TestOut[®]

TestOut PC Pro - English 7.0.x

LESSON PLAN

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1.0 Course Introduction

1.1: Course Introduction

This course is designed to prepare you to pass the TestOut PC Pro and CompTIA A+certifications.

Lecture Focus Questions:

- What are the course prerequisites?
- Which major topics are covered in the course?
- Which certification does this course prepare you for?
- What is the difference between hardware and software?
- What are some of the internal components of a computer?

Course Prerequisites

Before you take this course, you should have a basic understanding of computers. You should be familiar with how to:

- Use a mouse and keyboard
- Install and run programs
- Use basic productivity software, including word processing applications
- Save files created by common applications
- Browse the internet

PC Pro Certification

The TestOut PC Pro certification is the first exam of the TestOut Pro certifications. This certification measures not just what you know, but what you can do. It measures your ability to install, manage, repair, and troubleshoot PC hardware and Windows, Linux, and Mac operating systems.

The PC Pro certification addresses the following knowledge domains:

- Hardware
- Software
- Security
- Troubleshooting

Real-world Skills

In addition to covering everything you need to know to become certified, this course is designed to help you gain real-world skills that you will use every day as a PC technician. By the time you complete this course, you should be able to do the following:

- Set up a new computer.
- Identify system requirements when purchasing a new computer.

5

- Understand the technology and specifications used to describe computer components.
- Make informed choices about which device characteristics are required for your situation.
- Install or upgrade the operating system.
- Manage external devices.
- Troubleshoot common computer problems that can be resolved without replacing internal components.
- Connect to a small home network.

Exam	Objective
E XXIII	1.4 Install and configure a printer
	Select and install a printer
TestOut PC Pro	1.5 Configure networking devices
	Install and configure wired and wireless network adapters and cables
	 Install and configure Internet connection devices
	1.1 Given a scenario, install and configure laptop hardware and components.
CompTIA A+ Certification 220-1101	 Hardware/device replacement Keyboard/keys Random access memory (RAM) Hard disk drive (HDD)/solid-state drive (SSD) migration HDD/SSD replacement
	3.3 Given a scenario, select and install storage devices.
	Removable storage Flock drives
	Flash drivesMemory cards
	Optical drives

Video/Demo	Time
1.1.1 PC Pro Introduction	5:38
1.1.2 Computing Basics	10:52
☐ 1.1.4 Use the Simulator	12:12
1.1.7 Internal Components	3:10

Total Video Time	47:54
1.1.10 Work with Network and Server Cabinets	<u>6:32</u>
1.1.8 Work with Internal Components	9:30

Lab/Activity

- 1.1.5 Explore the Lab Interface
- 1.1.6 Set Up a Computer
- 1.1.9 Connect Internal Components

Fact Sheets

- 1.1.3 Computing Facts
- 1.1.11 Networking Rack Facts

Number of Exam Questions

10 questions

Total Time

About 104 minutes

2.0 PC Technician Responsibilities

2.1: Protection and Safety

Lecture Focus Questions:

- What safety precautions should you take when handling computer components?
- What is the proper way to lift heavy objects?
- What is electrostatic discharge (ESD) and how can it be a hazard to electronic computer components?
- What is the material safety data sheet (MSDS)?

The key terms for this section include:

Term	Definition
Capacitor	A device that stores an electric charge.
Electrostatic discharge	The flow of electricity from one electrically charged object to another.
Peripheral device	A device that connects to a computer, such as a monitor or printer.

This section helps you prepare for the following certification exam objectives:		
Exam	Objective	
	4.5 Summarize environmental impacts and local environmental controls.	
	 Material safety data sheet (MSDS)/documentation for handling and disposal Proper battery disposal 	

- Proper toner disposal
- Proper disposal of other devices and assets

Video/Demo	Time
2.1.1 Safety	4:54
2.1.3 Electrostatic Discharge	5:15
■ 2.1.4 ESD Protection	<u>4:11</u>
Total Video Time	14:20

Fact Sheets

■ 2.1.2 Safety Measures

Number of Exam Questions

10 questions

Total Time

About 35 minutes

2.2: Environmental Controls

Lecture Focus Questions:

- What is the best way to dispose of printer cartridges?
- Why should you be cautious when handling old CRT monitors?
- What is the difference between a brownout and a blackout?
- What is the difference between an online UPS and an offline UPS?

In this section, you will learn to:

- Configure UPS settings
- Install a UPS

The key terms for this section include:

Term	Definition
Line conditioner	A device that modifies the power signal to remove noise and create a smooth alternating current (AC) signal.
Standby power supply	An offline device that goes online to provide power when an undervoltage event occurs.
Uninterruptible power supply	An online device that is constantly providing battery power to the computer and being recharged by the wall outlet.

This section helps you prepare for the following certification exam objectives:

Exam	Objective
	4.5 Summarize environmental impacts and local environmental controls
CompTIA A+ Certification 220-1102	 Material safety data sheet (MSDS)/documentation for handling and disposal Proper battery disposal Proper toner disposal Proper disposal of other devices and assets Temperature, humidity, level awareness, and proper ventilation Location/equipment placement Dust cleanup Compressed air/vacuums Power surges, brownouts, and blackouts Battery backup Surge suppressor

Video/Demo Time 6:46

Total Video Time	25:56
2.2.4 Configure UPS Settings	<u>9:48</u>
2.2.3 Power Concerns	9:22

Lab/Activity

• 2.2.6 Install a UPS

Fact Sheets

2.2.2 Environmental Facts

□ 2.2.5 Power Concern Facts

Number of Exam Questions

10 questions

Total Time

About 58 minutes

2.3: Professionalism

Lecture Focus Questions:

- What are some ways you can make a good impression on a client?
- How should you respond to a difficult client situation?

This section helps you prepare for the following certification exam objectives:

This section free you prepare for the following certification exam objectives.			
Exam	Objective		
	4.7 Given a scenario, use proper communication techniques and professionalism		
CompTIA A+ 220-1102	 Professional appearance and attire Formal Business casual Use proper language and avoid jargon, acronyms, and slang, when applicable Maintain a positive attitude/project confidence Actively listen, take notes, and avoid interrupting the customer Be culturally sensitive Use appropriate professional titles, when applicable Be on time (if late, contact the customer) Avoid distractions Personal phone calls Texting/social media sites Personal interruptions Dealing with difficult customers or situations Avoid dismissing customer problems Do not argue with customers or be defensive Avoid being judgmental Clarify customer statements (ask open-ended questions to narrow the scope of the problem, restate the issue, or question to verify understanding Do not disclose experience via social media outlets Set and meet expectations/time line and communicate status with the customer Offer repair/replacement options, as needed Provide proper documentation on the services provided Follow up with customer/user later to verify satisfaction Deal appropriately with customers' confidential and private materials. Located on a computer, desktop, printer, etc. 		

Video/Demo Time

	4:37
Total Video Time	4:37

Fact Sheets

2.3.2 Professionalism Facts

Number of Exam Questions 10 questions

Total Time *About 20 minutes*

2.4: Change Management

Lecture Focus Questions:

- What is change management?
- What components are typically included in a change request?
- What is a risk analysis?

