



Lesson Plans

CompTIA's A+ IT Technician

(Exam 220-602)

Version 7.1

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Course Overview

The A+ certification has been updated for 2006. To obtain the A+ certification you must pass two exams. The A+ Essentials exam is required and covers basic operating system and hardware concepts. In addition to the Essentials exam, one specialization exam is required. Specialization exams include:

- A+ IT Technician (exam 220-602)
- A+ Remote Support Technician (exam 220-603)
- A+ Depot Technician (exam 220-604)

This course prepares students for the A+ IT Technician certification exam (220-602) by CompTIA. Before starting this course, you should have studied the material in the TestOut A+ Essentials course or have equivalent knowledge.

Module 0 – Introduction

This module introduces the students to the A+ certification requirements, Windows system tools and utilities, user accounts and groups, and teaches the students to use the hardware simulator.

Module 1 – PC Technician

This module teaches the fundamentals of performing as a PC Technician. This includes protecting computer equipment, personnel and the environment. Communication skills and attitudes associated with professionalism of a PC Technician are stressed. Preventative maintenance concerns, diagnostic procedures and troubleshooting techniques are also discussed.

Module 2 – System Components

In Module 2 students will learn to physically install a power supply, motherboard, CPU, memory, expansions cards, video cards, and sound cards. Students are also taught various methods to protect a system from overheating and how to modify common BIOS settings.

Module 3 – Storage Devices

In Module 3 students will learn to physically install floppy drives, IDE devices, serial ATA devices, and optical devices. They will learn how to configure a SCSI chain and how to select the correct hard drive for a given scenario.

Module 4 – File System

Module 4 provides a basic overview of the file system. Students will learn the basic components of a file system, how to navigate a file system, and how to select a file system for a hard drive. They will also learn how to control access to files using NTFS attributes.

Module 5 – Printing

Module 5 provides an overview of printing. This includes the basics of six types of printers: dot matrix, ink jet, laser, dye sublimation, solid ink, and thermal. Students will

become familiar with the factors to consider when selecting and installing a printer. The Windows 2000 and Windows XP concept of a logical printer is taught in this module. They will also learn how to troubleshoot common printing problems.

Module 6 – Networking

In Module 6 students will learn the basics of networking. This includes network protocols, server and client operating systems, network printing, wireless networking, Internet connectivity, and the techniques and tools used to troubleshoot network problems.

Module 7 – Portable Devices

In Module 7 students will become familiar with the components of a notebook system. They will learn power management strategies to reduce the amount of power consumed by portable devices, how to upgrade and repair a notebook, and guidelines for troubleshooting laptop computers.

Module 8 – Security

In Module 8 students will learn to control access to network resources, audit user actions and system events, use firewalls to secure an internal network, countermeasures to social engineering, and troubleshooting security issues. Students will learn strategies to physically secure the network, customize security and privacy settings with Internet Explorer, and how to use the Windows Local Security Policy to manage the system and users.

Module 9 – System Management

Module 9 discusses system management. This includes gaining an understanding of system files used to boot the system and compose the Windows registry. The student will also learn about disaster recovery tools used to restore operating system files in case of a disaster, backup and restore strategies, updating the operating system using hotfixes and service packs, and configuring host computers to accept Remote Desktop connections.

Module 10– Troubleshooting

In Module 10 students will learn guidelines for troubleshooting CPUs, memory, storage devices, expansion devices, and applications. They will also learn how to diagnose and resolve common system and startup errors. Several strategies for using disaster recovery tools are discussed.

Section 0.1: Course Introduction

Preparation

The video introduces the student to the A+ Technician course and the two exams required to be A+ certified. Robb Tracy, the A+ instructor, discusses who should take this course and what the course covers.

Lecture Focus Questions:

- Which A+ exam is required for the A+ certification?
- What is the exam number for the A+ IT Technician exam?

Time

About 5 minutes

Section 0.2: System Tools

Preparation

In this section students will become familiar with the functions of the following Windows tools and utilities: Device Manager, Task Manager, Event Viewer, System Configuration Utility (MSCONFIG), and System File Checker (SFC). Students will learn how to select the correct Windows utility to accomplish a given task.

A+ IT Technician Objectives

- 3.1 Identify the fundamental principles of operating systems
 - Locate and use operating system utilities and available switches for example:
 - System management tools
 - Device and Task Manager
 - MSCONFIG.EXE
 - Event Viewer
- 3.3 Identify tools, diagnostic procedures and troubleshooting techniques for operating systems
 - Use diagnostic utilities and tools to resolve operational problems for example:
 - Task and Device Manager
 - Event Viewer
 - MSCONFIG command
 - System File Checker (SFC)

Lecture Focus Questions:

- How can the System Configuration Utility help in troubleshooting?
- How are devices organized in Device Manager?
- What are the three types of events you might see in Event Viewer?
- Which tool lets you view running processes and current memory use?

Time

About 45 minutes

Section 0.3: Users and Groups

Preparation

This section discusses using Windows user accounts and groups to control user access to system resources. Information on the default groups installed on Windows 2000/XP systems and built-in users that can be employed is included.

A+ IT Technician Objectives

- 6.1 Identify the fundamentals and principles of security
 - Identify the purposes and characteristics of access control for example:
 - Access to operating system (e.g. accounts such as user, admin and guest. Groups, permission actions, types and levels), components, restricted spaces

Lecture Focus Questions:

- What is the difference between a *right* and a *permission*?
- How can groups simplify security administration?
- How are the rights assigned to the Power User group different than the rights assigned to the Administrator group?
- What is the purpose of the Backup group?

Time

About 20 minutes

Section 0.4: Using the Simulator

Preparation

This section teaches the students how to use the hardware simulator included in this course. Experiment with the simulations in this section until you are familiar with how the hardware simulator works. You will recognize the simulations in this course by the mouse icon to the left of the entry.

Time

About 30 minutes

Lab/Activity

- Put an Item on the Workbench
- Select an Item Based on Its Documentation
- Select Item Categories
- Install and Uninstall Components
- Set Dials and Switches
- Add Cabled Components
- Using the XP Simulator

Section 1.1: Protection and Safety

Preparation

This section discusses how to protect computer equipment, personnel and the environment. It stresses how to protect computer equipment from damage from Electrostatic Discharge (ESD) by implementing appropriate grounding procedures. It also discusses the actions that will ensure personal safety when working with computer components and how to properly dispose of computer equipment and hazardous chemicals.

A+ IT Technician Objectives

- 7.1 Identify potential hazards and proper safety procedures including power supply, display devices and environment (e.g. trip, liquid, situational, atmospheric hazards and high-voltage and moving equipment)

Lecture Focus Questions:

- How can ESD be a hazard to electronic computer components?
- What is the difference between a static-shielding bag and a static-resistant bag?
- What steps can you take to reduce ESD if you do not have the proper equipment handy?
- What is the MSDS? When would the information it provides be important?
- Which PC components require extra care to protect your personal safety?

Time

About 40 minutes

Section 1.2: Professionalism

Preparation

This section presents the elements associated with professionalism of a PC Technician. These include good communication skills, dealing with customers in a respectful manner, and acting with integrity.

A+ IT Technician Objectives

- 8.1 Use good communication skills including listening and tact/discretion, when communicating with customers and colleagues
 - Use clear, concise and direct statements
 - Allow the customer to complete statements—avoid interrupting
 - Clarify customer statements—ask pertinent questions
 - Avoid using jargon, abbreviations and acronyms
 - Listen to customers
- 8.2 Use job-related professional behavior including notation of privacy, confidentiality and respect for the customer and customers' property
 - Behavior
 - Maintain a positive attitude and tone of voice
 - Avoid arguing with customers and/or becoming defensive
 - Do not minimize customers' problems
 - Avoid being judgmental and/or insulting or calling the customer names
 - Avoid distractions and/or interruptions when talking with customers
 - Property
 - Telephone, laptop, desktop computer, printer, monitor, etc.

