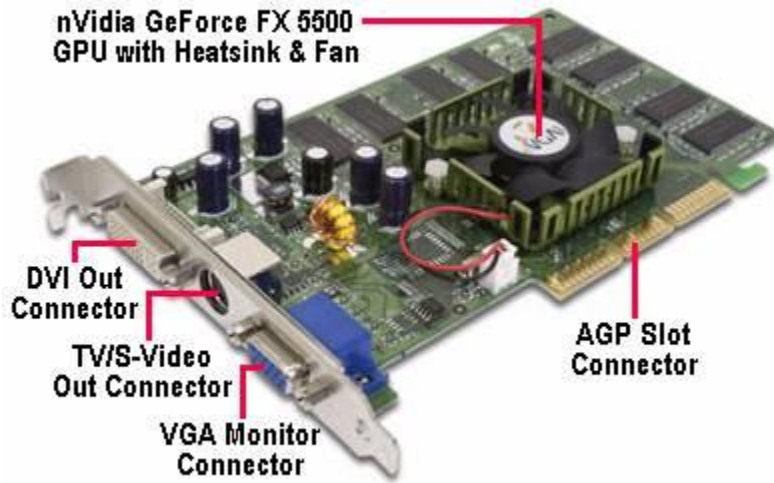


Microprocessor

1.A.2



Expansion Slots (located in back of case)



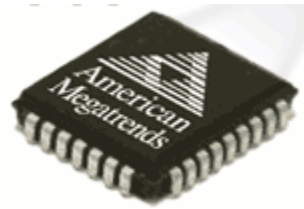
for video

Expansion Slot

1.A.2



PCI (Peripheral Component Interconnect) Slot – handles data



BIOS chip



BIOS setup screen




3.5 Inch Bay Drives – used for Floppy Disks; commonly called A drive




RAM

1.A.2

CPU PowerPoint 1.A.3



CENTRAL PROCESSING UNITS (CPU'S)




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Adapted from "Cooling Systems" – CTAE Information Technology Essentials
http://www.gactecm.org/curriculum_compet_essentials.html

Central Processing Units

- ❑ The CPU functions as the brain of the computer.



Manufacturers

- ❑ Intel and Advanced Micro Devices (AMD) are the two largest manufacturers of CPU's.
- ❑ Both make CPU's found in common computer systems.

1.A.3

CPU PowerPoint 1.A.3

Intel

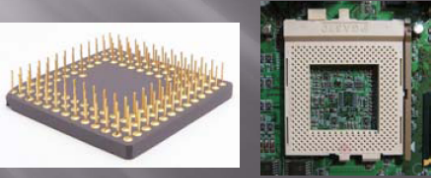
- Intel currently manufactures the fastest CPU's on the market, and their CPU's are often more expensive than those made by AMD.
- Intel's CPU's use names such as Pentium, Celeron, Core2 Duo, Core 2 Quad, Core i3, Core i5, and Core i7.

AMD

- AMD's CPU's are often less expensive.
- AMD CPU's have names such as Sempron, Athlon 64 X2, Athlon II, Phenom X2, Phenom X4, and Phenom II.

PGA

Pin Grid Array CPU's have pins on the CPU that plug into a motherboard socket.

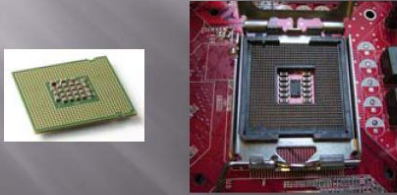


1.A.3

CPU PowerPoint 1.A.3

LGA

Land Grid Array CPU's have Pins on the motherboard and contact points on the CPU.




Factors that affect CPU price:

- ❑ Processor Speed
- ❑ CPU Interface (Motherboard Dependent)
- ❑ Number of Cores
- ❑ Cache
- ❑ Bus Speed
- ❑ Manufacturer

Which to Purchase?

- ❑ Both AMD and Intel make excellent CPU's. Always perform research, read reviews, and make your decision based on the intended use of the computer and the allotted budget.




1.A.3

RAM PowerPoint 1.A.4

PROFIT

RAM (RANDOM ACCESS MEMORY)




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Adapted from "Cooling Systems" – CTEC Information Technology Essentials
http://www.pactsem.org/curriculum_comput_essentials.html

RAM (Memory)

- RAM is the place in a computer where the operating system, application programs, and data in current use are kept so that the computer can dive in and access any part of the memory



Types

- The two most common types of RAM used in desktop computers today are DDR2 and DDR3.
- Notebook computers use SODIMMS (Small Outline DIMMS) which take up less space than desktop memory.

1.A.4



RAM PowerPoint 1.A.4

Compatibility

- ❑ Choice of RAM determined by the types of RAM compatible with the motherboard.
- ❑ Example - A motherboard designed to use DDR RAM will not accept DDR2 RAM.
- ❑ Important to closely examine motherboard specifications for CPU and RAM before making a purchase.