This section helps you prepare for the following certification exam objectives:

Exam	Objective
	4.2 Explain basic change-management best practices.
CompTIA A+ Certification 220-1102	 Documented business processes Rollback plan Sandbox testing Responsible staff member Change management Request forms Purpose of the change Scope of the change Date and time of the change Affected systems/impact Risk analysis

Video/Demo	Time
2.4.1 Change Management Overview	<u>4:17</u>
Total Video Time	4:17

Fact Sheets

□ 2.4.2 Change Management Facts

Number of Exam Questions

10 questions

Total Time

About 20 minutes

2.5: PC Maintenance

Lecture Focus Questions:

- Why is dust a hazard to a computer?
- What is the difference between a positive pressure system and a negative pressure system?
- What causes EMI?
- Which materials can you use to clean internal PC components?

The key terms for this section include:

Term	Definition
Interference	A signal that corrupts or destroys regular signals. Interference affects signals used by two devices to communicate on a network.
Electromagnetic interference (EMI)	Interference that affects wired network signals.
Heating, ventilation, and air conditioning (HVAC)	The system installed within buildings to control temperature by supplying heat and air conditioning.
Radio frequency interference (RFI)	Signals caused by cordless phones, microwave ovens, and wireless devices that interfere with wireless networking.

This section helps you prepare for the following certification exam objectives.		
Exam	Objective	
	1.1 Given a scenario, install and configure laptop hardware and components.	
	Hardware/device replacement	
CompTIA A+	3.4 Given a scenario, install and configure motherboards, central processing units (CPUs), and add-on cards.	
Certification 220- 1101	CoolingFans	
	3.7 Given a scenario, install and replace printer consumables.	
	 Inkjet Maintenance: Clean heads, replace cartridges, calibrate, clear jams 	

5.4 Given a scenario. troubleshoot video, projector, and display issues.

Physical cabling issues

5.7 Given a scenario, troubleshoot problems with wired and wireless networks.

- Common symptoms
 - External interference

4.5 Summarize environmental impacts and local environmental controls.

CompTIA A+ Certification 220-1102

- Temperature, humidity-level awareness, and proper ventilation
 - Location/equipments placement
 - Dust cleanup
 - Compressed air/vacuums

Video/DemoTime1 2.5.1 PC Maintenance Best Practices3:23Total Video Time3:23

Fact Sheets

■ 2.5.2 PC Maintenance Facts

Number of Exam Questions

10 questions

Total Time

About 19 minutes

2.6: PC and Networking Tools

Lecture Focus Questions:

- What is a good tool to use to retrieve a screw that has fallen into a computer case?
- What types of electrical properties can a multimeter measure?
- How does a loopback plug verify that a device can both send and receive signals?

This section helps you prepare for the following certification exam objectives:

Exam	Exam Objective		
CompTIA A+ Certification 220-1101	 2.8 Given a scenario, use networking tools. Crimper Cable stripper WiFi analyzer Toner probe Punchdown tool Cable tester Loopback plug Network tap 5.2 Given a scenario, troubleshoot problems related to motherboards, RAM, CPU, and power.		
	No power4.4 Given a scenario, use common safety procedures		
CompTIA A+ Certification 220-1102	 Electrostatic discharge (ESD) straps ESD mats Proper component handling and storage 		

Video/Demo	Time
■ 2.6.1 PC and Networking Tools	<u>5:22</u>
Total Video Time	5:22

Fact Sheets

■ 2.6.2 PC and Networking Tools Facts

Number of Exam Questions

10 questions

Total Time

About 21 minutes

Time

4:38

4:38

2.7: Troubleshooting Process Overview

Lecture Focus Questions:

- Why is the end user an important troubleshooting resource?
- How does good documentation help in the troubleshooting process?
- Why is it important to check the simple, obvious solutions first?
- How do you know if you should fix the problem right away or establish a plan of action?

This section helps you prepare for the following certification exam objectives:

5.1 Given a scenario, apply the best practice methodology to resolve problems. • Always consider corporate policies, procedures, and impacts before implementing changes • Identify the problem • Gather information from the user, identify user changes, and, if applicable, perform backups before making changes • Inquire regarding environmental or infrastructure changes • Establish a theory of probable cause (question the obvious) • If necessary, conduct external or internal research based on symptoms • Test the theory is confirmed, determine the next steps to resolve the problem • If the theory is not confirmed, re-establish a new theory or escalate • Establish a plan of action to resolve the problem and implement the solution • Refer to the vendor's instructions for guidance • Verify full system functionality and, if applicable, implement preventive measures • Document the findings, actions, and outcomes	Inis section neips you prepare for the following certification exam objectives:		
resolve problems. Always consider corporate policies, procedures, and impacts before implementing changes Identify the problem	Exam	Objective	
impacts before implementing changes Identify the problem		, , , , , , , , , , , , , , , , , , ,	
CompTIA A+ Certification 220- 1101 Compt the theory of probable cause (question the obvious) Test the theory is confirmed, determine the next steps to resolve the problem If the theory or escalate Establish a plan of action to resolve the problem and implement the solution Refer to the vendor's instructions for guidance Verify full system functionality and, if applicable, implement preventive measures			
	Certification 220-	 Gather information from the user, identify user changes, and, if applicable, perform backups before making changes Inquire regarding environmental or infrastructure changes Establish a theory of probable cause (question the obvious) If necessary, conduct external or internal research based on symptoms Test the theory to determine the cause Once the theory is confirmed, determine the next steps to resolve the problem If the theory is not confirmed, re-establish a new theory or escalate Establish a plan of action to resolve the problem and implement the solution Refer to the vendor's instructions for guidance Verify full system functionality and, if applicable, implement preventive measures 	

Video/Demo

2.7.1 Troubleshooting Process

Total Video Time

Fact Sheets

2.7.2 Troubleshooting Process Facts

Number of Exam Questions

10 questions

Total Time

About 20 minutes

2.8: Support Systems

Lecture Focus Questions:

- How can a ticketing system be used to streamline help desk operations?
- What is the difference between an information asset and an infrastructure asset?
- What is the procurement life cycle?
- Why is an inventory management database beneficial?

In this section, you will learn to:

- Configure ticketing system settings
- Create a ticket
- Close a ticket
- View warranty information

The key terms for this section include:

Term	Definition	
Asset	A resource that has value to an organization.	
Asset management	The process of tracking and managing an organization's assets.	
This section helps you prepare for the following certification exam objectives:		
Exam	Objective	
	2.2 Use operating system features and utilities	

This socion holps yo	bu prepare for the following certification exam objectives.		
Exam	Objective		
	2.2 Use operating system features and utilities		
	Manage applications and processes		
TestOut Network Pro	4.4 Use and configure a ticketing system		
	Create a help ticketClose a help ticketConfigure ticketing system settings		
	4.1 Given a scenario, implement best practices associated with documentation and support systems information management.		
CompTIA A+ Certification 220- 1102	 Ticketing systems User information Device information Description of problems Categories Severity Escalation levels Clear, concise written communication 		

Problem description

- Progress notes
- Problem resolution
- Asset management
 - Inventory lists
 - Database system
 - Asset tags and IDs
 - o Procurement life cycle
 - Warranty and licensing
 - Assigned users

Video/Demo	Time
□ 2.8.1 Ticketing Systems	4:24
2.8.3 Create and Close Tickets	5:13
2.8.4 Ticketing System Settings	3:48
■ 2.8.7 Asset Management	4:16
2.8.9 Explore Asset Tracking Systems	4:00
2.8.10 View Warranty Information	<u>4:58</u>
Total Video Time	26:39

Lab/Activity

- 2.8.5 Create a Ticket
- 2.8.6 Close a Ticket

Fact Sheets

- 2.8.2 Ticketing Systems Facts
- 2.8.8 Asset Management Facts

Number of Exam Questions

10 questions

Total Time

About 71 minutes

2.9: Documentation

Lecture Focus Questions:

- What is the difference between policies and procedures?
- How can a knowledge base provide support for employees?
- What steps are included in an offboarding process?

