Cool Careers in Cyber Security
Missing Computer Parts

Delivery: Can be used as a table demo (hands-on) activity or during a presentation session. Large display table recommended. Pre-cut and laminate the computer parts ahead of time.

Session Overview:

Computer Science I

Objectives:

- Students will understand that computers are made up of a collection of components that work together to perform complex functions.
- Students will be able to identify the main components of the computer.
- Students will be able to describe the functions of specific computer components and their importance to the collective whole.

Materials/Supplies:

- One or several disassembled computers. Parts will include a combination of (the seven major components that you'll find in any normal PC are indicated in bold)

Motherboard	**Central Processing Unit (CPU)**	**Random access memory (RAM)**
Expansion card- Video or Graphics Card	**Power Supply**	**Hard Drive**
Optical Drive CD-ROM pr DVD-ROM drive	Power cords	Expansion card-Network NIC or Network Interface Card
Fan	Expansion slots (Memory Slots)	Connectors and Cables VGA / HDMI / SVGA Serial cable
IDE drives/ribbon cable	Expansion card-Modem	Expansion slots -PCI slots
Floppy disk drive	Expansion card-Sound	Expansion card-Additional ports
Mouse	Speakers	Keyboard

Introduction:

Computers are very helpful: they allow us write letters, do homework, find information on the Internet, and even create our own music or videos. Some of us can recognize the external parts of a computer; monitor, keyboard, mouse. But many of us are somewhat clueless when it comes to the inside of the computers. We know how to turn our computer on, how to surf the Internet and how to use the word processor. Are you the kind of person who's always wondered wants inside a computer?

Scenario:

Evidence was found on the thief's work computers. However, the computer has been disassembled. Further investigation reveals parts are missing. What parts are missing? A key part of being a cyber investigator is not only seeing what is there, but also noticing what is missing.

Lesson:

1. Each table should have 1-2 sets of computer parts. Parts will include items from the list above.
2. Each table will include 1-2 sets of laminated computer part cards. Cards will include a picture and label with the function on the back of card.
3. Students work to recognize the parts and make a list of the parts found and the potential parts that are missing.

Resources:

- How Stuff Works: http://electronics.howstuffworks.com/how-to-tech/build-a-computer.htm
- Penn State Tutorial: http://www.personal.psu.edu/glh10/ist110/topic_old/topic04/topic04_02.html
- How To Disassemble a Computer http://www.instructables.com/id/Disassemble-a-Computer/ or http://www.instructables.com/id/Disassemble-a-Computer/?ALLSTEPS

Final Thoughts:

Points you might want to make:

- Just like your body, there are many parts that make up the whole. Different parts of the computer work to achieve different goals such as inputting, processing, and outputting. The computer has fail safes that let you know if there is something wrong with a component.
- Although the inside of the computer looks complicated-once you recognize the parts it's similar to putting a puzzle together.

Recommendations/Feedback:

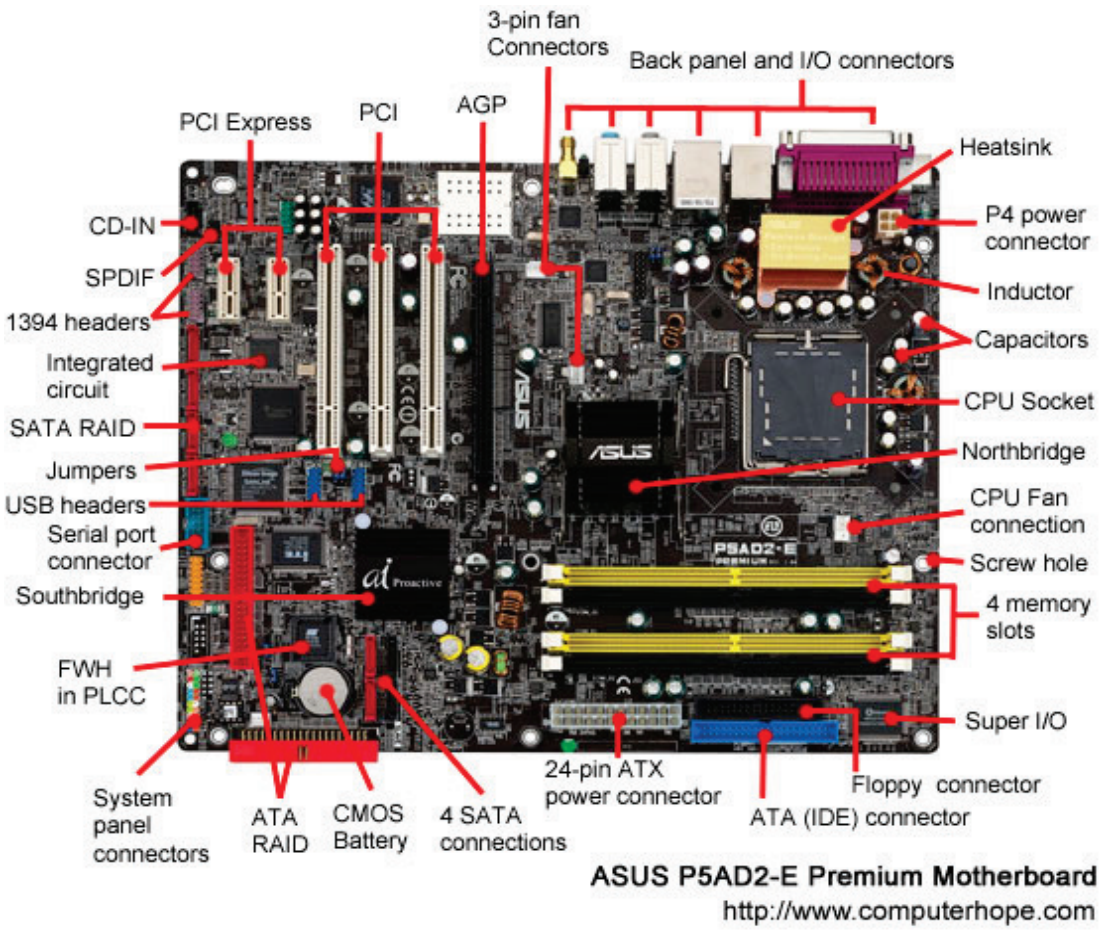
What parts were found? What parts were missing? What were the functions of the missing parts?

Answers will vary.

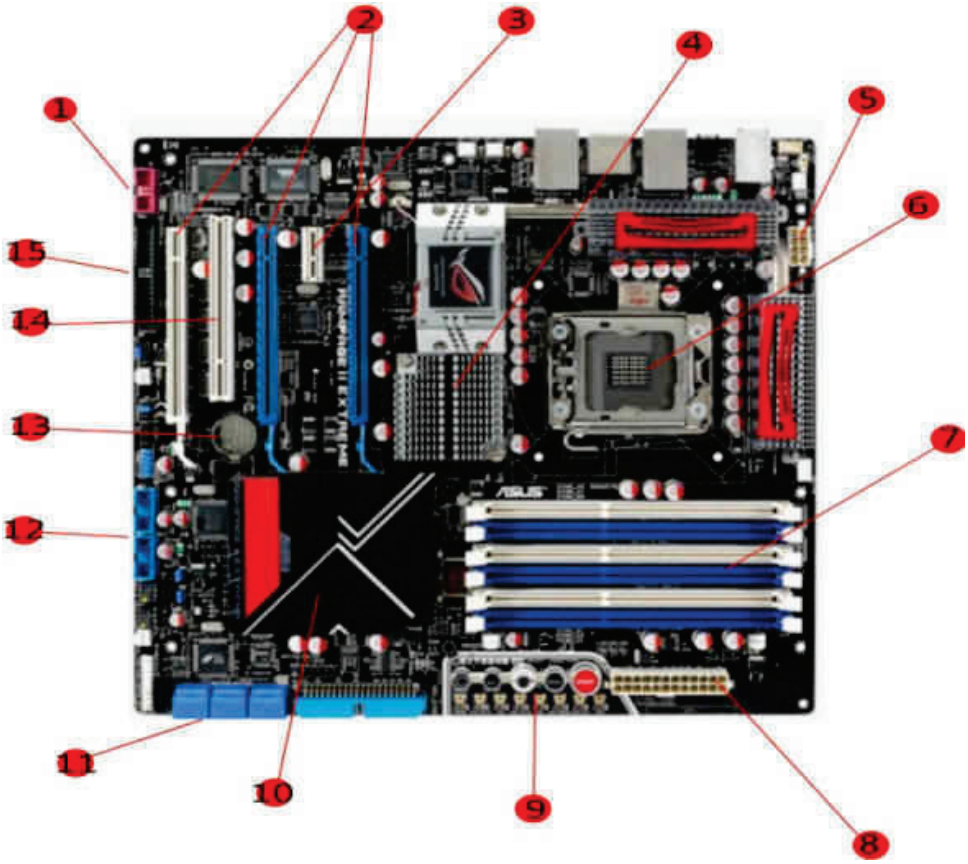
For Presenter Review

Parts of the PC:

1. Motherboard – which has the
    a. Central Processing Unit (CPU) performs most of the calculations of the computer
    b. Chip set
    c. RAM (random-access memory)
    d. BIOS (Basic Input Output System)
    e. Internal Buses – a subsystem that transfers data between different components inside the computer
    f. PCI Express (expansion cards such as graphics, land and physics processors)
    g. Internal buses
        i. PCI
        ii. SATA
        iii. ATA
    h. External BUS Controllers (BUS controllers are also used to talk between different computers)
        i. USB
        ii. FireWire
        iii. Esata
        iv. SCSI
2. Power Supply – Distributes the electric current to all of the parts of the computer.
3. Removable Media Devices
    a. CD – Plays CD-Roms (Read Only Memory) most of the time it works old CD's and computer programs
    b. DVD – Plays DVDs, but also can play CD-Roms so you can interchange the two drives when looking at changing/upgrading your
    c. Blu-ray
4. Sound Card – Can produce different sounds and better (or worse or similar) sound quality.
5. Operating System
6. Hard Drive – The main component
7. CPU Fan – A smaller fan that sits on top of the CPU and the motherboard because the CPU needs to remain the most cool it is important to have a fan on it.
8. Fan – Keeps the internal components of the computer cool. This is where you may need to bring out the canned air.
9. Expansion Cards – Lets you add functionality to the different computers by connecting in different things such as more RAM or different audio/video cards.



Source: http://www.computerhope.com/jargon/m/mothboar.htm



1. Firewire header: Firewire is also known as IEEE 1394. It is basically a high performance serial bus for digital and audio equipment to exchange data. Often used for transferring digital video to the PC straight from a digital camera. The FireWire header onboard means you can install a FireWire port on your machine.
2. PCI Express 16x slots: Currently the most common slot for Graphics cards, the PCI Express 16x slots provides 16 separate lanes or data transfer.
3. PCI Express 1x Slot: Like the PCI Express 16x above the 1x slot uses exactly the same system but only has a single lane of serial data transfer. These slots are used for expansion cards that do not require the same amount of data transfer that a graphics card requires. You will usually find components such as tv tuners, network cards and sound cards make use of the PCI Express 1x slot. You will also notice the difference in size between the 1x and the 16x slots. The PCI Express 1x slot is noticeably smaller and easy to spot.
4. Chipset – North Bridge (with heatsink: A chipset is a number of integrated circuits built onto the board to provide specific functions e.g. one part of the chipset may be an onboard component such as a modem or sound chip. Other parts may be used to control the CPU functions. Since these chips are working harder with each generation, motherboard manufacturers have started to put heatsinks and active coolers (fans) on the main parts of the chipset to disperse some of the heat.
5. 5 and 8 - Power connector: The standard power connector, the cable for this will be coming from the PSU, a clip is normally provided to make sure you get them in the correct order.
6. CPU (Central Processing Unit): All the CPU "sockets look very similar, however they are different in the way they have different amount of pins and in different layouts. There are currently two major CPU socket types PGA and LGA
7. DIMM (Double Inline Memory Module) slots: DIMM's are common memory types for computers. They vary in speeds and standards however and they need to match up to what your motherboard has been designed to take.

9 - Motherboard controls: Not available on all motherboards, but some allow direct control of the motherboard via simple buttons. Power switch, error checking, CMOS clearing, passwords and more features can be accessed directly on the motherboard on some models.

10 - Chipset - South Bridge: It handles things like the PCI bus, onboard Network and sound chips as well as the IDE and S-ATA buses.

11 - Serial ATA Connector: Serial ATA or more commonly seen as S-ATA is a new way of connecting your Hard Drives to your PC.

12 - USB 2.0 header: As well as having USB ports on the rear of the motherboard, motherboard manufacturers often add a couple of USB headers so you can connect optional cables for extra USB ports.