Lecture Focus Questions:

- What specific things can you do to improve your people skills?
- What actions and comments contribute to common stereotypes about PC technicians?
- How does professionalism affect customer satisfaction?
- How does respect affect your actions towards customers?

Time

About 30 minutes

Section 1.3: PC Maintenance

Preparation

In this section students will learn how to protect PCs through preventative maintenance measures including proper ventilation, regular backups, and maintaining the environment where the PC is deployed. Students will also learn how to safely clean computer components and the tools used to repair and maintain a computer.

A+ IT Technician Objectives

- 1.2 Identify tools, diagnostic procedures and troubleshooting techniques for personal computer components
 - Recognize names, purposes, characteristics and appropriate application of tools for example:
 - Multimeter
 - Anti-static pad and wrist strap
 - Specialty hardware / tools
 - Loop back plugs
 - Cleaning products (e.g. vacuum, cleaning pads)
- 1.3 Perform preventive maintenance of personal computer components
 - Identify and apply common preventive maintenance techniques for personal computer components for example:
 - Display devices (e.g. cleaning, ventilation)
 - Power devices (e.g. appropriate source such as power strip, surge protector, ventilation and cooling)
 - Input devices (e.g. covers)
 - Storage devices (e.g. software tools such as Disk Defragmenter and cleaning of optics and tape heads)
 - Thermally sensitive devices such as motherboards, CPU, adapter cards memory (e.g. cleaning, air flow)
- 4.3 Identify tools and diagnostic procedures to troubleshooting printers and scanners
 - Identify appropriate tools used for troubleshooting and repairing printer / scanner problems
 - Multimeter
 - Screwdrivers
 - Cleaning solutions
 - Extension magnet

Lecture Focus Questions:

- Why is dust an enemy to a computer?
- What will too much, or too little, humidity do to a computer?
- What types of materials can you use to clean internal PC components?
- How are backups related to preventive maintenance?

Time

About 45 minutes

Section 1.4: Troubleshooting Overview

Preparation

In this section students will learn basic diagnostic procedures and troubleshooting techniques. They will learn that following a systematic approach to problem solving is usually the most efficient method of troubleshooting.

A+ IT Technician Objectives

- 1.2 Identify tools, diagnostic procedures and troubleshooting techniques for personal computer components
 - Identify and apply basic diagnostic procedures and troubleshooting techniques
 - Isolate and identify the problem using visual and audible inspection of components and minimum configuration

Lecture Focus Questions:

- Why is checking the obvious first so important?
- Why are driver and operating system updates so important?
- What is the last step of troubleshooting that is commonly overlooked by PC technicians?
- What place does intuition have in the troubleshooting process?
- How could user education be a beneficial step in the troubleshooting process?

Time

About 25 minutes

Section 2.1: BIOS

Preparation

This section discusses the Basic Input Output System (BIOS), which is a collection of programs that allow the CPU to communicate with other devices. The BIOS cannot be rewritten. Also discussed is the Complementary Metal-Oxide Semiconductor (CMOS) that contains basic configuration data the computer uses to start up. The CMOS can be written to and the parameters can be changed as necessary, using the CMOS editor. Students will learn the correct key sequence to enter the CMOS editor, view and modify common BIOS settings, and disable onboard devices.

Lecture Focus Questions:

- What are the functions of the BIOS?
- What is the role of CMOS? How does it differ from the BIOS?
- Why does the CMOS require a battery?
- What determines the keystroke to open a CMOS editor? How can you find this information?
- Why might you need to update the BIOS?
- How can you recover if updating the BIOS fails?

Time

About 40 minutes

Lab/Activity

- Find BIOS Settings
- Turn on Num Lock
- Disable Onboard Devices

Section 2.2: Power Supplies

Preparation

In this section students will learn the basics of PC power supplies and how to test for and change a failing power supply. Power quality issues such as power surges, spikes, sags, brownouts and blackouts can create problems for the PC. A surge protector, line conditioner, Standby Power Supply (SPS), and an Uninterruptible Power Supply (UPS) are all devices that can be implemented to prevent power problems. Students will learn how to use a volt meter to test a power supply, how to replace the power supply, and how to configure a UPS.

A+ IT Technician Objectives

- 1.1 Install, configure, optimize and upgrade personal computer components
 - Add, remove and configure personal computer components including selection and installation of appropriate components for example:
 - Power supplies
- 1.3 Perform preventive maintenance of personal computer components
 - Identify and apply common preventive maintenance techniques for personal computer components for example:
 - Power devices (e.g. appropriate source such as power strip, surge protector, ventilation and cooling)

Lecture Focus Questions:

- What units are used to measure the amount of power required by a computer system?
- How do you determine what size of power supply is required for a specified computer?
- Why is it important to read the documentation when connecting power and case cables?
- How do power supplies address heat control?
- What is *soft power*?
- What are common symptoms of power supply problems?
- Why shouldn't you attempt to open or repair a failed power supply?
- What is the difference between a *brownout* and a *blackout*?
- How does a UPS differ from a surge protector?

Time

About 60 minutes

Lab/Activity

- Connect Power and Case Cables

Section 2.3: Motherboards

Preparation

In this section students will learn how to physically install a motherboard in a PC case. They will also learn how to complete the installation by configuring the motherboard settings and connecting the header cables.

A+ IT Technician Objectives

- 1.1 Install, configure, optimize and upgrade personal computer components
 - Add, remove and configure personal computer components including selection and installation of appropriate components for example:
 - Motherboards

Time

About 40 minutes

Lab/Activity

- Choose a Motherboard 1
- Choose a Motherboard 2
- Install Header Devices
- Configure Motherboard Jumpers
- Clear the CMOS

Section 2.4: Processors

Preparation

This section presents an overview of modern CPUs in order to familiarize students with CPUs they may come in contact with. Students will learn how to install a processor in a motherboard and how to install a heatsink and fan.

A+ IT Technician Objectives

- 1.1 Install, configure, optimize and upgrade personal computer components
 - Add, remove and configure personal computer components including selection and installation of appropriate components for example:
 - Processors / CPUs

Lecture Focus Questions:

- How does the CPU socket style determine which CPU could be installed in a specified computer?
- How do you determine the placement of the CPU on the zip socket?
- What special installation considerations are there when installing a single CPU in a multi-processor system?
- What methods are used to dissipate CPU generated heat?
- Why is thermal grease important when installing a processor?

Time

About 45 minutes

Lab/Activity

- Choose a Processor 1
- Choose a Processor 2
- Install a Processor
- Install a Heatsink and Fan

Section 2.5: Memory

Preparation

In this section students will learn how to select and install a memory module in a specified motherboard. They will learn to visually recognize different types of RAM that may be installed in a PC system and common signs that a computer needs additional memory.

A+ IT Technician Objectives

- 1.1 Install, configure, optimize and upgrade personal computer components
 - Add, remove and configure personal computer components including selection and installation of appropriate components for example:
 - Memory

Lecture Focus Questions:

- What are the most important things to consider when selecting memory?
- When installing memory, how do you determine which slots to fill first?
- Besides counting the number of pins, how can you tell the difference between 168-pin DIMMs and DDR modules? How can you tell the difference between DDR and DDR-2 modules?
- When might you need to edit the BIOS when installing additional memory?
- How can you make sure you select the correct memory for your motherboard?

Time

About 60 minutes

Lab/Activity

- Install SDRAM Memory
- Select and Install Memory
- Install RDRAM Memory
- Select SDRAM Memory
- Choose the Correct Memory
- Select DDR Memory
- Select RDRAM Memory
- Disable Memory Tests

Section 2.6: Expansion Cards

Preparation

This section discusses installing expansion cards. Students will learn how to identify expansion buses and cards by sight, and the precautions to take when installing an expansion card.

A+ IT Technician Objectives

- 1.1 Install, configure, optimize and upgrade personal computer components
 - Add, remove and configure personal computer components including selection and installation of appropriate components for example:
 - Adapter cards

Lecture Focus Questions:

- What is an advantage of the PCI bus over the ISA bus?
- Which buses are commonly used by graphics cards?
- What type of slot can a PCIe 1x card be placed in?