The key terms for this section include:

Term	Definition
Policies	Establish rules set by an organization to address a particular problem or concern. A policy explains why action is needed and what action should be taken.
Procedure	Defines a desired outcome and outlines how that desired outcome should be met, who should complete the work, and when it should be completed.
Standard Operating Procedure (SOP)	Provides detailed information for performing complex business activities.
Onboarding	Describes the process followed when setting up a partnership with a new employee. Includes such things as HR paperwork and setting up a work environment for the employee.
Offboarding	Describes the process followed when ending a relationship with an employee. Includes such things as collecting keys, disabling accounts, and collection assets, such as a laptop computer.

Exam	Objective
	3.3 Implement security best practices
TestOut PC Pro	Enforce password settings
	4.1 Given a scenario, implement best practices associated with documentation and support systems information management.
CompTIA A+ Certification 220- 1102	 Types of documents Acceptable use policy (AUP) Network topology diagram Regulatory compliance requirements Splash screens Standard operating procedures New-user setup checklist End-user termination checklist

Knowledge base/articles

Video/Demo	Time
■ 2.9.1 Documentation Types	4:08
2.9.3 Onboarding and Offboarding Checklists	<u>4:59</u>
Total Video Time	9:07

Fact Sheets

- □ 2.9.2 Documentation Types Facts
- □ 2.9.4 Onboarding and Offboarding Checklists Facts

Number of Exam Questions

10 questions

Total Time

About 30 minutes

3.0 Hardware

3.1: Network Media

Lecture Focus Questions:

- What are the advantages and disadvantages of coaxial cable?
- Why are wires twisted together in twisted pair cables?
- What is the difference between STP and UTP cabling?
- What is the difference between Cat6 and Cat6a cabling?
- Which connector type and cable grade is used to connect a cable modem to the internet connection?
- What advantages do fiber optic cables offer over twisted pair or other media choices? What are the disadvantages of implementing fiber optic cables?
- What is the difference between single-mode cables and multi-mode cables?
- How can you tell the difference between an ST connector and an SC connector?

In this section, you will learn to:

Select and install a network adapter

Key terms for this section include the following:

Term	Definition
Coaxial cable	Carries broadband internet signals.
Inner conductor	Carries data signals in cables.
Insulator	Surrounds inner cable conductor and keeps signal separated from the mesh conductor.
Braided mesh conductor	Functions as a second physical channel and as a ground.
Sheath	Encases a cable to protect it from external elements.
F type connector	A coaxial cable specification used for CCTV video systems.
RG-6	A coaxial cable specification used for cable TV, satellite TV, and broadband cable internet.
Unshielded twisted pair (UTP) cable	A cable generally used for Ethernet cables and telephone wires.
Shielded twisted pair (STP) cable	A cable that provides more EMI protection, but is more expensive than UTP cable.
Category 5e (Cat 5e) cable	A cable that supports gigabit Ethernet.
Category 6 (Cat 6) cable	A gigabit Ethernet cable with 10 Gbps speeds limited to cable length less than 55 meters.

Category 6a (Cat 6a) A gigabit Ethernet cable with 10 Gbps speeds limited to cable length less than 100 meters. cable Category 7 (Cat 7) Has the strictest specifications for crosstalk and noise of the cable Cat cables. A connector with 4 connectors, 2 pairs of wires, and a RJ-11 connector locking tab; used primarily for telephone wiring. A connector with 8 connectors, 4 pairs of wires, and a RJ-45 connector locking tab; used for Ethernet networks. Patch twisted pair cable Uses the same wire configuration on each connector end. Crossover twisted pair Arrange wires in the first connector using T568A standard and the second connector the T568B standard. cable Fiber optic cable Carries broadband internet signals. Central core Carries the signal. Maintains the signal in the center of the core. Cladding Protective layer Prevents the cladding and central core from breaking. Plastic sheath Encases everything and protects the cable. Single mode cable Transfers data using a single light ray. Multi-mode Transfers data using multiple light rays. ST, SC, and LC Straight tip, Subscriber connector, and Lucent connector-connectors various fiber optic connector types.

Inis section helps you prepare for the following certification exam objectives:		
Exam Objective		
	1.5 Configure networking devices	
TestOut PC Pro	 Install and configure wired and wireless network adapters and cables 	
	3.1 Explain basic cable types and their connectors, features, and purposes.	
CompTIA A+ 220- 1101	 Network cables Copper Cat 5 Cat 5e Cat 6 Cat 6a Coaxial Shielded twisted pair Direct burial Unshielded twisted pair Plenum Optical 	

- Fiber
- o T568A/T568B
- Peripheral cables
 - USB 2.0
 - o USB 3.0
 - Serial
 - Thunderbolt
- Adapters
- Connector types
 - o **RJ11**
 - RJ45
 - F type
 - Straight tip (ST)
 - Subscriber connector (SC)
 - Lucent connector (LC)
 - Punchdown block
 - microUSB
 - o miniUSB
 - o USB-C
 - Molex
 - Lightning port
 - o DB9

Video/DemoTime▣ 3.1.1 Network Cables13:36Total Video Time13:36

Fact Sheets

- □ 3.1.2 Coaxial Cable Facts
- □ 3.1.3 Twisted Pair Cable Facts
- □ 3.1.4 Twisted Pair Connector Facts
- □ 3.1.5 Fiber Optic Cable Facts

Number of Exam Questions

10 questions

Total Time

About 44 minutes

3.2: Cables and Connectors

Lecture Focus Questions:

- What are the two classifications for how universal serial bus (USB) devices are powered?
- What is a digital visual interface (DVI) interface used for and why is it still useful?
- What is the video connection found on most televisions and entertainment systems?
- Why is the USB-C connection so popular?
- What is the hard drive connection frequently used in modern computers?
- What is Small Computer System Interface (SCSI) and why is it still used after 20 years?
- What does a Molex connector do?
- What can you do to connect older peripherals with newer computers?