Capacity

- ❑ Different operating systems can address various amounts of RAM.
- ❑ The majority of 32 bit versions of modern Microsoft Windows operating systems can address up to 4GB of RAM.
- ❑ 64 bit versions of Microsoft Windows operating systems can address 8GB or more of RAM depending on the specific edition.


1.A.4



Cooling Systems PowerPoint 1.A.5



ALL ABOUT COOLING SYSTEMS



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Adapted from "Cooling Systems" – CTAE Information Technology Essentials
http://www.gactaem.org/curriculum_compnet_ite essentials.html

COOLING SYSTEMS

- The inside of a PC can get very hot.
- Too much heat can cause damage to the inside of the computer
- A cooling system, usually provided by fans, can help.

Case Fans

- Case fans come in a variety of sizes, but most cases are designed to use 80 mm, 90 mm, and 120 mm fans.



1.A.5

Cooling Systems PowerPoint 1.A.5

Fan Placement

- ❑ Proper fan placement is important for quality air flow.
- ❑ Fans placed at the front of the case pull air into the case (Intake).
- ❑ Fans placed at the back of the case push air out of the case (Exhaust).

Heatsinks

- ❑ Heatsinks are normally constructed from copper and/or aluminum and directly contact microchips on a circuit board.
- ❑ A fan blows air across the heatsink which transfers heat absorbed from the CPU into the air.
- ❑ Copper absorbs heat faster than aluminum, but aluminum transfers heat to air faster than copper.

CPU Heatsinks

A copper heatsink and fan.




Continued...

1.A.5

Cooling Systems PowerPoint 1.A.5


CPU Heatsinks ...continued

An aluminum heatsink with fan.





Heat Pipes

- ▣ This heatsink uses heat pipes to move heat from the contact point to the fins that radiate the heat into the air.



RAM Coolers

Memory (RAM) is often covered with a heatsink to allow for overclocking.



1.A.5

Cooling Systems PowerPoint 1.A.5

Quality, Not Quantity

- Remember that proper placement of fans will create quality air flow, which is far more important than the number of fans installed within a case.

1.A.5



Lesson B – Hardware – External**Anticipation Guide BCS (1.B.1)**

DIRECTIONS: Use this anticipation guide to preview what you will learn about the hardware components or parts of a personal computer (PC). Check YES or NO beside each statement.

I can list some of the types of storage devices available today. ___YES ___NO

I can list some of the common types of input devices used today. ___YES ___NO

I can list some advantages and disadvantages of different types of display devices. ___YES ___NO

I can list and describe the major parts/functions of a hard drive. ___YES ___NO

I can list and describe the major parts/functions or benefits of using common storage devices. ___YES ___NO


I can list some advantages and disadvantages of each type of printer. ___YES ___NO

I can list the steps in setting up and installing a local printer. ___YES ___NO

I can describe preventative maintenance procedures for most printers. ___YES ___NO

I can list and describe the basic steps involved in troubleshooting a printer. ___YES ___NO

Storage Devices PowerPoint 1.B.2




Introduction to Storage Devices

PROFITT Curriculum
Basic Computer Skills Module 1
Hardware Concepts

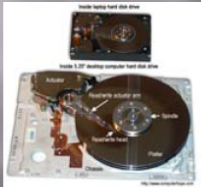
Adapted from CTAE Resource Network—Used with permission.
http://www.gactaem.org/ourjournal_compnet_lessons/1a5.html

Storage Devices



- ❑ Used to keep data when the power to the computer is turned off.
- ❑ Can come in a variety of medium/media (location where data is stored)

Hard Disk




- ❑ Usually mounted inside the computer's system unit.
- ❑ Can store billions of characters of data.
- ❑ Storage capacity stated in forms of bytes; Megabytes, Gigabytes or Terabytes

1.B.2


Storage Devices PowerPoint 1.B.2

Magnetic Storage



- ❑ Hard disks use magnetic storage
- ❑ Data recorded onto disks or tape by magnetizing particles of an oxide based surface coating.
- ❑ A fairly permanent type of storage that can be modified.
- ❑ Cassette tapes, video tapes, and even credit cards use this type of storage.

Floppy Disk



- ❑ Round piece of flexible Mylar plastic covered with a thin layer of magnetic oxide and sealed inside a protective covering.
- ❑ May be referred to as a "floppy" - used in A drive on a computer
- ❑ 3½ disk capacity is 1.44 MB or 1,440,000 bytes
- ❑ Quickly becoming replaced by flash drives and SD cards

Solid-State Storage

- ❑ Removable storage medium that uses integrated circuits (Ics) instead of magnetic or optical storage.
- ❑ Data transfers at higher rate of speed than other storage methods.
- ❑ Great for transferring data from one machine to the next.
- *Flash memory cards* - connect to SD ports; widely used in notebook computers, digital cameras and video cameras - mini versions found in many smartphones; used to store MP3 music files, photos, and personal files



1.B.2


Storage Devices PowerPoint 1.B.2

Optical Storage


- Means of recording data as light and dark spots on CD or DVD.
- Reading is done through a low-power laser light.
 - Pits
 - Dark spots
 - Lands
 - Lighter, non-spotted surface areas

CD-ROM

- “CD – Read Only Memory”
- Also called CD-R (CD-Read)
- Storage device that uses laser technology to read data that is permanently stored on compact disks, cannot be used to write data to a disk.
- Replaced 8-track and cassette; most music now available for purchase in this format.