Time

About 25 minutes

Lab/Activity

- Install an AGP Card
- Install an Expansion Card

Section 2.7: Video

Preparation

This section presents the role and functions of a video card. It discusses the factors to consider when selecting a video card, how to install a video card, using shared video memory, and configuring the AGP aperture size.

A+ IT Technician Objectives

- 1.1 Install, configure, optimize and upgrade personal computer components
 - Add, remove and configure personal computer components including selection and installation of appropriate components for example:
 - Display devices
 - Adapter cards
- 2.2 Install, configure, optimize and upgrade laptops and portable devices
 - Describe how video sharing affects memory upgrades

Lecture Focus Questions:

- What are the two most common video card buses used today?
- What is the advantage of having built-in memory on a video card?
- How does the color depth and resolution depend on the amount of video card memory?
- What is the difference between a TV tuner and VI/VO?
- What are the advantages and disadvantages of using a motherboard with built-in video?
- Why might your Windows XP system report only 448 MB of memory when there is 512 MB installed?
- How does the AGP aperture size or TurboCache increase the amount of memory available for video?

Time

About 65 minutes

Lab/Activity

- Select an AGP Card
- Upgrade a Video Card
- Select a Dual Monitor Video Card
- Increase Shared Video Memory
- Set the AGP Aperture

Section 2.8: Audio

Preparation

In this section students will learn the basics of sound cards; the role of sound cards, sound board channels, file types for digital audio, and common connectors and ports. They will become familiar with the factors to consider when selecting a sound card and how to create a multi-media system by installing sound devices.

A+ IT Technician Objectives

- 1.1 Install, configure, optimize and upgrade personal computer components
 - Add, remove and configure personal computer components including selection and installation of appropriate components for example:
 - Input devices (e.g. basic, specialty and multimedia)
 - Adapter cards

Lecture Focus Questions:

- Which components are used to convert analog sound into digital data, and digital data into analog sound?
- What is the difference between stereo, 5.1, and 7.1 audio?
- What is a sampling rate?
- What are the most common additional features available with sound cards?
- What is the difference between a WAV file and a MIDI file?
- What are the common connectors that might be on a sound card?

Time

About 25 minutes

Lab/Activity

- Install a Sound Card
- Select a Sound Card

Section 2.9: Cooling

Preparation

In this section students will learn various methods to keep PC systems cool. The CPU, hard drive, memory, and video board all produce heat that can cause the system to overheat. Students will learn factors to be considered and procedures to implement in order to prevent the overheating of PC systems.

A+ IT Technician Objectives

- 1.1 Install, configure, optimize and upgrade personal computer components
 - Add, remove and configure personal computer components including selection and installation of appropriate components for example:
 - Cooling systems
- 1.3 Perform preventive maintenance of personal computer components
 - Identify and apply common preventive maintenance techniques for personal computer components for example:
 - Display devices (e.g. ventilation)
 - Power devices (e.g. ventilation and cooling)
 - Thermally sensitive devices such as motherboards, CPU, adapter cards memory (e.g. cleaning, air flow)

Lecture Focus Questions:

- How does adequate cooling improve performance and extend the life of components?
- How does organizing and attaching cables and wires in and around a computer system help with internal airflow?
- Why should you keep the system case cover on during normal operations?
- When might you want to add liquid cooling to a computer?
- What is the difference between a heat sink and a heat spreader?
- What is the function of a thermal pad? When should it be used?

Time

About 15 minutes

Section 3.1: Floppy

Preparation

This section covers the basics of installing and configuring floppy drives. Students will learn how to install both a single floppy drive and dual floppy drives. They will also learn to connect cables appropriately.

A+ IT Technician Objectives

- 1.1 Install, configure, optimize and upgrade personal computer components
 - Add, remove and configure personal computer components including selection and installation of appropriate components for example:
 - Storage Devices

Lecture Focus Questions:

- What precautions should you take with floppy disks?
- What method do you use to clean the read/write heads of the floppy disk?
- How does the floppy disk density affect storage capacity?
- What elements can you visually inspect to ensure the floppy cable was installed correctly?
- What cabling scheme is used to distinguish drive A: from drive B:?

Time

About 40 minutes

Lab/Activity

- Install a Floppy Drive
- Install Two Floppy Drives

Section 3.2: Parallel ATA (IDE)

Preparation

In this section students will learn how to install IDE devices in a PC system. They will learn how to configure the master/slave setting, and connect data and power cables.

A+ IT Technician Objectives

- 1.1 Install, configure, optimize and upgrade personal computer components
 - Add, remove and configure personal computer components including selection and installation of appropriate components for example:
 - Storage Devices

Lecture Focus Questions:

- What makes IDE such a popular hard drive?
- What are the differences between IDE, EIDE, and ATA?
- How are jumpers used to define the master/slave status of devices?
- What type of cable do ATA devices require?
- Why are DMS modes, rather than PIO modes, used on newer drives?

Time

About 70 minutes

Lab/Activity

- Install a PATA Hard Disk
- Configure Drive Jumpers
- Select a Hard Drive
- Install an Ultra ATA Drive

Section 3.3: Serial ATA

Preparation

In this section students will learn how to install a serial ATA device. Serial ATA replaces the parallel ATA technology with a serial bus. Serial ATA can transfer data much faster than Ultra ATA.

A+ IT Technician Objectives

- 1.1 Install, configure, optimize and upgrade personal computer components
 - Add, remove and configure personal computer components including selection and installation of appropriate components for example:
 - Storage Devices

Lecture Focus Questions:

- How does SATA improve upon the limitations of PATA?
- How is configuring SATA easier than configuring PATA?
- What enhancements does SATA II (SATA-II) provide over the original SATA specifications?
- What are hot plug SATA devices?
- What is eSATA?

Time

About 15 minutes

Lab/Activity

- Install SATA Drives

Section 3.4: SCSI

Preparation

This section discusses the Small Computer System Interface (SCSI). Students will learn the details of SCSI standards. They will learn how to configure a SCSI chain by setting the SCSI ID numbers and terminating appropriate devices on the SCSI chain.

A+ IT Technician Objectives

- 1.1 Install, configure, optimize and upgrade personal computer components
 - Add, remove and configure personal computer components including selection and installation of appropriate components for example:
 - Storage Devices

Lecture Focus Questions:

- What are the advantages of using SCSI devices?
- What factors would you consider when assigning a SCSI ID number?
- What is prevented by proper termination of SCSI devices?
- What factors determine the maximum length of a SCSI bus?

Time

About 75 minutes

Lab/Activity

- Install a SCSI Adapter and Device
- Connect External SCSI Devices
- Install an Internal SCSI Device

Section 3.5: Optical Devices

Preparation

This section covers the factors to consider when selecting an optical drive. Students will learn how to select a suitable optical drive for a given scenario, and then install IDE CD-ROM and DVD devices.

A+ IT Technician Objectives

- 1.1 Install, configure, optimize and upgrade personal computer components
 - Add, remove and configure personal computer components including selection and installation of appropriate components for example:
 - Storage Devices

Lecture Focus Questions:

- What is the difference between DVD-R and DVD+R? Are the two standards compatible?
- An optical drive speed is identified as 24x10x70. What does each of the numbers indicate?
- How do you prevent buffer underrun errors?

Time

About 15 minutes

Lab/Activity

- Select a CD Drive
- Select an Optical Drive

Section 3.6: Choose a Storage Solution

Preparation

This section contains a comparison of storage devices including hard disks, optical disks, and flash devices. Students will learn how to select and install the correct hard drive for a given scenario.

A+ IT Technician Objectives

- 1.1 Install, configure, optimize and upgrade personal computer components
 - Add, remove and configure personal computer components including selection and installation of appropriate components for example:
 - Storage Devices

Lecture Focus Questions:

- What are the advantages of hard disks over all other forms of storage media?
- How do optical drives store and read data from a disc?
- How does a flash card differ from a floppy disk or a hard disk?
- How does SATA improve upon the limitations of ATA?
- How is configuring SATA easier than configuring ATA?
- What is a typical application for SCSI devices?
- Which type of interface would you commonly use to attach a flash card reader to the computer?