In this section, you will learn to:

Install USB devices

Key terms for this section include the following:

Term	Definition
DB-9	A serial port with 9 pins that's used to connect many different serial devices such as a printer, scanner, router, etc. The D in the name is based on the D shape of the connector.
Recommend Standard 232 (RS-232)	RS-232 was commonly used in computer serial ports. It has mostly been replaced with USB ports.
DisplayPort (DP)	A digital display port primarily used to connect to a computer monitor to carry high-quality digital video and audio signals, but not Ethernet data.
Integrated Drive Electronics (IDE)	A 40-pin connector and cable ribbon used to connect older hard drives to older motherboards. A separate Molex power cable is needed.
Micro-USB	A very small USB port found on many non-Apple cell phones, tablets, and other portable devices used to transfer power or data.
Serial Advanced Technology Attachment (SATA)	A 7-pin connector and cable frequently used in modern personal computers to connect hard drives to the motherboard. A separate power cable is needed.
Serial Attached SCSI (SAS)	A serial protocol that replaces parallel SCSI; it's typically used in enterprise-level storage systems.

USB4

Fourth generation of USB industry standards introduced in 2019 that provides a data transfer speed up to 40 Gbps. Also called USB4 Gen3x2 or USB4 40 Gbps.

Video Graphic Array (VGA) A serial connector that transmits analog video and power to connect external display devices like monitors or projectors. VGA is a DE-15, 15-pin connector in three rows that has been used for many years and is frequently blue.

This section helps you prepare for the following certification exam objectives:

Exam	Objecti

1.3 Install and configure storage

TestOut PC Pro

CompTIA 220-

1101

- Install internal and external storage devices
- 3.1 Explain basic cable types and their connectors, features, and purposes
 - Peripheral cables
 - o USB 2.0
 - USB 3.0
 - Serial
 - Thunderbolt
 - Video cables
 - High-Definition Multimedia Interface (HDMI)
 - DisplayPort
 - Digital Visual Interface (DVI)
 - Video Graphics Array (VGA)
 - Hard drive cables
 - Serial Advanced Technology Attachment (SATA)
 - Small Computer System Interface (SCSI)
 - External SATA (eSATA)
 - Integrated Drive Electronics (IDE)
 - Adapters
 - Connector types
 - o **RJ11**
 - RJ45
 - microUSB
 - o miniUSB
 - USB-C
 - Molex
 - Lightning port
 - DB9

3.6 Given a scenario, deploy and configure multifunction devices/printers and settings.

Device connectivityUSB

Video/Demo	Time
	5:51
3.2.2 Universal Serial Bus	7:59
■ 3.2.5 Peripheral and Video Cables	12:24
■ 3.2.7 Hard Drive Cables	<u>10:25</u>
Total Video Time	36:39

Lab/Activity

• 3.2.4 Install USB Devices

Fact Sheets

- 3.2.3 USB Facts
- □ 3.2.6 Peripheral and Video Cables Facts
- □ 3.2.8 Hard Drive Cable Facts
- □ 3.2.9 Adapter and Converter Facts

Number of Exam Questions

11 questions

Total Time

About 80 minutes

3.3: Cases and Motherboards

Lecture Focus Questions:

- What is a form factor and why is it important?
- What functions do chipsets perform on newer systems?
- What are the basic steps of installing a motherboard?
- What are some typical onboard input/output (I/O) connectors?
- What is a Peripheral Component Interconnect (PCI) and why is it used?

In this section, you will learn to:

Choose and install a motherboard

Key terms for this section include the following:

Term	Definition
Central processing unit (CPU) socket	A series of pins that form electrical connectivity between a processor and the motherboard without soldering. Sometimes called the CPU slot.
Chipset	A collection of integrated circuits that control the flow of communication between the processor, memory, and external devices.
Direct current (DC direct)	The type of current used inside a computer.
Firmware	Software that is permanently stored on the motherboard in integrated flash memory.
Form factors	Standards for overall design and functionality that help ensure computer components can be interchanged among vendors and generations of technology.
I/O connectors	Input and output ports located on the back panel of the PC connect to the motherboard and provide a gateway for communication with external devices.
Motherboard	The main circuit board that is either connected to or houses all of the components operating in the computer. Motherboards adhere to design specifications called form factors.
Peripheral Component Interconnect	A type of standard connection on the motherboard that allows you to insert a card for peripheral connections and add to the capabilities of a computer. Often called an expansion slot.

Exam	Objective
TestOut PC	C 1.1 Select and install PC components
Pro	 Install and connect a power supply

- Install and connect a motherboard
- Install a CPU and CPU fan

3.4 Given a scenario, install and configure motherboards, central processing units (CPUs), and add-on cards.

- Motherboard form factor
 - Advanced Technology eXtended (ATX)
 - Information Technology eXtended (ITX)
- Motherboard connectors types
 - Peripheral Component Interconnect (PCI)
 - PCI Express (PCIe)
 - Power connectors
 - o SATA
 - eSATA
 - SAN
 - Headers
 - o M.2
- Motherboard compatibility
 - o CPU sockets
 - Advanced Micro Devices, Inc. (AMD)
 - Intel
- Basic Input/Output system (BIOS)/Unified Extensible Firmware Interface (UEFI) settings
- Expansion cards
- Cooling
 - o Fans

Video/Demo	Time
■ 3.3.1 Cases and Form Factors	6:23
■ 3.3.3 Motherboard Components	4:20
■ 3.3.5 Install a Motherboard	<u>6:19</u>
Total Video Time	17:02

Lab/Activity

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1101

3.3.7 Choose and Install a Motherboard

Fact Sheets

- □ 3.3.2 Cases and Form Factor Facts
- □ 3.3.6 Motherboard Installation Facts

Number of Exam Questions

10 questions

Total Time

About 55 minutes

3.4: Motherboard Troubleshooting

Lecture Focus Questions:

- What symptoms indicate system power problems? How do you troubleshoot system power problems?
- How do you interpret error codes generated during POST?
- What symptoms indicate system overheating? How do you troubleshoot overheating issues?
- What symptoms indicate internal and external device failures? How do you troubleshoot internal and external device failures?

In this section, you will learn to:

- Troubleshoot system power
- Troubleshoot power supply problems

Key terms for this section include the following:

Term	Definition
Black screen	A black screen before login or continuous system reboots indicates a fatal system error. A black screen during daily work indicates different problems to troubleshoot. A black screen was known as a blue screen of death in previous Windows versions.
Distended capacitors	Capacitors on the motherboard may swell or leak fluid when they become overstressed. When they fail, the motherboard will fail.
Overheating	When a computer's internal components generate heat that does not dissipate, the computer's functions and hardware may be damaged.

Exam	Objective
	1.1 Select and install PC components
	Install and connect a power supply
	4.1 Troubleshoot hardware components
TestOut PC Pro	 Troubleshoot system startup Troubleshoot system power Troubleshoot malfunctioning systems
	4.4 Use and configure a ticketing system
	Close a help ticket

5.2 Given a scenario, troubleshoot problems related to motherboards, RAM, CPU, and power.

- Common symptoms
 - Power-on self-test (POST) beeps
 - Proprietary crash screens (blue screen of death [BSOD]/pinwheel)
 - Black screen

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- No power
- Sluggish performance
- Overheating
- Burning smell
- Intermittent shutdown
- Application crashes
- o Grinding noise
- Capacitor swelling
- Inaccurate system date/time

4.1 Given a scenario, implement best practices associated with documentation and support systems information management.

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- Ticketing systems
 - Clear, concise written communication
 - Progress notes
 - Problem resolution

Video/Demo	Time
■ 3.4.1 Motherboard Troubleshooting	<u>8:20</u>
Total Video Time	8:20

Lab/Activity

- 3.4.3 Troubleshoot System Power
- 3.4.4 Troubleshoot Power Supply Problems

Fact Sheets

□ 3.4.2 Motherboard Troubleshooting Facts

Number of Exam Questions

10 questions

Total Time

About 48 minutes

3.5: Memory

Lecture Focus Questions:

- What is the difference between static random-access memory (SRAM) and dynamic random-access memory (DRAM)?
- What are two advantages of using Double-Data Rate Synchronous Dynamic RAM 3 (DDR3) memory over DDR2 memory?
- What is the difference between small outline dual in-line memory module (SODIMM) and universal dual in-line memory module (UniDIMM)?
- How does DDR4 differ from DDR3?