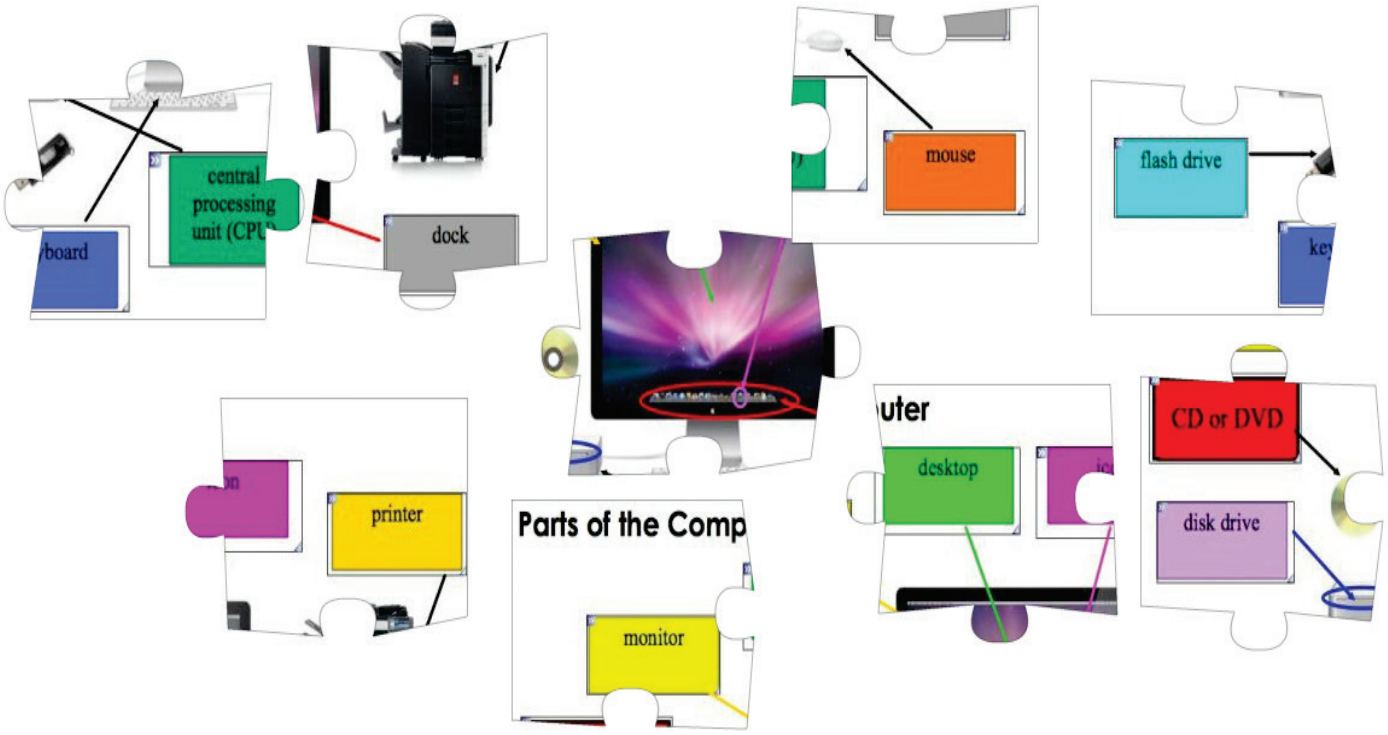
13 - Motherboard Battery: The battery gives the board a small amount of power in order to store some vital data on your machine when the power is off. Data stored is that like the time and date so you don't have to reset them every time you boot the machine up. Motherboard batteries are usually long lasting Lithium batteries. Removing this can reset all the data on your machine including the BIOS settings, however not replacing this correctly can lead to irreparable damage to the motherboard.

14 - PCI (Peripheral Component Interconnect) slot: The PCI bus (not PCI express) is now an older technology and although the PCI slots are still available, they have decreased in number and are being replaced by the PCI Express 1x slots. Its unlikely that you will get a motherboard without a PCI slot at the moment due to the fact that a lot of components still use the standard PCI slot. It would be awkward to upgrade to a system without PCI slots as it may mean upgrading more components than you would like to,

15 - Floppy Drive Connector: More simple than the IDE connector you only have to remember to get the red line to pin 1 of the connector and the red line to pin 1 on the floppy drive, This port is only to be used with floppy drives. You may not have a floppy controller on your motherboard as its slowly being phased out as more people are using writable CD's and DVDs to transfer data, to store data and to use as boot up discs.

Because computers are so important to our lives, there is a constant need to design and develop new hardware, software, and systems. Have you used a computer before? I'm sure you have. But have you seen the inside of a computer? What is all that! Actually the parts of the computer are similar to a big puzzle.

Put these puzzle parts together



The puzzle solution shows the outside parts of the computer. Now we want to explore the inside parts of the computer. While we learn the parts we will also explore the four functions of a computer: input, process, output, and storage. The individual parts are not much use by themselves, but when assembled together they allow you to play games, write papers, search the Internet, communicate with friends and much more.