Time

About 15 minutes

Lab/Activity

- Select a Hard Drive 1
- Select a Hard Drive 2

Section 4.1: Partitions and Disks

Preparation

In this section students will learn to understand the relationship between hard disks, partitions, and volumes. This section discusses the purpose of different partition types that can be created on a storage device such as primary partitions, extended partitions, logical drives, and active partitions. It also discusses the difference between basic disks and basic volumes, and dynamic disks and dynamic volumes. Students will learn how to create primary and extended partitions, upgrade a basic disk to a dynamic disk, and create dynamic volumes.

A+ IT Technician Objectives

- 3.1 Identify the fundamentals of using operating systems
 - Identify concepts and procedures for creating, viewing, managing disks, directories and files in operating systems
 - Disks (e.g. active, primary, extended and logical partitions)

Lecture Focus Questions:

- What must be done to prepare a disk drive before an operating system can be installed?
- What is the relationship between a partition and the drive letter?
- What is the difference between basic and dynamic disks?

Time

About 45 minutes

Lab/Activity

- Create a Primary Partition
- Create a Logical Drive
- Create a Simple Volume

Section 4.2: File Systems

Preparation

This section teaches students how to select a file system for a hard drive that will be used with Windows. Three file systems are discussed, with a comparison of the properties of each file system. Students will learn how to format an existing drive and convert a hard drive from a FAT32 to a NTFS file system.

A+ IT Technician Objectives

- 3.1 Identify the fundamental principles of operating systems
 - Identify concepts and procedures for creating, viewing and managing disks, directories and files on operating systems
 - Disks (e.g. file systems including FAT32 and NTFS)
 - Locate and use operating system utilities and available switches for example:
 - Disk management tools (e.g. Format)
- 6.2 Install, configure, upgrade and optimize security
 - Install and configure software, wireless and data security for example:
 - File systems (converting from FAT32 to NTFS only)

Lecture Focus Questions:

- How is NTFS different than FAT16 and FAT32?
- Why should you back up all data before formatting a drive?
- How can you reformat a drive from FAT to NTFS without losing all of the data?
- Which operating systems can use NTFS?

Time

About 40 minutes

Lab/Activity

- Format Drives

Section 4.3: Managing Files

Preparation

In this section students will learn how to use command line utilities to manage files and directories in the file system. .

A+ IT Technician Objectives

- 3.1 Identify the fundamental principles of operating systems
 - Use command-line functions and utilities to manage operating systems, including proper syntax and switches for example:
 - CMD
 - HELP
 - DIR
 - EDIT
 - COPY
 - XCOPY
 - MD / CD / RD
 - Identify concepts and procedures for creating, viewing and managing disks, directories and files on operating systems
 - Directory structures (e.g. create folders, navigate directory structures)
 - Files (e.g. creation, attributes, permissions)
 - Locate and use operating system utilities and available switches for example:
 - System management tools
 - CMD
 - File management tools (e.g. Windows EXPLORER)

Time

About 45 minutes

Lab/Activity

- Use Command Help
- Manage Directories
- Copy Files

Section 4.4: File Attributes

Preparation

This section discusses the NTFS file attributes used to control access to directories and files. Students will learn how to use the *attrib* command to view and modify file attributes.

A+ IT Technician Objectives

- 3.1 Identify the fundamental principles of operating systems
 - Use command-line functions and utilities to manage operating systems, including proper syntax and switches for example:
 - ATTRIB
 - Locate and use operating system utilities and available switches for example:
 - File management tools (e.g. ATTRIB.EXE)

Lecture Focus Questions:

- How can attributes add a level of security to files and folders?
- What attributes are supported by NTFS that are not supported by FAT or FAT32?
- Which file attributes can you **not** set using the **attrib** command?

Time

About 30 minutes

Lab/Activity

- Hide Files
- Protect Files

Section 4.5: Disk Optimization

Preparation

This section teaches a student how to optimize storage space on the PC. This is done by focusing in on two methods: upgrading hardware such as the hard disk and disk interface to the fastest hardware that is within the budget, and performing tasks to clean up the hard disk. Students will learn how to check a hard disk for errors, defragment a hard disk, and perform Disk Cleanup.

A+ IT Technician Objectives

- 1.3 Perform preventive maintenance of personal computer components
 - Identify and apply common preventive maintenance techniques for personal computer components for example:
 - Storage devices (e.g. software tools such as Disk Defragmenter)
- 3.1 Identify the fundamental principles of operating systems
 - Locate and use operating system utilities and available switches for example:
 - Disk management tools (e.g. DEFRAG, CHKDSK)
- 3.2 Install, configure, optimize and upgrade operating systems – references to upgrading from Windows 95 and NT may be made
 - Identify procedures and utilities used to optimize operating systems for example:
 - Hard drives (e.g. disk defragmentation)

Lecture Focus Questions:

- What tasks does Disk Cleanup perform?
- Why does fragmentation take place?
- How does defragmenting improve how a system performs?
- What is a *lost cluster*?
- How is a *cross-linked file* resolved?

Time

About 40 minutes

Lab/Activity

- Use Disk Cleanup

Section 5.1: Printers and Scanners

Preparation

This section presents an overview of the basics of six types of printers: Dot Matrix, Ink Jet (Ink Dispersion), Laser, Dye Sublimation, Solid Ink, and Thermal. The basics of how scanners work and their available features are also discussed.

A+ IT Technician Objectives

- 4.1 Identify the fundamental principles of using printers and scanners
 - Describe processes used by printers and scanners including laser, ink dispersion, thermal, solid ink and impact printers and scanners

Lecture Focus Questions:

- Which printer type is ideal for printing carbon-copy documents?
- What is a common application for a thermal printer?
- What features are used to describe the quality and speed of print jobs a printer can produce?
- What types of materials should you not print on with a laser printer?
- Why does a laser printer use heat in the printing process?
- What function is performed during the transferring stage in laser printing?
- What is the function of the printer driver?
- What is the function of the CCD microchip?
- What are common interfaces used for scanners?
- What products should you use to clean the scanner bed?

Time

About 60 minutes

Section 5.2: Printer Configuration

Preparation

This section reviews basic printing concepts in Windows 2000 and Windows XP. The critical difference between Windows XP/2000 and earlier versions of Windows is that the printer is not an actual physical device, but the printer is a logical printer consisting of the print device, printer driver and print spooler. Students will learn how to install a plug-and-play printer, manually install a printer, and set and change the default printer.

A+ IT Technician Objectives

- 4.2 Install, configure, optimize and upgrade printers and scanners
 - Install and configure printers / scanners
 - Power and connect the device using local or network port
 - Install and update device driver and calibrate the device
 - Configure options and default settings
 - Install and configure print drivers (e.g. PCLTM, PostscriptTM, GDI)
 - Install and configure printer upgrades including memory and firmware
 - Optimize scanner performance including resolution, file format and default settings

Lecture Focus Questions:

- How is a printer a logical device?
- What is the function of the print driver? The print queue?
- Which printing component takes the print job from the queue and sends it to the print device?

Time

About 45 minutes

Lab/Activity

- Install a Plug and Play Printer
- Manually Install a Printer

Section 5.3: Troubleshooting Printing

Preparation

This section discusses troubleshooting techniques for common printing problems. Because of a wide variety of printers on the market, students need to learn to visit the manufacturer's Web site and check the knowledgebase or Frequently Asked Questions (FAQs) for specific details about printers. Guidelines for implementing a preventative maintenance plan to extend the life of a printer are discussed.