Key terms for this section include the following:

Term	Definition
DDR	Five generations of RAM synchronized with the system clock including DDR1 through DDR5. Each new generation doubles the data transfer rate.
DRAM	A type of RAM that stores data using a single transistor for every bit of data.
SODIMM	A smaller memory card with unique notch positions that is used in laptops and notebook computers.
SRAM	A type of RAM that stores data using four transistors for every bit of data.

rnis section neips you prepare for the following certification exam objectives:		
Exam	Objective	
	1.1 Select and install PC components	
TestOut PC Pro	Install memory modules	
	3.2 Given a scenario, install RAM types.	
CompTIA 220- 1101	 RAM types Small outline dual inline memory module (SODIMM) Double Data Rate 3 (DDR3) Double Data Rage 4 (DDR4) Double Data Rate 5(DDR5) Error correction code (ECC) RAM Single channel Dual channel Triple channel Quad-channel 	
1.7 Given a scenario, apply application installation and CompTIA 220- configuration concepts. 1102		
	System requirements for applications	

RAM requirements

Video/Demo	Time
■ 3.5.1 DRAM Types	<u>10:46</u>
Total Video Time	10:46

Fact Sheets

- 3.5.2 Random Access Memory (RAM) Facts
- 3.5.3 Multi-Channel Memory Architecture Facts

Number of Exam Questions

10 questions

Total Time

About 31 minutes

3.6: Memory Installation

Lecture Focus Questions:

- Why is consulting the motherboard documentation so important when purchasing memory?
- You have DDR2 memory with a column address signal (CAS) latency of 6 and DDR3 memory with a CAS latency of 7. What can you tell about the relative speed of the two memory modules?
- What is the difference between error correction code (ECC) and registered memory?
- How does a triple-channel configuration and a quad-channel configuration differ?
- What should you do after installing the memory?

In this section, you will learn to:

- Select and install the correct memory module
- Install triple-channel memory

Key terms for this section include the following:

Term	Definition
Buffered memory	A space in memory that holds memory addresses or data before it is transferred to the memory controller. It is also called registered memory.
Capacity	A term that refers to the storage capacity of the memory module.
Error correcting code	A type of memory that detects and corrects common internal data corruption. It is also called parity memory.
Frequency	Memory frequency (called speed) should be supported by the system bus/memory controller.

Exam	Objective
	1.1 Select and install PC components
TestOut PC Pro	Install memory modules
	3.2 Given a scenario, install the appropriate RAM.
CompTIA 220- 1101	 RAM types Error correction code (ECC) Double Data Rate 3 (DDR3) Double Data Rate 4 (DDR4) Single channel Dual channel

- Triple channel
- Quad-channel

1.4 Given a scenario, use the appropriate Microsoft Windows 10 Control Panel utility.

System

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4.4 Given a scenario, use common safety procedures.

- Electrostatic discharge (ESD) straps
- ESD mats
- Equipment grounding

Video/Demo	Time
3.6.1 Memory Characteristics	14:08
3.6.4 Select the Correct Memory Module	5:57
	<u>7:09</u>
Total Video Time	27:14

Lab/Activity

- 3.6.3 Select Memory by Sight
- 3.6.7 Install Triple Channel Memory

Fact Sheets

- □ 3.6.2 Memory Facts
- 3.6.6 Memory Installation Facts

Number of Exam Questions

10 questions

Total Time

About 72 minutes

3.7: Memory Troubleshooting

Lecture Focus Questions:

- What does a memory error indicate?
- What are the symptoms of memory errors? How do you troubleshoot memory problems?
- What has happened when the system boots, but the memory count is incorrect?
- When might a memory problem manifest itself?

In this section, you will learn to:

- Test memory
- Troubleshoot memory

Key terms for this section include the following:

Term	Definition
Memory errors	Memory errors usually indicate a failing module or discrepancies between new and old memory.

Exam	Objective
	1.1 Select and install PC components
TestOut PC Pro	Install memory modules
	4.1 Troubleshooting
	Troubleshoot system memory
	5.2 Given a scenario, troubleshoot problems related to motherboards, RAM, CPU, and power.
CompTIA 220- 1101	 Common symptoms Power-On Self Test (POST) beeps Sluggish performance Intermittent shutdown Application crashes
CompTIA 220- 1102	1.4 Given a scenario, use the appropriate Microsoft 10 Control Panel utility.
	Administrative Tools
	4.1 Troubleshoot hardware components

Troubleshoot system memory

Video/Demo	Time
■ 3.7.1 Memory Troubleshooting	6:37
□ 3.7.2 Test Memory	<u>4:25</u>
Total Video Time	11:02

Lab/Activity

- 3.7.4 Troubleshoot Memory 1
- 3.7.5 Troubleshoot Memory 2

Fact Sheets

□ 3.7.3 Memory Troubleshooting Facts

Number of Exam Questions

10 questions

Total Time

About 51 minutes

3.8: BIOS/UEFI

Lecture Focus Questions:

- What are the functions of the basic input/output system (BIOS)?
- What is the role of the complementary metal-oxide-semiconductor (CMOS)? How does it differ from the BIOS?
- Why does CMOS require a battery?
- What might be common reasons for editing CMOS settings?
- What determines the keystroke to open a CMOS editor? How can you find this information?
- What functions do the power on self test (POST) process perform?

In this section, you will learn to:

- Find BIOS and Unified Extensible Firmware Interface (UEFI) settings
- Configure BIOS/UEFI security

Key terms for this section include the following:

Term	Definition
Unified Extensible Firmware Interface	A software interface between the operating system and platform firmware. UEFI will eventually replace BIOS.
Basic Input Output System	Firmware that controls input and output operations.
Electrically erasable programmable read-only memory (EEPROM)	A RAM chip that replaced the CMOS chip.
Complementary metal-oxide semiconductor	A technology for constructing integrated circuits.

Exam	Objective
	1.2 Configure hardware components
TestOut PC Pro	Configure BIOS/UEFI settingsImplement firmware updates
	3.3 Implement security best practices
	Configure BIOS/UEFI security settings
CompTIA 220- 1101	3.2 Given a scenario, troubleshoot common personal computer (PC) security issues.