CD-RW



- “CD-Read Write”
- A storage device that reads data from CD’s and also can write data to CD’s.
- Similar to a CD-ROM, but has the ability to write to CD.
- Used to make “mixed tapes”, share music

1.B.2

Storage Devices PowerPoint 1.B.2

DVD




- DVD ROM
 - Digital Video Disk which is read only – used to hold videos – replaces video tapes. Played on DVD and Blue Ray players
- DVD-R
 - Digital Video Disk which can be written to one time. Once you record, it then becomes read only. Used to store home movies and pictures.
- DVD-RW
 - Digital Video Disk which can be rewritten to. Also used for home movies and pictures.

Blu-Ray Technology

- New standard in storage
- Blu-Rays look a lot like DVDs
 - New disks use blue laser light instead of the red laser light used in traditional CD players
 - Disks may ultimately hold
 - Over 30GB on one-sided disks
 - Over 50GB on two-sided disks
- Remember – You can play a DVD in a Blu-Ray player, but you can't play a Blu-Ray disk in a DVD player!

Flash or Jump Drives

- External storage devices that can be used like a external hard drive.
- They have the capability to be saved to, deleted from, and files can be renamed just like with a normal hard drive.
- Connect to USB ports; also called memory sticks; portable – about the size of a small pack of gum; can be transported on keychains or lanyards. Used to store music, photos, and personal files.



http://en.wikipedia.org/wiki/File:SanDisk_Driver_Micro.png

1.B.2



Storage Devices PowerPoint 1.B.2

Hot Swappable

- ❑ A hot swappable device is one which can be replaced whilst the server is still in operation.
- ❑ You should only hot swap components when the component and operating system supports it.
- ❑ The following components can be hot swapped: RAM, disk drive, power supply, NIC, graphics cards.
- ❑ Hot swappable components are more expensive. Often only necessary when you need to keep a server operational 24/7.

List of Devices for Secondary Storage

- Magnetic tape and disks
- Compact Disk Read-Only Memory (CD-ROM)
- Write Once Read Many - (WORM)
- Magneto-optical disks
- Redundant Array of Inexpensive Disks (RAID)
- Optical disks
- Digital Video Disks
- Memory cards
- Flash memory
- Removable storage

References

- ❑ Computing Essentials 2005
- ❑ CTAE Resources - http://www.gactaern.org/curriculum_compnet_essentials.html
- ❑ M. Guymon. Pleasant Grove High School
- ❑ www.ehow.com

1.B.2



Display Devices PowerPoint 1.B.3



Introduction to Display Devices

PROFIT Curriculum
Basic Computer Skills Module 1
Hardware Concepts


Adapted from "Cooling Systems" – CTAE Information Technology Essentials
http://www.gaotaem.org/curriculum_compet_essentials.html

Monitor Overview

- Display device that forms an image by converting electronic signals from the computer into points of colored light on the screen.
- The most-used output device on a computer.
- Most desktop displays use a cathode ray tube (CRT).
- Laptops use liquid crystal display (LCD), light-emitting diode (LED), and gas plasma or other image projection technology.
- Monitors using LCD technologies are beginning to replace CRT.

How Monitors Work

- Most use a cathode-ray tube as a display device.
- CRT: Glass tube that is narrow at one end and opens to a flat screen at the other end.
- Narrow end contains electron guns.
 - Single gun for monochrome and three guns for color.
 - Display screen is covered with tiny phosphor dots that emit light when struck by the electron gun.

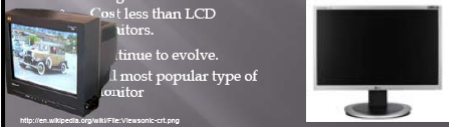


1.B.3

Display Devices PowerPoint 1.B.3

From CRT to LCD

- CRT
 - Bulky, heavy, use vacuum tube technology.
 - Using technology that was developed in the 19th century – available for over 70 years
 - 1. Vivid colors and detailed images and text.
 - Cost less than LCD monitors.
 - Continue to evolve.
 - Still most popular type of monitor
- LCD
 - First LCD laptop monitors were very small due to manufacturing costs but now are available in a variety of sizes.
 - Light, sleek, energy-efficient, have sharp picture.



http://en.wikipedia.org/wiki/File:Viewsonic_crt.png http://en.wikipedia.org/wiki/File:LG_L154WT-SP_LCD_monitor.jpg

LCD History

- Liquid crystals were first discovered in 1888 by Austrian botanist Friedrich Reinitzer.
- RCA made the first experimental LCD in (1968).
- Manufacturers have been developing creative variations and improvements since on LCDs.
- In 1997, manufactures began to offer full size LCD monitors as alternatives to CRT monitors.