A+ IT Technician Objectives

- 4.3 Identify tools and diagnostic procedures to troubleshooting printers and scanners
 - Gather information about printer / scanner problems
 - Review and analyze collected data
 - Isolate and resolve identified printer / scanner problem including defining the cause, applying the fix and verifying functionality
 - Identify appropriate tools used for troubleshooting and repairing printer / scanner problems
- 4.4 Perform preventive maintenance of printers and scanners
 - Perform scheduled maintenance according to vendor guidelines (e.g. install maintenance kits, reset page counts)
 - Ensure a suitable environment
 - Use recommended supplies

Lecture Focus Questions:

- What are three obvious things you should check before doing more extensive printing troubleshooting?
- What problems are indicated if the printer can print a test page but you cannot send a print job to the printer from a workstation?
- What problems are indicated if a print job is full of garbled text?
- How does paper quality affect a printer?
- What is the best way to clean up a toner spill?
- How do you clean an ink jet printer head?

Time

About 60 minutes

Section 6.1: Network Protocols

Preparation

This section covers network protocols which are used in computer networks to define how computers communicate with each other. Common protocol suites are discussed, with the primary focus on the TCP/IP protocol suite.

A+ IT Technician Objectives

- 5.1 Identify the fundamental principles or networks
 - Identify names, purposes and characteristics of basic network protocols and terminologies for example:
 - TCP / IP (e.g. gateway, subnet mask, DNS, WINS, static and automatic address assignment)
 - IPX / SPX (NWLink)
 - NETBEUI / NETBIOS
 - SMTP
 - IMAP
 - HTML
 - HTTP
 - HTTPS
 - SSL
 - Telnet
 - FTP
 - DNS

Lecture Focus Questions:

- What is the difference between a *protocol* and a *protocol suite*?
- What is the most common protocol suite used by computers today? Why?
- What protocol suite is used on older NetWare servers?
- What are three e-mail protocols? How are they different?
- How can you tell if your browser is using SSL?
- Why does using FTP pose a security problem?
- What is a secure alternative to Telnet?

Time

About 45 minutes

Section 6.2: TCP/IP Configuration

Preparation

This section discusses the role of TCP/IP addresses. The IP address is composed of the logical host and the logical network address together. Students will become familiar with the various TCP/IP configuration parameters used to set up a system on a network: IP address, subnet mask, default gateway address, DNS server address, WINS server address, and MAC address. Students will learn how to configure a computer to use DHCP, and configure TCP/IP settings on a workstation.

A+ IT Technician Objectives

- 5.1 Identify the fundamental principles or networks
 - Identify names, purposes and characteristics of basic network protocols and terminologies for example:
 - TCP / IP (e.g. gateway, subnet mask, DNS, WINS, static and automatic address assignment)
- 5.2 Install, configure, optimize and upgrade networks
 - Establish network connectivity
- 5.3 Use tools and diagnostic procedures to troubleshoot network problems
 - Diagnose and troubleshoot basic network issue for example:
 - Protocol configuration
 - TCP / IP (e.g. gateway, subnet mask, DNS, WINS, static and automatic address assignment)

Lecture Focus Questions:

- What is the difference between a MAC address and an IP address? Which address can you assign to a computer?
- How does the IP address indicate both the network and the node address? What is used to identify each part of the address?
- What is the address class of IP address 133.66.155.189?
- What is the default subnet mask for the IP address 166.88.1.45? What is the network address? What is the host address?
- What is the function of the default gateway?
- What is the difference between a DNS server and a WINS server? When would you use a WINS server?
- How can using a DHCP server simplify TCP/IP configuration? What values can be delivered by a DHCP server?
- Your computer has an IP address of 169.254.33.12. What does this indicate?

Time

About 75 minutes

Lab/Activity

- Configure IP Parameters
- Configure a Client for DHCP

Section 6.3: Server Connections

Preparation

In this section students will learn how to establish a network connection between a workstation client and a server. This section reviews available server operating systems and client operating systems. It also discusses the credentials that must be used to authenticate to the system. Students will learn how to install and configure client software.

A+ IT Technician Objectives

- 5.1 Identify the fundamental principles or networks
 - Identify names, purposes and characteristics of basic network protocols and terminologies for example:
 - TCP / IP (e.g. gateway, subnet mask, DNS, WINS, static and automatic address assignment)
 - IPX / SPX (NWLink)
 - NETBEUI / NETBIOS
- 5.2 Install, configure, optimize and upgrade networks
 - Establish network connectivity
 - Configure client options (e.g. Microsoft, Novell) and network options (e.g. domain, workgroup, tree)

Lecture Focus Questions:

- What is the purpose of client software? How does this differ from the purpose of networking protocols?
- What software would you use to connect a Windows client to a Linux server? What software allows you to connect a Windows client to a NetWare server?
- What logon parameters do you need to supply to log on to a NetWare server?

Time

About 30 minutes

Lab/Activity

- Install the MS Novell Client

Section 6.4: Resource Sharing

Preparation

This section reviews how sharing resources on a network increases the efficiency of an organization. Two models of network sharing are presented and three common network operating systems are discussed. Students will learn how to share a folder and map a drive to a shared folder.

A+ IT Technician Objectives

- 5.2 Install, configure, optimize and upgrade networks
 - Demonstrate the ability to share network resources
 - Models
 - Configure permissions
 - Capacities / limitations for sharing for each operating system

Lecture Focus Questions:

- What are the advantages of a client/server network over a peer-to-peer network?
- When might you consider using a peer-to-peer network?
- What is the role of Active Directory, eDirectory, and Open Directory?
- What is contained in the ACL?
- What services does Samba provide when installed on a Linux server?

Time

About 45 minutes

Lab/Activity

- Share a Folder
- Map a Drive

Section 6.5: Network Printing

Preparation

This section presents a high level overview of using network printing to create a more efficient networking environment. Students will become familiar with network printing processes and components such as spooling, print queue, and print server. Students will also learn how to share a local printer as a network printer and configure a network printer on a workstation.

A+ IT Technician Objectives

- 4.2 Install, configure, optimize and upgrade printers and scanners
 - Install and configure printers / scanners
 - Power and connect the device using local or network port
 - Install and update device driver and calibrate the device
 - Configure options and default settings
 - Install and configure print drivers (e.g. PCLTM, PostscriptTM, GDI)
 - Install and configure printer upgrades including memory and firmware
 - Optimize scanner performance including resolution, file format and default settings
- 5.2 Install, configure, optimize and upgrade networks
 - Demonstrate the ability to share network resources

Lecture Focus Questions:

- What is the benefit of network printing?
- What is the purpose of the print server?
- Which type of devices can act as a print server?
- What is an advantage of having a printer with a built-in print server and network interface?

Time

About 25 minutes

Lab/Activity

- Share a Local Printer
- Add a Network Printer

Section 6.6: Wireless Networking

Preparation

This section covers the basics of wireless networking including three of the most common radio frequency wireless networking standards: 802.11a, 802.11b, and 802.11g. Students will become familiar with the wireless equipment used in wireless networking and the steps to secure a wireless network. Students will learn how to create a wireless connection and configure wireless network settings.

A+ IT Technician Objectives

- 5.1 Identify the fundamental principles or networks
 - Identify names, purposes and characteristics of technologies for establishing connectivity for example:
 - Wireless (all 802.11)
- 5.2 Install, configure, optimize and upgrade networks
 - Establish network connectivity
 - Obtain a connection
 - Configure network options
- 6.2 Install, configure, upgrade and optimize security
 - Install and configure software, wireless and data security for example:
 - Wireless client configuration
 - Unused wireless connections

Lecture Focus Questions:

- What type of device is required to create an infrastructure wireless network configuration?
- What is the purpose of an SSID?
- Why should default security settings be changed when dealing with a wireless network?
- What is *snorting* and what can be done to prevent it?

Time

About 70 minutes

Lab/Activity

- Create a Wireless Connection
- Use WPA Encryption

Section 6.7: Internet Connectivity

Preparation

This section presents different methods of connecting to the Internet through an Internet Service Provider (ISP). Students will learn how to configure a dial-up connection in Windows.