Common symptoms

3.4 Given a scenario, install and configure motherboards, CPUs, and add-on cards.

- Basic Input/Output System (BIOS)/Unified Extensible Firmware Interface (UEFI) settings
 - Boot options
 - USB permissions
 - Trusted Platform Module (TPM) security features
 - Secure Boot
 - Boot password
- Encryption
- CPU architecture
 - Multicore
 - Multithreading
 - Virtualization support

Video/Demo	Time
■ 3.8.1 BIOS/UEFI	12:05
	4:07
	11:03
☐ 3.8.5 Use Built-in System Diagnostics	2:09
	2:38
3.8.8 BIOS/UEFI Security	7:41
3.8.9 Configure BIOS/UEFI Security Settings	<u>7:50</u>
Total Video Time	47:33

Lab/Activity

- 3.8.7 Find BIOS/UEFI Settings
- 3.8.11 Configure BIOS/UEFI Security

Fact Sheets

- □ 3.8.3 BIOS/UEFI Facts
- □ 3.8.10 BIOS/UEFI Security Facts

Number of Exam Questions

10 questions

Total Time

About 92 minutes

3.9: Processors

Lecture Focus Questions:

- What are the differences between the four levels of cache memory?
- What is the biggest limitation of using a 32-bit processor?
- What factors should be considered when comparing the speed of computers?
- What are the benefits of using a smaller processor size during central processing unit (CPU) manufacture?
- What is the difference between hyper-threading and multithreading?
- Under what circumstances might you choose to use throttling?
- What is virtualization? Which CPU features enable advanced virtualization support?
- Which components are used with a CPU to dissipate heat?

In this section, you will learn to:

Select and install a processor

Key terms for this section include the following:

Term	Definition
Multi-core	A processor that has multiple processors within a single processor package.
Throttling	The process of modifying the operating characteristics of a processor based on current conditions.
Overclocking	A process that pushes a CPU beyond its designed specifications.
Virtualization	The ability to install and run multiple operating systems simultaneously on a single physical machine.

Exam	Objective
	1.1 Select and install PC components
TestOut PC Pro	Install a CPU and CPU fan
	3.4 Given a scenario, install and configure motherboards, central processing units (CPUs), and add-on cards.
CompTIA 220- 1101	 Motherboard compatibility CPU sockets Advanced Micro Devices, Inc. (AMD) Intel Multisocket CPU architecture x64/s86

- Single-core
- Multicore
- Virtualization support
- Multithreading
- Cooling
 - o Fans
 - Heat sink
 - Thermal paste/pads
 - Liquid
- 1.1 Compare and contrast common operating system types and their purposes.

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- System requirements for applications
 - o 32-bit vs. 64-bit application requirements
 - RAM requirements
 - Central processing unit (CPU) requirements

Video/Demo	Time
■ 3.9.1 Processor Concepts	11:35
☐ 3.9.5 Install a Processor	<u>5:50</u>
Total Video Time	17:25

Lab/Activity

• 3.9.7 Select and Install a Processor

Fact Sheets

- 3.9.2 CPU Facts
- □ 3.9.3 CPU Performance Facts
- □ 3.9.4 CPU Socket Facts
- □ 3.9.6 CPU Installation Facts

Number of Exam Questions

12 questions

Total Time

About 62 minutes

3.10: Processor Troubleshooting

Lecture Focus Questions:

- What are the basic troubleshooting steps for a processor?
- What should you do when a processor is overheating?
- What do POST beeps indicate?

In this section, you will learn to:

Troubleshoot processor installation

The key terms for this section include:

Term	Definition
Basic input/output system (BIOS)	The firmware that provides runtime services for operating systems and programs. It also performs hardware initialization during the boot process.
Unified Extensible Firmware Interface (UEFI)	A publicly available specification that defines a software interface between an operating system and platform firmware.
Central processing unit (CPU)	The electronic circuitry that executes instructions comprising a computer program. The CPU performs basic arithmetic, logic, control, and input/output operations specified by the instructions in the program.

Exam	Objective
TestOut	4.1 Troubleshoot hardware components
Network Pro	Troubleshoot CPU installation
	3.4 Given a scenario, install and configure motherboards, central processing units (CPUs), and add-on cards.
	Motherboard compatibility
	CPU sockets
CompTIA A+ 220-1101	5.2 Given a scenario, troubleshoot problems related to motherboards, RAM, CPU, and power.
	Common symptoms
	Power-On Self Test (POST) beepsNo power
	Overheating

Video/Demo	Time
■ 3.10.1 Processor Troubleshooting	<u>6:19</u>
Total Video Time	6:19

Lab/Activity

- 3.10.3 Troubleshoot Processor Installation 1
- 3.10.4 Troubleshoot Processor Installation 2

Fact Sheets

□ 3.10.2 Processor Troubleshooting Facts

Number of Exam Questions

10 questions

Total Time

About 46 minutes

3.11: Video and Expansion Cards

Lecture Focus Questions:

- What advantage does a Peripheral Component Interconnect Express (PCIe) bus have over a PCI bus?
- Which type of devices typically use mini PCI cards?
- Which bus type is commonly used by graphics cards?
- What type of slot can a PCle x1 expansion card be placed in?
- How does the video card affect the quality of the image on the monitor?
- Which type of Digital Video Interface (DVI) connector sends digital signals only?
- How does the graphics processing unit (GPU) increase the video performance?
- What are the differences between integrated graphics and dedicated video cards?
- What advantages are provided by the Scalable Link Interface (SLI) and CrossFire?
- What is the general function of High-Bandwidth Digital Content Protection (HDCP)? When should you be concerned with an HDCP video card or monitor?
- When would a capture card be used?

In this section, you will learn to:

- Install an expansion card
- Install a video card
- Configure a capture card
- Upgrade a video card

The key terms for this section include:

Term	Definition
Peripheral Component Interconnect	A connection slot for a 32-bit computer bus. PCI was developed to replace the obsolete Industry Standard Architecture (ISA) and Video Electronic Standards Association (VESA) bus standards.
PCI Extended (PCI-X)	A PCI design that overcomes PCI bandwidth limitations.
PCI Express	The connector that replaced PCI, PCI-X and AGP.
Mini PCI	A subset of the PCI interface, but with a small form factor.
Legacy bus	Buses that have been replaced by newer types are considered legacy buses.
Multi-GPU	The ability to link video cards together. This allows you to share the graphic processing load between the two GPUs.
DirectX/(Open Graphics Library (openGL)	A collection of application program interfaces (APIs) that improves graphic, animation, and multimedia creations.

High-Bandwidth Digital Content Protection

A digital copy form designed to protect digital media from piracy.