LCD Technology

- Until recently, was only used on notebook computers and other portable devices.
- Used for displays in notebooks, small computers, pagers, phones and other instruments.
- Uses a combination of fluorescent-based backlight, color filters, transistors, and liquid crystal to create and illuminate images.

1.B.3



Display Devices PowerPoint 1.B.3

Monitor Quality, Resolution and Pixels

Quality:

- Manufacturers describe quality by dot pitch.
- Smaller dot pitches mean pixels are closely spaced which will yield a sharper image.


Resolution:

- Indicates how densely packed the pixels are.
- The amount of Pixels on the screen. The more pixels the better the resolution.

Pixels:

- The smallest unit in a graphic image; computer display devices use a matrix of pixels to display text and graphics.


S-Video or Y/C Cables



S-video connection

- This cable might also be referred to as a SVHS cable and can be found on most high-end televisions, all videodisc players, camcorders, digital cable and satellite set top boxes, and SVHS VCRs. S-video cables differ from composite cables in that they split video signal into two different components: luminance and chrominance.

VGA Cables




VGA cable

- This is your standard monitor cable. It is typically male-to-male with three rows, 15 pins. A VGA cable is used for computer to monitor, or computer to projector connections. Its only home theater application may be as a connection to an HDTV decoder, such as the current RCA model.

1.B.3

Display Devices PowerPoint 1.B.3

DVI Cables




- Digital Video Interface (DVI) cables look a little like a standard VGA cable, but they are slightly larger. Under ideal circumstances, the DVI cable creates a 'digital to digital' connection between video or data source and display device. There are, however, only limited situations when this ideal circumstance occurs.
- DVI is still developing, so there is no universal standard for the DVI cable as of yet. Currently projector manufacturers including InFocus, Sony, and Epson use different standards.

HDMI Cable



- In short, HDMI cables are a smaller version of DVI cables. HDMI systems can also send and receive 24 bit, 8 channel, 192kHz digital audio signals as well as video on the HDMI cable. HDMI has only been available for a couple of years but is found on an increasing number of projection televisions, plasma televisions, LCD TVs, DVD players, and other consumer electronics devices. HDMI looks to become a connectivity standard for HDTV in the following years.

RGBHV Cables



- Again, these cables look identical to simple composite cables. But this time, the RGBHV cable splits the video signal into five. There are three different types of RGB cables. RGBHV is a five-cable system that splits the video signal for color into red, green, and blue, and then has two more cables to carry the sync for the signal (horizontal and vertical sync). RGB H/V is a four-cable system that splits the color the same way, but has the horizontal and vertical sync on a single fourth cable. Straight RGB video cables again split the color signal in three, but carry the additional sync signal on one of the color cables, usually the green (called RGB sync on green).

1.B.3



Display Devices PowerPoint 1.B.3

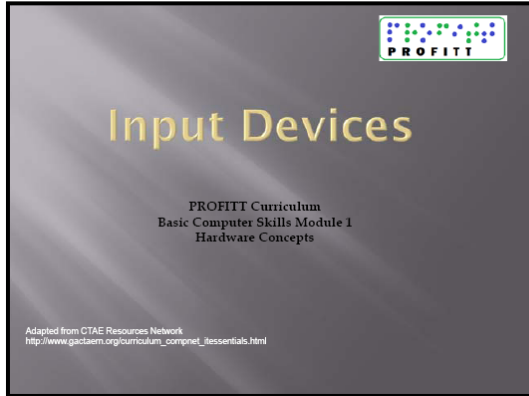
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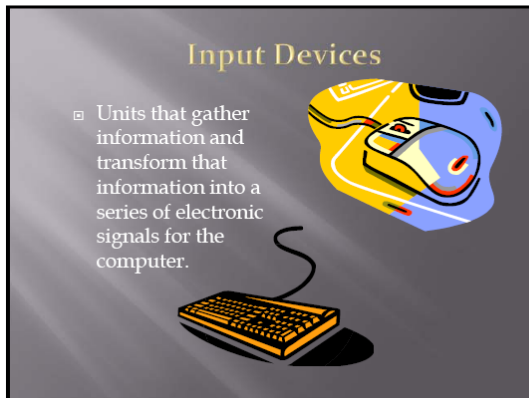
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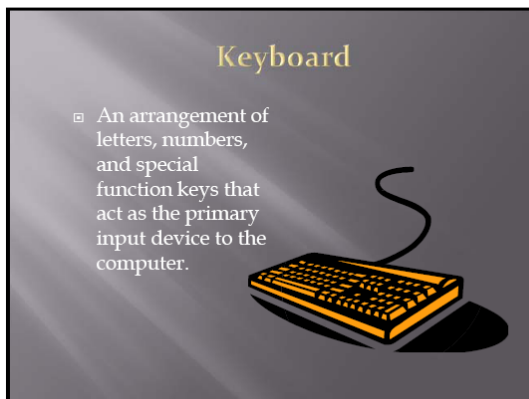
1.B.3



Input Devices PowerPoint 1.B.4








1.B.4

Input Devices PowerPoint 1.B.4

Mouse

- An input device that allows the user to manipulate objects on the screen by moving the mouse along the surface of the desk.