A+ IT Technician Objectives

- 2.1 Identify fundamental principles of using laptops and portable devices
 - Identify appropriate applications for laptop-specific communication connections such as Bluetooth, infrared, cellular WAN and Ethernet
- 5.1 Identify the fundamental principles of networks
 - Identify names, purposes and characteristics of basic network protocols and terminologies for example:
 - ISP
 - Identify names, purposes and characteristics of technologies for establishing connectivity for example:
 - Dial-up networking
 - Broadband (e.g. DSL, cable, satellite)
 - ISDN networking
 - Wireless (all 802.11)
 - Infrared
 - Bluetooth
 - Cellular
 - VoIP
- 5.2 Install, configure, optimize and upgrade networks
 - Establish network connectivity
 - Install and configure network cards
 - Obtain a connection
 - Configure network options

Lecture Focus Questions:

- In which situations would a PSTN still be the best Internet option? Why?
- How does DSL enable you to talk on the phone and connect to the Internet at the same time?
- What is the difference between BRI and PRI service levels when dealing with ISDN Internet?
- What is the main drawback to cable Internet?
- What is required for a satellite Internet connection?

Time

About 40 minutes

Lab/Activity

- Create a Dialup Internet Connection

Section 6.8: Troubleshooting Tools

Preparation

In this section students will learn how to use tools such as ipconfig, ping, tracert, and nslookup to view configuration information that can be used to troubleshoot network problems.

A+ IT Technician Objectives

- 5.3 Use tools and diagnostic procedures to troubleshoot network problems
 - Identify names, purposes and characteristics of tools for example:
 - Command line tools (e.g. IPCONFIG.EXE, PING.EXE, TRACERT.EXE, NSLOOKUP.EXE)
 - Cable testing device

Lecture Focus Questions:

- What is the relationship between **ping** and **tracert**?
- When would you use **nslookup**?

Time

About 45 minutes

Lab/Activity

- Find Configuration Information 1
- Find Configuration Information 2
- Find Path Information

Section 6.9: Troubleshooting

Preparation

This section discusses troubleshooting common network problems such as physical connectivity, protocol configuration, communication, and resource access. Students will practice using ipconfig, ping, and tracert to troubleshoot network communication.

A+ IT Technician Objectives

- 5.3 Use tools and diagnostic procedures to troubleshoot network problems
 - Diagnose and troubleshoot basic network issue for example:
 - Driver / network interface
 - Protocol configuration
 - TCP / IP (e.g. gateway, subnet mask, DNS, WINS, static and automatic address assignment)
 - IPX / SPX (NWLink)
 - Permissions
 - Firewall configuration
 - Electrical interference
- 5.4 Perform preventive maintenance of networks including securing and protecting network cabling

Lecture Focus Questions:

- What is the relationship between **ping** and **tracert**?
- When would you use **nslookup**?

Time

About 45 minutes

Lab/Activity

- Troubleshoot IP Configuration Problems
- Troubleshoot Network Communication 1
- Troubleshoot Network Communication 2
- Troubleshoot Network Communication 3

Section 7.1: Portable Devices

Preparation

This section provides an overview of portable devices. This will include information about types of portable devices, components of a notebook system, notebook power issues, battery types for portable devices, PC card types, and methods for connecting a portable device to a network.

A+ IT Technician Objectives

- 2.1 Identify fundamental principles of using laptops and portable devices
 - Identify appropriate applications for laptop-specific communication connections such as Bluetooth, infrared, cellular WAN and Ethernet
 - Identify appropriate laptop-specific power and electrical input devices and determine how amperage and voltage can affect performance

Lecture Focus Questions:

- What kinds of components are typically built into a notebook computer?
- How do you add devices to a portable device?
- What size slot is required for the different types of PC cards?
- What is the battery memory effect that is present in Ni-cad batteries?
- What advantages do NiMH batteries have over Li-Ion batteries?
- How should you dispose of notebook batteries?

Time

About 50 minutes

Section 7.2: Upgrade and Repair

Preparation

In this section students will learn how to add memory to a notebook. They will also learn how to change notebook components such as a hard disk, keyboard, and display.

A+ IT Technician Objectives

- 2.1 Identify fundamental principles of using laptops and portable devices
 - Identify the major components of the LCD including inverter, screen and video card
- 2.2 Install, configure, optimize and upgrade laptops and portable devices
 - Removal of laptop-specific hardware such as peripherals, hot-swappable and non-hot-swappable devices

Lecture Focus Questions:

- How do you identify the location and replacement procedures for notebook systems?
- How can you tell if a failed notebook display is caused by the display or the video card?
- How can you continue to use a notebook if a built-in component (such as a keyboard, pointing device, or network card) fails?

Time

About 45 minutes

Section 7.3: Troubleshooting

Preparation

In this section students will learn troubleshooting guidelines to follow when working with laptop computers.

A+ IT Technician Objectives

- 2.3 Use tools, diagnostic procedures and troubleshooting techniques for laptops and portable devices
 - Use procedures and techniques to diagnose power conditions, video, keyboard, pointer and wireless card issues for example:
 - Verify AC power (e.g. LEDs, swap AC adapter)
 - Verify DC power
 - Remove unneeded peripherals
 - Plug in external monitor
 - Toggle Fn keys
 - Check LCD cutoff switch
 - Verify backlight functionality and pixilation
 - Stylus issues (e.g. digitizer problems)
 - Unique laptop keypad issues
 - Antenna wires

Time

About 45 minutes

Section 8.1: Resource Security

Preparation

This section discusses controlling access to network resources. NTFS permissions can be configured to control access to files and folders. Share permissions work together with NTFS permission to control access to shared folders. Printer permissions can be assigned to printers to control printing tasks.

A+ IT Technician Objectives

- 5.2 Install, configure, optimize and upgrade networks
 - Demonstrate the ability to share network resources
 - Configure permissions
- 6.1 Identify the fundamentals and principles of security
 - Identify the purposes and characteristics of access control for example:
 - Access to operating system (e.g. accounts such as user, admin and guest. Groups, permission actions, types and levels), components, restricted spaces
- 6.2 Install, configure, upgrade and optimize security
 - Install and configure software, wireless and data security for example:
 - Data access (e.g. permissions)
- 6.3 Identify tool, diagnostic procedures and troubleshooting techniques for security
 - Diagnose and troubleshoot software and data security issues for example:
 - Data access issues (e.g. permissions, security policies)

Lecture Focus Questions:

- How are the rights assigned to the Power User group different than the rights assigned to the Administrator group?
- What is the purpose of the Backup group?
- Which NTFS permissions are required to allow a user to open, edit, and save changes to a document?
- How does file ownership affect access and permissions?
- How do share permissions differ from NTFS permissions? How do they work together?
- Mary sends a print job to the printer. Who can delete this print job from the queue?

Time

About 45 minutes

Lab/Activity

- Configure NTFS Permissions 1
- Configure NTFS Permissions 2
- Configure Shared Folder Permissions
- Configure Printer Permissions

Section 8.2: System Security

Preparation

This section provides a review of Local Security Policy settings used to control system functions and user rights. It also discusses measures that can be implemented to minimize current authentication security threats. Students will learn how to configure Local Security Policy settings.

A+ IT Technician Objectives

- 6.2 Install, configure, upgrade and optimize security
 - Install and configure software, wireless and data security for example:
 - Authentication technologies
 - Data access (e.g. basic local security policy)
- 6.3 Identify tool, diagnostic procedures and troubleshooting techniques for security
 - Diagnose and troubleshoot software and data security issues for example:
 - Data access issues (e.g. security policies)

Lecture Focus Questions:

- What is the difference between password policy settings and account lockout settings?
- How can you use user rights to control the type of operations that users can perform?
- What happens to the local security policy settings when the computer is a member of the domain?
- What is the best way to prevent password cracking? How can account lockout help?
- How could smart cards improve the security of an organization?
- What are common biometric identification systems?

Time

About 50 minutes

Lab/Activity

- Configure Policies
- Enforce Password Settings

Section 8.3: Auditing

Preparation

In this section students will learn how to use auditing to record user and system actions. Students will learn how to enable auditing in the Local Security Policy.