This section helps you prepare for the following certification exam objectives:

	Total and the tellowing continuation exam espectives.
Exam	Objective
	1.1 Select and install PC components
TestOut PC Pro	Select and install expansion cards
	3.1 Explain basic cable types and their connectors, features, and purposes.
	 Video cables High-Definition Multimedia Interface (HDMI) DisplayPort Digital Visual Interface (DVI) Video Graphics Array (VGA)
CompTIA A+	3.4 Given a scenario, install and configure motherboards, central processing units (CPUs), and add-on cards.
220-1101	 Motherboard connector types Peripheral Component Interconnect (PCI) PCI Express (PCIe) Expansion cards
	3.4 Given a scenario, install and configure motherboards, central processing units (CPUs), and add-on cards.
	 Expansion cards Video card Capture Cards

Video/Demo	Time
■ 3.11.1 Expansion Buses and Slots ■ 3.11.1 Expansion Buses ■ 4.11.1 Expansion Buses ■ 4.1	4:31
3.11.3 Install an Expansion Card	4:19
■ 3.11.5 Video Cards	5:33
	6:02
☐ 3.11.8 Configure Capture Card	<u>5:58</u>
Total Video Time	26:23

Lab/Activity

• 3.11.4 Install Expansion Cards

• 3.11.10 Upgrade a Video Card

Fact Sheets

- □ 3.11.2 Expansion Bus Types
- □ 3.11.6 Video and Capture Card Facts
- 3.11.9 Video Card Installation Facts

Number of Exam Questions

10 questions

Total Time

About 76 minutes

3.12: Audio

Lecture Focus Questions:

- What do you need to do to play Audio Interchange File Format (AIFF) files on a Windows computer?
- What color typically indicates the speaker port on a sound card? What color is used for the microphone?
- Which connectors are used for digital S/PDIF audio?
- Which encoding techniques are used for surround sound audio?

In this section, you will learn to:

- Manage audio devices
- Select and install a sound card

The key terms for this section include:

Term	Definition
Sound card	An expansion card that manages sound input and output.
Sampling rate	The number of analog signal samples taken over a period of time.
Analog output	An output that allows sound to be played through external devices.
Analog input	An input that allows audio to be recorded through the sound card.

This section helps you prepare for the following certification exam objectives:

Exam	Objective
	1.1 Select and install PC components
TestOut PC Pro	Select and install expansion cards
CompTIA A+	3.4 Given a scenario, install and configure motherboards, central processing units (CPUs), and add-on cards.
220-1101	 Expansion cards Sound card

Video/Demo	Time
☐ 3.12.1 Digital Audio	8:12
☐ 3.12.2 Sound Cards	3:14
☐ 3.12.4 Manage Audio Devices	<u>8:50</u>
Total Video Time	20:16

Lab/Activity

3.12.7 Select and Install a Sound Card

Fact Sheets

- □ 3.12.3 Sound Card Facts
- □ 3.12.5 Sound Card Installation Facts
- 3.12.6 Sound Card Connectors

Number of Exam Questions

10 questions

Total Time

About 58 minutes

3.13: Cooling

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?
- Why is it important that case fans are installed properly?
- When might you want to add liquid cooling to a computer?
- What is the difference between an active heat sink and a passive heat sink?
- What is the function of thermal paste? When should you use it?

The key terms for this section include:

Term	Definition
Case fan	A fan that creates a pressurized system that allows air to flow through the computer case in a specific way.
Heat sink	A hardware component made of heat conductive material.
Liquid cooling	An additional cooling agent used when air cooling is not enough.

This section helps you prepare for the following certification exam objectives:

Exam	Objective
	3.4 Given a scenario, install and configure motherboards, central processing units (CPUs), and add-on cards.
CompTIA A+ 220-1101	 Cooling Fans Heat sink Thermal paste/pads Liquid

Video/DemoTime▣ 3.13.1 System Cooling7:56Total Video Time7:56

Fact Sheets

■ 3.13.2 System Cooling Facts

Number of Exam Questions

10 questions

Total Time

About 23 minutes

3.14: Power Supplies

Lecture Focus Questions:

- What are the names of the Windows power states?
- What is the purpose of each power state?

In this section, you will learn to:

- Edit power options
- Create a power plan

This section helps you p	prepare for the following certification exam objectives:
Exam	Objective
	1.1 Select and install PC components
TestOut PC Pro	Install and connect a power supply
	3.4 Given a scenario, install and configure motherboards, central processing units (CPUs), and add-on cards.
	 Motherboard form factor Advanced Technology eXtended (ATX) Information Technology eXtended (ITX) Motherboard Connector types Power connectors Motherboard compatibility CPU sockets Advanced Micro Devices, Inc. (AMD)
CompTIA A+ Certification 220-1101	3.5 Given a scenario, install or replace the appropriate power supply.
	 Input 115v vs. 220v Output 3.3V vs. 5v vs. 12v 20-pin to 24-pin motherboard adapter Redundant power supply Modular power supply Wattage rating 5.2 Given a scenario, troubleshoot problems related to motherboards, RAM, CPU, and power.
	Common symptoms

No power

Video/Demo	Time
3.14.1 Power Supplies	4:17
■ 3.14.3 Identify Power Supply Components	5:54
3.14.4 Change the Power Supply	<u>7:17</u>
Total Video Time	17:28

Lab/Activity

• 3.14.5 Install a Power Supply

Fact Sheets

□ 3.14.2 Power Supply Facts

Number of Exam Questions

10 questions

Total Time

About 45 minutes

4.0 Operating Systems Basics

4.1: Operating System

Lecture Focus Questions:

- What is an operating system (OS)?
- What are four of the most common operating systems?
- What are the risks of using an operating system after its end-of-life (EOL)?
- What is the difference between a proprietary and an open-source operating system?

The key terms for this section include:

Term	Definition
Graphical user interface (GUI)	A software program that uses icons, menus, and other visual components to interact with and control a computer's or electric device's resources.
End of life	The term vendors use to notify users that support, updates, and patches for an operating system or software will no longer be provided by the vendor.
Operating system kernel	The most basic component of an operating system. The kernel runs the CPU, memory, and peripheral devices.

Exam	Objective
TestOut PC Pro	 2.1 Install, update, and configure an operating system Install, update, and configure Windows Install, update, and configure macOS Install, update, and configure Linux
CompTIA A+ 220-1102	 1.8 Explain common OS types and their purposes. Workstation OSs Windows Linux macOS Chrome OS Vendor life-cycle limitations End-of-life (EOL) Update limitations Compatibility concerns between OSs

Video/Demo	Time
4.1.1 Workstation Operating Systems	<u>5:36</u>
Total Video Time	5:36

Fact Sheets

Number of Exam Questions

10 questions

Total Time

About 21 minutes

4.2: Windows Basics

Lecture Focus Questions:

- What basic features are offered with each of the common Windows versions?
- What is the difference between Windows Pro and Windows Pro for Workstations?
- When would it be beneficial to use either workgroups or domain access accounts?
- How can the gpedit.msc utility be helpful?
- How can you customize the Windows user interface?
- How does a Windows in-place upgrade differ from Windows clean installation?

In this section, you will learn to:

- Use the Windows 10 interface
- Use the Windows 11 interface

The key terms for this section include:

Term	Definition
Operating system (OS)	A set of programs that manages system functions, the applications that are running on a computer and the computer's hardware.
Kernel	The core of the operating system that is loaded into memory when the system boots.
Driver	A type of computer program that enables the operating system to interact with hardware devices.
Interface	A type of computer program that allows the user to interact with the kernel and the utilities.
Utilities	The features or programs included with an operating system that perform system-related tasks.
Application	A subclass computer program that is designed for end users.