Sound Card

- A circuit board that gives the computer the ability to accept audio input, play sound files, and produce audio output through speakers or headphones.



Digital Camera

- Allows users to take pictures and store images electronically.
- Most digital cameras have built in internal flash memory to store pictures.
- The Three Basic Types of Digital Cameras Are:
 - **Field Cameras:** has many lenses and other attachments
 - **Studio Cameras:** stationary camera used for professional photography
 - **Point and Shoot:** affordable and lightweight for general home and business use



1.B.4

Input Devices PowerPoint 1.B.4

Pointing Device


- ❑ An input device that allows a user to control a pointer on the screen.
- ❑ The location and shape change as the user moves the pointing device.
- ❑ Pointing Devices Include:
 - Mouse
 - Trackball
 - Touchpad

Insertion Point

- ❑ A symbol on the screen that is usually blinking in the shape of a vertical bar.
- ❑ Used to indicate where the next character you type or item you insert will be place.

Scanner


- ❑ Light sensing input device that reads printed text and graphics and then translates the results into a form the computer can process.
- ❑ Allows users to capture data from an original source document and save in an electronic format.



1.B.4

Input Devices PowerPoint 1.B.4

Smart Phone




- A small hand held device that users can enter data and instructions using a variety of techniques.
- Ways to Input Using a Smart Phone:
 - Draw or write on special paper with a digital pen
 - Enter text-based messages via a wireless keyboard
 - Speak into the microphone that wirelessly communicates with the phone
 - Take a picture using the built in digital camera

Touch Screen

- A touch sensitive display device that allows users to interact with devices by touching various areas of the screen.
- Examples of Touch Screens:
 - Smart Phones
 - Airport Check-In Kiosk
 - Grocery Store Self Check Out
 - ATM's

Modem




- A device that sends and receives data to and from computers over telephone/dsl/cable lines.
- Means (Modulate – Demodulate).

1.B.4

Input Devices PowerPoint 1.B.4

Barcode Reader

□ A barcode reader (or barcode scanner) is an electronic device for reading printed barcodes. Like a flatbed scanner, it consists of a light source, a lens and a light sensor translating optical impulses into electrical ones.



Biometric Device

□ The use of special input devices to analyze some physical parameter assumed to be unique to an individual, in order to confirm their identity as part of an authentication procedure.

□ Types of Biometric Devices:

- Fingerprint Scanning
- Iris Recognition
- Voice Recognition
- Facial Recognition

KVM Switch

□ KVM stands for "Keyboard, Video, Mouse." A KVM switch connects one keyboard, one mouse and one video display to multiple computers. This allows users to control multiple computers with only a single set of input and output devices.

1.B.4

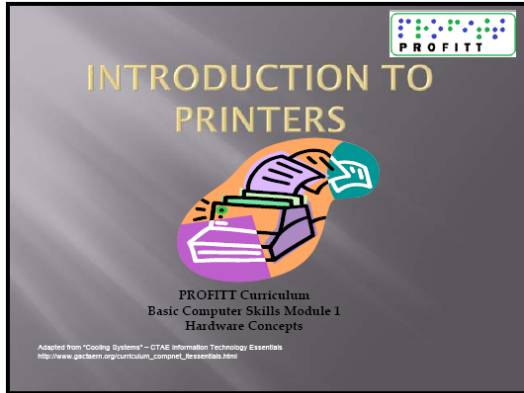
Input Devices PowerPoint 1.B.4

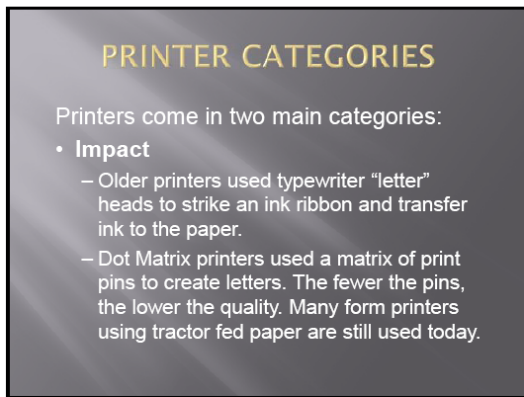


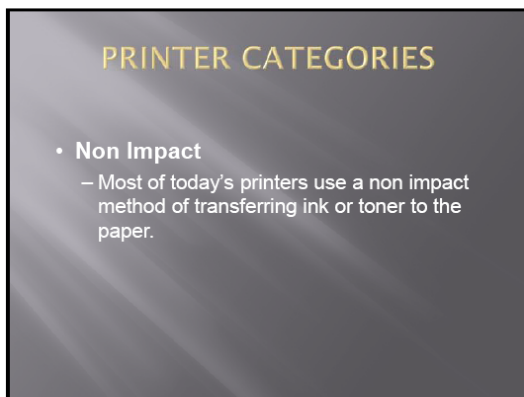
1.B.4



Introduction to Printers PowerPoint 1.B.5







1.B.5



Introduction to Printers PowerPoint 1.B.5

TYPES OF PRINTERS

- There are Four main types of printers:
 - Dot matrix
 - Ink jet
 - Laser
 - Thermal dye transfer and thermal wax transfer
- We'll concentrate on two of these – ink jet and laser.