A+ IT Technician Objectives

- 6.1 Identify the fundamentals and principles of security
 - Identify the purposes and characteristics of auditing and event logging
- 6.2 Install, configure, upgrade and optimize security
 - Install and configure software, wireless and data security for example:
 - Auditing and event logging (enable / disable only)

Lecture Focus Questions:

- Why is it best to limit the number and type of events that are audited?
- Where do you view auditing events that have been logged on the system?
- Which event category audits changes to user account properties?
- Which event category audits system shutdown?

Time

About 20 minutes

Lab/Activity

- Enable Auditing

Section 8.4: Firewalls

Preparation

This section discusses how firewalls act as a barrier between an internal network and an external network to secure the internal network. A firewall consists of a set of rules that examines incoming traffic and determines if it is allowed. Students will learn how to configure the Windows firewall.

A+ IT Technician Objectives

- 6.2 Install, configure, upgrade and optimize security
 - Install and configure software, wireless and data security for example:
 - Software firewalls
- 6.3 Identify tool, diagnostic procedures and troubleshooting techniques for security
 - Diagnose and troubleshoot software and data security issues for example:
 - Software firewall issues

Lecture Focus Questions:

- Why is using a firewall important when connecting your computer to the Internet?
- Is the Windows firewall service a host-based or a network-based firewall solution?
- What information does the firewall use to allow or prevent communication?
- What are the disadvantages of using a firewall?

Time

About 25 minutes

Lab/Activity

- Configure the Windows Firewall

Section 8.5: Internet Explorer Security

Preparation

In this section students will learn to use Internet Options within the Internet Explorer browser to customize security and privacy settings.

A+ IT Technician Objectives

- 5.2 Install, configure, optimize and upgrade networks
 - Install and configure browsers
 - Enable / disable script support
 - Configure proxy and security settings

Lecture Focus Questions:

- What is the difference between the Local intranet and Trusted zones?
- How do the different privacy settings for cookies affect Web browsing?
- What is a *cookie*? How do cookies pose a security threat?

Time

About 50 minutes

Lab/Activity

- Add a Trusted Site
- Add a Restricted Site
- Customize Zone Settings
- Change the Cookie Level
- Customize Cookie Handling
- Configure Browser Security
- Use a Proxy Server

Section 8.6: Social Engineering

Preparation

This section discusses how social engineering attacks are used access information from a network. Students will become familiar with common social engineering attacks and effective countermeasures.

A+ IT Technician Objectives

- 6.4 Perform preventive maintenance for security
 - Recognize social engineering and address social engineering situations

Lecture Focus Questions:

- What characteristics of human nature does social engineering exploit?
- Who is usually the target in social engineering?
- How can dumpster diving give attackers valuable information?
- What is the best defense against a social engineering attack?

Time

About 20 minutes

Section 8.7: Troubleshooting

Preparation

In this section students will learn how to troubleshoot the following security issues: Windows firewall, data access issues, and encryption issues.

A+ IT Technician Objectives

- 5.3 Use tools and diagnostic procedures to troubleshoot network problems
 - Diagnose and troubleshoot basic network issue for example:
 - Permissions
 - Firewall configuration
- 6.3 Identify tool, diagnostic procedures and troubleshooting techniques for security
 - Diagnose and troubleshoot software and data security issues for example:
 - Software firewall issues
 - Wireless client configuration issues
 - Data access issues (e.g. permissions, security policies)
 - Encryption and encryption technology issues

Lecture Focus Questions:

- How might a firewall be blocking certain types of communications?
- You are unable to encrypt a certain file. What might be causing the problem?
- How does the local security policy affect actions that users can perform?

Time

About 20 minutes

Section 9.1: System Files

Preparation

In this section students learn about the Windows 2000 and Windows XP system files used to boot the system. They will also learn about the Windows registry, which stores hardware and software settings for the Windows operating system. Students are cautioned to be very careful when editing the registry because it may negatively affect the functionality of the workstation. Students will learn how to back up, modify, and restore the registry.

A+ IT Technician Objectives

- 3.1 Identify the fundamental principles of operating systems
 - Locate and use operating system utilities and available switches for example:
 - System management tools
 - REGEDIT.EXE
 - REGEDT32.EXE

Lecture Focus Questions:

- What tasks does the NTLDR file perform?
- When is the NTBOOTDD.SYS file used?
- Which file identifies hardware and loads that information into the registry?
- What tests are performed during POST?
- What are the recommended methods for editing the registry?
- Why is creating a registry backup so important?

Time

About 35 minutes

Section 9.2: Remote Management

Preparation

In this section students will learn how to configure a host computer to accept Remote Desktop connections, open the Remote Desktop port in the Windows Firewall, and establish a guest Remote Desktop connection.

A+ IT Technician Objectives

- 3.1 Identify the fundamental principles of operating systems
 - Locate and use operating system utilities and available switches for example:
 - System management tools
 - Remote Desktop
- 3.3 Identify tools, diagnostic procedures and troubleshooting techniques for operating systems
 - Use diagnostic utilities and tools to resolve operational problems for example:
 - Remote Desktop Connection and Assistance

Lecture Focus Questions:

- Which versions of Windows support a guest Remote Desktop connection? A host Remote Desktop connection?
- What port must be opened to allow Remote Desktop to run through the firewall?
- How does printer redirection work in Remote Desktop?
- How does a user retain control of a Remote Assistance session?
- What are the different ways you can send a Remote Assistance invitation?

Time

About 30 minutes

Lab/Activity

- Enable Remote Desktop

Section 9.3: System Updates

Preparation

In this section students will learn how to update the operating system with hotfixes and service packs. They will learn the available settings that can be used to customize how updates are installed on the system. Students will learn how to enable Automatic Updates, configure Automatic Update settings, and how to Flash the BIOS.

A+ IT Technician Objectives

- 3.4 Perform preventive maintenance for operating systems
 - Demonstrate the ability to perform preventive maintenance on operating systems including software and Windows updates (e.g. service packs), scheduled backups / restore, restore points

Lecture Focus Questions:

- What is the difference between a hotfix and a service pack?
- What should you do if you need to install service pack 2 but haven't yet installed service pack 1?
- What are two reasons why updates are released for the operating system?
- How does keeping the system software up to date increase security?
- Which update setting would be appropriate if you wanted to review the list of updates before they are installed?
- Why are end users not always dependable when it comes to installing updates on their computers?
- In addition to using Automatic Updates, what else should you do to make sure that all application and driver files are updated?

Time

About 45 minutes

Lab/Activity

- Configure Automatic Updates

Section 9.4: System Restore

Preparation

This section focuses on two disaster recovery tools used to restore operating system files in case of a disaster. System Restore is a service of Windows XP that monitors system files and some applications by taking a snapshot (restore point) of the system files before changes are made to the files. It can be used to restore a system to a state that was saved as a restore point previous to a change that has negatively affected the system. Automated System Recovery (ASR) is a last-resort method of backing up and restoring the operating system and should be used only after backups and system restore points have failed. The students will learn how to create a system restore point and restore a computer to a restore point.

A+ IT Technician Objectives

- 3.1 Identify the fundamental principles of operating systems
 - Locate and use operating system utilities and available switches for example:
 - System management tools
 - System Restore
- 3.3 Identify tools, diagnostic procedures and troubleshooting techniques for operating systems
 - Demonstrate the ability to recover operating systems (e.g. boot methods, recovery console, ASR, ERD)
- 3.4 Perform preventive maintenance for operating systems
 - Demonstrate the ability to perform preventive maintenance on operating systems including restore points

Lecture Focus Questions:

- What are three actions that you take that might trigger a restore point being made?
- What is the minimum disk space required to use System Restore? What happens when System Restore runs out of free disk space?
- What three things do you need on hand before you can perform an automated system recovery?
- You have implemented a regular schedule for making restore points and creating ASR diskettes. What else must you do to protect the system?

Time

About 40 minutes

Lab/Activity

- Create a Restore Point
- Restore to a Point in Time

Section 9.5: Backup and Restore

Preparation

In this section students will learn how to implement backup and restore strategies to protect data. Three different backup strategies are outlined along with the characteristics for both backup and restore of each strategy.