INKJET PRINTERS

- Developed in the 1960s, but first commercialized by IBM in 1976.

Ink is forced through tiny holes (50 – 60 microns in size). Ink can be a single color, or multi-colors.

The resolution of the dots can be as large (small?) as 1440 x 720. With the proper resolution, color ink and photo paper, you can produce photographic quality prints.

Ink jets are less expensive than color laser printers making them popular in the home market.

INKJET PRINTER



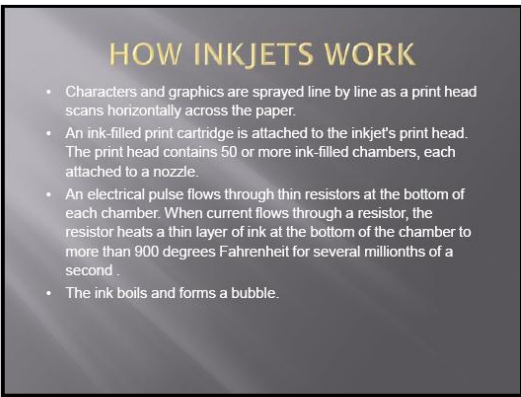
Image by permission: <http://commons.wikimedia.org/wiki/File:Printer.jpg>

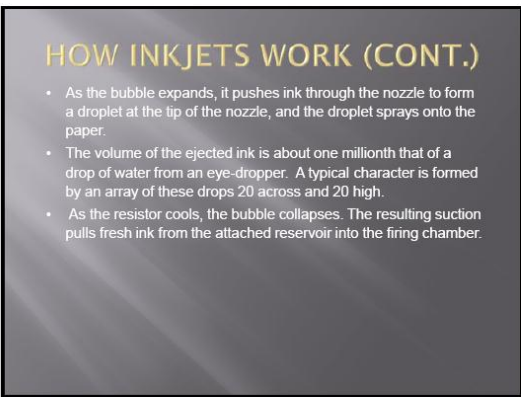
1.B.5



Introduction to Printers PowerPoint 1.B.5







1.B.5



Introduction to Printers PowerPoint 1.B.5

INKJET DISADVANTAGES

- **Cartridges** – Ink can dry out over time. If large amounts of printing is done, the cost can be more than a laser. They are also subject to mold growing in the ink, which forces ink out the nozzle.
- **Refills** - Cartridges can be refilled, but the quality of refill ink is often less than OEM standards, and after a few uses, the nozzles are worn out, and ink drips.
- **Cost** – While the printer is usually cheap, the cartridges can be expensive, and often hard to find.
- **Paper jams** – Moisture in paper often causes paper to misfeed.

LASER PRINTERS

- Laser printers use a type of dry, powdered, electrically charged ink called toner. The printer places the toner on an electrically charged rotating drum and then deposits the toner on paper as the paper moves through the system at the same speed the drum is turning. This involves a complicated process of optical, electrical, and mechanical systems.

Laser printers have the best quality of print, and are the standard by which other printers are judged. Lasers have long been the most expensive, but costs have continually dropped.

The process of printing is broken down into 6 phases:

LASER PRINTERS

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1.B.5

Introduction to Printers PowerPoint 1.B.5

LASER PRINTERS

Remember the line "Charlie Can Walk Dance & Talk French". The first letters are in the order of the 6 steps.

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

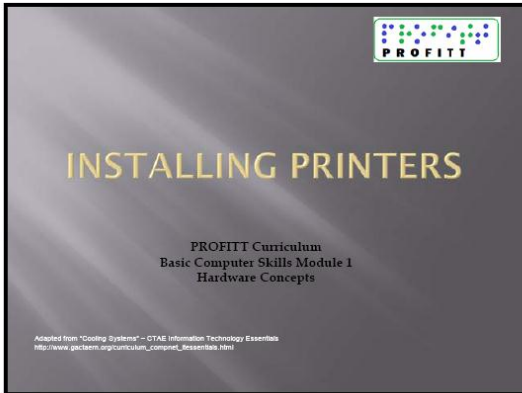
LASER PRINTERS

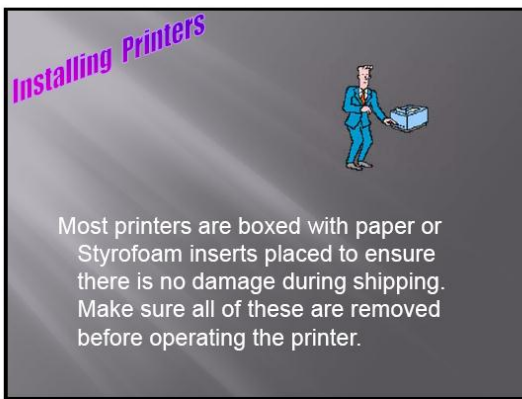
1. **Cleaning:** Excess toner is scraped from the photoelectric drum.
2. **Conditioning:** A uniform -600 volt charge is placed on the photoelectric drum by the primary corona.
3. **Writing:** Laser diodes write an invisible electric image on the photoelectric drum by causing the drum surface to be less negative wherever the laser beam hits.
4. **Developing:** This is where the transfer roller places the toner on the drum. The toner sticks to the areas that have had the electric charge lessened due to the laser beam.
5. **Transfer:** The secondary corona uses a positive charge to attract the toner from the drum to the paper. The paper gets charged by corona too.
6. **Fusing:** The toner is then melted into the paper.

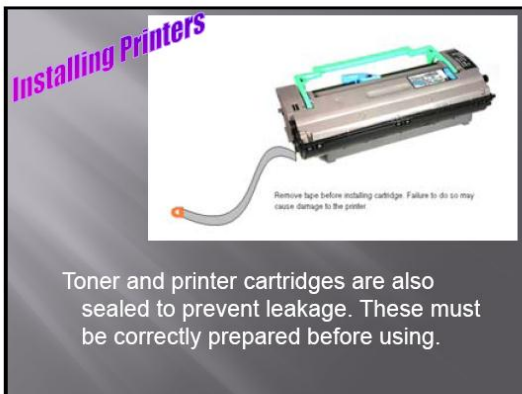
1.B.5



Installing a Printer PowerPoint 1.B.6








1.B.6

Installing a Printer PowerPoint 1.B.6

Installing Printers



Printers need specific drivers to operate correctly. These are included with the printer on CD's. Some printers even come with specialty programs or applications.

Installing Printers



Printer related programs might include ink or toner management.

Installing Printers



Windows will often recognize and auto install the drivers once the device is plugged in.

1.B.6

Installing a Printer PowerPoint 1.B.6

Installing Printers




Read the installation directions carefully, as some printers will not install properly if the software / hardware is not connected in the proper sequence. This is especially true with USB printers.

Installing Printers



If the device is not automatically recognized, you may use the add printer option to install a new printer

Installing Printers




Select the port the printer is attached to and then the type of printer. Chose the "Have Disk" option to load drivers from a CD.

1.B.6



Installing a Printer PowerPoint 1.B.6


Installing Printers



Parallel USB

Most USB printers require all software to be installed before plugging in the unit or turning it on.

Installing Printers



Printer cables are usually considered accessory items and are a separate purchase.

1.B.6

Printer Project (1.B.7)

Utilizing local available printers, install a printer on a computer system.

1. What hardware is needed?
2. What software is needed?
3. If you did not have the CD that came with the printer, where could you find the software?

Demonstrate how you would replace the toner or ink cartridge.


1. What do you do with the empty cartridge?
2. How do you prepare for the installation?
3. What maintenance should be done during a new cartridge install?

A business is going to install 4 printers for each individual office personnel who do a little printing occasionally. What type of printer would you recommend? What is the current price range for this type of printer?

A business is planning to install 4 printers to be used by 30 employees. Several of them will do a lot of printing. What type of printer would you recommend? What is the current price range for this type of printer?

1.B.7

Laptops and Portable Devices PowerPoint 1.C.1




LAPTOPS AND PORTABLE DEVICES

Vocabulary Terms

PROFITT Curriculum
Basic Computer Skills Module 1
Hardware Concepts

Adapted from "Cooling Systems" - CTAE Information Technology Essentials
http://www.go-teens.org/curriculum_comput_essentials.html


PDA's



- PDA stands for Personal Digital Assistant.
- PDA's have been in use for many years and they are generally used to synchronize a person's computer with an ultra portable device.
- PDA's provide people with access to many functions of a computer, such as email, Internet access, and their personal calendar.

NOTEBOOKS

The term "notebook" can be used interchangeably with the term "laptop". Notebooks are similar to desktop in function, but they are far more portable.




1.C.1



Laptops and Portable Devices PowerPoint 1.C.1


Tablets

- Have been on the market for several years, but they have not been nearly as popular as notebooks.
- Function like notebook computers with the addition of displays (screens) that swivel into a position similar to writing tablets.
- Also have touch screen capability and a stylus. Android and Apple OS most popular.



NETBOOKS

Netbooks are much smaller than standard notebook computers. They are normally, far less expensive.