A+ IT Technician Objectives

- 3.1 Identify the fundamental principles of operating systems
 - Locate and use operating system utilities and available switches for example:
 - Disk management tools (e.g. NTBACKUP)
- 3.4 Perform preventive maintenance for operating systems
 - Demonstrate the ability to perform preventive maintenance on operating systems including scheduled backups

Lecture Focus Questions:

- What is the difference between a full + incremental backup and a full + differential backup?
- Why can't you combine incremental and differential backup methods?
- Which backup methods do **not** reset the Archive bit?
- Where should backup media be stored for maximum security?
- Why should you test your restore methods?

Time

About 40 minutes

Section 10.1: System Components

Preparation

This section focuses on troubleshooting CPUs and memory problems. Students are taught common symptoms that usually identify a CPU or memory problem, along with suggestions to prevent or resolve the problem. It also provides information about how virtual memory works, how to optimize your Windows XP memory, and check memory usage. Students will learn how to configure virtual memory settings.

A+ IT Technician Objectives

- 1.2 Identify tools, diagnostic procedures and troubleshooting techniques for personal computer components
 - Recognize and isolate issues with peripherals, multimedia, specialty input devices, internal and external storage and CPUs
 - Identify the steps used to troubleshoot components (e.g. check proper seating, installation, appropriate components, settings and current driver) for example:
 - Processor / CPUs and motherboards
 - Memory
- 1.3 Perform preventive maintenance of personal computer components
 - Identify and apply common preventive maintenance techniques for personal computer components for example:
 - Thermally sensitive devices such as motherboards, CPU, adapter cards memory (e.g. cleaning, air flow)
- 3.2 Install, configure, optimize and upgrade operating systems – references to upgrading from Windows 95 and NT may be made
 - Identify procedures and utilities used to optimize operating systems for example:
 - Virtual memory

Lecture Focus Questions:

- What are the most common causes of CPU failure?
- After installing memory, what should be checked if the computer reboots and the screen remains blank?
- How can you tell the difference between a memory error caused by hardware and one caused by software?

Time

About 70 minutes

Lab/Activity

- Configure Virtual Memory

Section 10.2: Storage Devices

Preparation

In this section students will learn factors to consider when troubleshooting storage devices.

A+ IT Technician Objectives

- 1.2 Identify tools, diagnostic procedures and troubleshooting techniques for personal computer components
 - Recognize and isolate issues with peripherals, multimedia, specialty input devices, internal and external storage and CPUs

Lecture Focus Questions:

- What is the first thing that should be done when a hard drive begins to manifest problems?
- What should be done to an IDE drive before installing it into the system case?
- What are the two most common problems when installing or replacing SCSI devices?
- When replacing a hard drive, why might a BIOS configuration be unnecessary?
- What can cause a floppy drive light to remain lit constantly?
- Why should sector translation be used only when a hard drive is initially installed?

Time

About 20 minutes

Section 10.3: Expansion Devices

Preparation

This section suggests diagnostic procedures and troubleshooting techniques to be used when troubleshooting common problems for expansion cards.

A+ IT Technician Objectives

- 1.2 Identify tools, diagnostic procedures and troubleshooting techniques for personal computer components
 - Recognize and isolate issues with peripherals, multimedia, specialty input devices, internal and external storage and CPUs
 - Identify the steps used to troubleshoot components (e.g. check proper seating, installation, appropriate components, settings and current driver) for example:
 - Adapter cards
 - Display and input devices

Lecture Focus Questions:

- How can upgrading the driver eliminate device errors?
- What are some possible problems that can cause a monitor to display improper color?
- What is color shift and how do you correct it?
- What role does the codec play in audio and video playback?

Time

About 20 minutes

Section 10.4: Applications

Preparation

This section contains guidelines for troubleshooting common application issues. It also discusses using Windows Reporting to report system errors such as operating system errors, Windows component errors, and program errors to Microsoft. Students will learn how to configure Windows Reporting.

A+ IT Technician Objectives

- 3.2 Install, configure, optimize and upgrade operating systems – references to upgrading from Windows 95 and NT may be made
 - Identify procedures and utilities used to optimize operating systems for example:
 - Services
 - Startup
 - Application
- 3.3 Identify tools, diagnostic procedures and troubleshooting techniques for operating systems
 - Recognize and resolve common operational problems for example:
 - Application install, start or load failure
 - Recognize and resolve common error messages and codes for example:
 - Windows reporting
 - Use diagnostic utilities and tools to resolve operational problems for example:
 - MSCONFIG command

Lecture Focus Questions:

- Which user groups have the ability to install applications that can be used by users other than themselves?
- Why is it sometimes necessary to use Windows Compatibility Mode?
- What is the purpose of Windows Error Reporting?
- What are the different ways to assign applications to start automatically when a system is booted?
- What are the most common causes for shortcut malfunction?

Time

About 40 minutes

Lab/Activity

- Configure Windows Reporting

Section 10.5: System and Startup Errors

Preparation

In this section students learn how to troubleshoot Windows lockups, use Driver Rollback as a disaster recovery tool, and diagnose and resolve common startup errors. They will also become familiar with different Windows XP Boot modes. Students will learn how to edit the properties of a device and roll back a driver, and how to boot in Safe Mode to resolve startup problems.

A+ IT Technician Objectives

- 3.3 Identify tools, diagnostic procedures and troubleshooting techniques for operating systems
 - Demonstrate the ability to recover operating systems (e.g. boot methods, recovery console, ASR, ERD)
 - Recognize and resolve common operational problems for example:
 - Auto-restart errors
 - Bluescreen error
 - System lock-up
 - Device drivers failure (input / output devices)
 - Application install, start or load failure
 - Recognize and resolve common error messages and codes for example:
 - Boot (e.g. invalid boot disk, inaccessible boot drive, missing NTLDR)
 - Startup (e.g. device / service failed to start, device / program in registry not found)
 - Event Viewer
 - Registry
 - Windows reporting
 - Use diagnostic utilities and tools to resolve operational problems for example:
 - Startup modes (e.g. safe mode, safe mode with command prompt or networking, step-by-step / single step mode)
 - Documentation resources (e.g. user / installation manuals, internet / web based, training materials)
 - Task and Device Manager
 - Event Viewer
 - MSCONFIG command

Lecture Focus Questions:

- What types of things should be recorded when a crash occurs? Why is this so important?
- What sources are available for reference if common troubleshooting doesn't provide an answer?
- How can driver rollback help you recover from system instability problems?
- What are the most common causes for a **Missing NTLDR** error message?
- Under which conditions would using the Last Known Good startup option be helpful? When would it not help to resolve the problem?
- What is the difference between Safe Mode and Enable VGA Mode?
- What type of actions can you take in Safe Mode to help resolve startup problems?

Time

About 85 minutes

Lab/Activity

- Roll Back a Driver

Section 10.6: System Recovery

Preparation

In this section a variety of last resort disaster recovery tools are discussed including: Recovery Console, Recovery CDs, Recovery Partitions, and Parallel Installations. Students will learn how to install the Recovery Console to a local disk, boot the system into the Recovery Console, and use commands to correct system errors.

A+ IT Technician Objectives

- 3.3 Identify tools, diagnostic procedures and troubleshooting techniques for operating systems
 - Demonstrate the ability to recover operating systems (e.g. boot methods, recovery console, ASR, ERD)
 - Use diagnostic utilities and tools to resolve operational problems for example:
 - Bootable media
 - Startup modes (e.g. safe mode, safe mode with command prompt or networking, step-by-step / single step mode)
 - Recover CD / recovery partition

Lecture Focus Questions:

- Under which conditions would using the Last Known Good startup option be helpful? When would it not help to resolve the problem?
- What two things do you need to use ASR?
- When should the Recovery Console be used in the recovery process? Which other things should you try first?
- How does installing the Recovery Console before a system crash expedite the troubleshooting process?
- What information is stored on the recovery partition?
- What actions should you take before restoring the system from backup?

Time

About 35 minutes