Smart Phone



- A small hand held device that users can enter data and instructions using a variety of techniques.
- Ways to Input Using a Smart Phone:
 - Draw or write on special paper with a digital pen
 - Enter text-based messages via a wireless keyboard
 - Speak into the microphone that wirelessly communicates with the phone
 - Take a picture using the built in digital camera

1.C.1

Laptops and Portable Devices PowerPoint 1.C.1

MP3 Player

- Allows you to take your music with you
- Lets you transfer digital audio files from your computer to the player using programs like Windows Media Player and iTunes
- Connects to computer using USB port



1.C.1



Laptop Shopping Guide – Low Budget (1.C.2)

1) Using the catalogs provided by your instructor, find three laptops or notebook PCs priced between \$300.00 and \$500.00 and use the following table to list key features of each. Based on your findings determine which would be your laptop of choice for either yourself or your family.

Name/Model	Price	RAM, Processor Type/Speed	Hard Drive Size	Major Features

1.C.2



Name/Model	Price	RAM, Processor Type/Speed	Hard Drive Size



Laptop Shopping Guide – High Budget (1.C.2 cont.)

1.C.2

1) Using the catalogs provided by your instructor, find three laptops or notebook PCs priced between \$600.00 and \$1500.00 and use the following table to list key features of each. Based on your findings determine which would be your laptop of choice for either yourself or your family.

2) Write a two paragraph summary of why you would choose that particular laptop.

Major Features				



Laptop of Choice:

Summary:

1.C.2



Lesson D – Troubleshooting and Maintenance

Troubleshooting Vocabulary (1.D.1)

Virus

Spyware

Hacker

Phish

Pirate

Anti-virus software

Defrag

Corrupt

Reformat

Backup

Update

1.D.1

Computer Maintenance PowerPoint 1.D.2



COMPUTER MAINTENANCE

Basic Rules for Taking Care of Your Computer

PROFITT Curriculum
Computer Basics Module 1
Hardware Concepts

The Basics

- ❑ Caring for your computer will help it live longer!
- ❑ Common items like smoke, liquid, and even dust can destroy a new computer.
- ❑ Important to keep the computer clean inside and out.

Software Maintenance

- ❑ Maintaining the software (operating system) on your computer keeps your files safe.
- ❑ There are four basic steps you can take to maintain your operating system (OS).
 - Defragmenting
 - Cleaning old files
 - Scan for viruses
 - Scan for malware

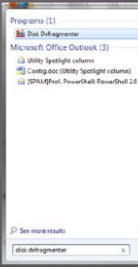
1.D.2



Computer Maintenance PowerPoint 1.D.2

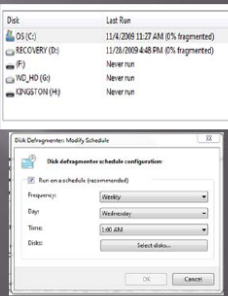
Defrag

- ❑ Complete once a month – helps make sure files are where they should be and may make computer run faster.
- ❑ Click Start, then type “disk defragmenter” into the search window.



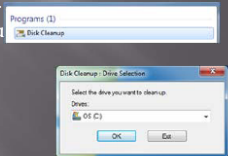
Defrag

- ❑ The main defragmentation screen shows all the places on your computer that can be defragmented.
- ❑ You can also tell your computer how often to perform this function.



Disk Clean-Up

- ❑ Gets rid of old files in temporary and system folders which take up space and slow down your computer.
- ❑ Type “disk cleanup” in the search window to find it in Programs.
- ❑ Select the drive you want to clean up.



1.D.2



Computer Maintenance PowerPoint 1.D.2

Disk Cleanup

- Select the files or folders you want to delete to free up space from the main screen.
- A progress bar will keep track of you the cleanup process.
- When finished, the bar will close.



Virus Scan

- Viruses can slow down or even destroy your computer.
- Should be done at least once a week.
- Software to scan for viruses include Norton, McAfee, and AVG.



An example of the Norton Virus Software main screen

Spyware/Malware Protection

- Malware – short for malicious software; these are programs that are designed to go into your OS and cause damage to your files.
- These can disrupt or deny operation, gather information that leads to loss of privacy or exploitation, gain unauthorized access to system resources, and other abusive behavior
- A good antivirus program will stop most of these from attacking your OS.

1.D.2



Computer Maintenance PowerPoint 1.D.2

Hardware Maintenance

- ❑ Dust and heat are two major threats to your computer.
- ❑ It's important to invest in a system that has a good cooling system.
- ❑ Blowing out the inside of your PC once a month prevents internal damage to your computer parts.

Protecting From Dust



Canned air





A dirty case fan

- ❑ Keeping your system dust-free not only extends the life, but helps increase system stability and reduce noise.
- ❑ Dust can affect the fans, power supply, keyboard, and even mouse on your computer.
- ❑ Canned air works best at blowing out the hardware on your system. A dust cover can also keep your computer dust-free.

Keeping Computer Cool

- ❑ The inside of a PC can get very hot.
- ❑ Too much heat can cause damage to the inside of the computer
- ❑ A cooling system, usually provided by fans, can help.
- ❑ Proper placement of fans will create quality air flow, which is far more important than the number of fans installed within a case.



1.D.2