Exam	Objective
	2.1 Install, update, and configure an operating system
TestOut PC Pro	Install, update, and configure WindowsInstall, update, and configure Linux
CompTIA A+ Certification 220-1101	3.4 Given a scenario, install and configure motherboards, central processing units (CPUs), and add-on cards.
	CPU architecture

Multithreading

1.1 Identify basic features of Microsoft editions

- Windows 10 editions
 - Home
 - o Pro
 - Pro for Workstations
 - Enterprise
- Feature differences
 - Domain access vs. workgroup
 - Desktop styles/user interface
 - Availability of Remote Desktop Protocol (RDP)
 - Random-access memory (RAM) support limitations
 - BitLocker
 - o gpedit.msc

Upgrade paths

o In-place upgrade

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1.8 Explain common OS types and their purposes.

- Workstation OSs
 - Windows
 - Linux
 - macOS

1.9 Given a scenario, perform OS installations and upgrades in a diverse OS environment.

- Types of installations
 - Upgrade

Video/Demo	Time
4.2.1 Windows Operating Systems	5:13
4.2.3 Windows 10 Editions	3:30
■ 4.2.4 Windows 11 Editions	3:50
■ 4.2.6 Windows Features	6:11
4.2.8 Use the Windows 10 Interface	7:20
4.2.9 Use the Windows 11 Interface	6:33
4.2.11 Windows Upgrade	<u>6:04</u>
Total Video Time	38:41

Fact Sheets

□ 4.2.2 Windows Operating System Facts
□ 4.2.5 Windows Editions Facts
□ 4.2.7 Windows Features Facts
□ 4.2.10 Windows Interface Facts
□ 4.2.12 Windows Upgrade Facts

Number of Exam Questions

10 questions

Total Time *About 74 minutes*

4.3: Linux Basics

Lecture Focus Questions:

- Why do many administrators choose to use a command line interface on a Linux server?
- What is a Linux distribution?
- Which common commands can you use to navigate through shells?
- Which types of items can Tab be used to complete once you start typing the entities' name?
- What is the difference between free software and open-source software?

In this section, you will learn to:

Navigate Linux using a GUI

Key terms for this section include the following:

Term	Definition
Linux	An open-source operating system.
Distribution	A custom version of Linux.
Shell	A command line interface.

Inis section nelps you prepare for the following certification exam objectives:		
Exam	Objective	
	2.1 Install, update, and configure an operating system	
TestOut PC Pro	Install, update, and configure Linux	
	2.2 Use operating system features and utilities	
	Use common Linux command line utilities	
	1.8 - Explain common OS types and their purposes.	
	Workstation OSsLinux	
CompTIA 220- 1102	1.11 Identify common features and tools of the Linux client/desktop OS.	
	Common commands	
	。 Is	
	o mv	
	o CP	
	o ps	

- o top
- Best practices
 - o Backups
 - o Antivirus
 - Updates/patches
- Tools
 - Shell/terminal
 - Samba

Video/Demo	Time
■ 4.3.1 Linux Operating Systems	6:17
4.3.2 Navigate Linux in the GUI	<u>3:52</u>
Total Video Time	10:09

Fact Sheets

■ 4.3.3 Linux Facts

Number of Exam Questions

10 questions

Total Time

About 26 minutes

4.4: macOS Basics

Lecture Focus Questions:

- What are some characteristics unique to Apple or MacOS systems?
- Which keyboard key does the MacOS use for most keyboard shortcuts?
- Which MacOS feature is used to install Windows on an Apple system?
- What file system does MacOS use?
- What is the Finder's primary purpose?
- What are the components of the MacOS user interface?
- How do you access the multiple desktop feature?

In this section, you will learn to:

Navigate the Mac OS interface

The key terms for this section include:

Term	Definition
MacOS	A proprietary closed-source, operating system designed by Apple, Inc.
Apple File System (APFS)	The default file system for Mac computers using macOS 10.13 or later.

Exam	Objective
	2.1 Install, update, and configure an operating system
	Install, update, and configure macOS
TestOut PC Pro	2.2 Use operating system features and utilities
	Use core macOS or iOS features
	1.8 Explain common OS types and their purposes.
	Various filesystem typesAPFS
CompTIA 220- 1102	1.10 Identify common features and tools of the macOS/desktop OS.
	 Installation and uninstallation of applications File types .dmg .pkg

- .app
- o App Store
- o Uninstallation process
- Apple ID and corporate restrictions
- Best practices
 - Antivirus
 - Updates/patches
- System preferences
 - Displays
 - Networks
 - Printers
 - Scanners
 - Privacy
 - Accessibility
- Features
 - Multiple desktops
 - Mission control
 - Keychain
 - o Spotlight
 - Gestures
 - Finder
 - o Remote Disc
 - Dock

Video/Demo	Time
■ 4.4.1 macOS Introduction	9:05
4.4.2 Installing and Uninstalling Apps	3:21
4.4.3 macOS Interface System Preferences	8:49
4.4.4 macOS Features and Settings	<u>7:12</u>
Total Video Time	28:27

Fact Sheets

Number of Exam Questions

11 questions

Total Time

About 45 minutes

5.0 Storage

5.1: Storage Devices

Lecture Focus Questions:

- What are the advantages of SSDs over all other forms of storage media?
- How does a flash device differ from a hard disk?
- Which storage device types are magnetic media? Which are optical? Which are solid state?

Key terms for this section include the following:

Term	Definition
Flash memory	Electronic non-volatile memory that is easy to erase and reprogram.
Hard disk	A long-term storage device that uses a thick magnetic disk made of several aluminum platters in a protective shell.
Integrated Drive Electronics (IDE)	An electronic interface that allows communication between a motherboard's data paths or bus and a computer's hard disks.
Non-Volatile Memory Express (NVMe)	A memory storage device designed to allow access to non-volatile storage media through a PCI express (PCIe) bus.
Optical disc	A storage device that records binary information through pits in a reflectively-coated disc. Optical discs use lasers for reading and writing information.
M.2	A popular solid-state drive often used in portable computing devices.
SD card	A flash memory device is often used in digital cameras.
Solid-state drive (SSD)	A flash device with a large storage capacity comparable to a hard disk.

Exam	Objective
	3.3 Given a scenario, select and install storage devices.
CompTIA A+ 220- 1101	 Hard drives Speeds 5400rpm 7200rpm 10,000rpm 15,000rpm Form factor

SSDs

- Communications interfaces
 - Non-volatile Memory Express (NVMe)
 - SATA
 - Peripheral Component Interconnect Express (PCIe)
- Form factors
 - M.2
 - mSATA
- Removable storage
 - Flash drives
 - Memory cards
 - Optical drives

Video/DemoTime₤ 5.1.1 Storage Devices8:40Total Video Time8:40

Fact Sheets

Number of Exam Questions

10 questions

Total Time

About 24 minutes

5.2: SATA

Lecture Focus Questions:

- What enhancements does SATA2 provide that the original SATA specifications do not?
- What is eSATA? When would you use it?
- What are two ways to configure a SATA2 drive with a system that supports only SATA1?
- How does SATA2 differ from SATA3?
- What advantage does eSATAp have over eSATA?

In this section, you will learn to:

Install SATA devices

Key terms for this section include the following:

Term	Definition
Serial Advanced Technology Attachment (SATA)	The latest generation of standards for hard disk and other storage devices.
External SATA (eSATA)	An extension to the SATA standard that enables SATA drives to attach externally.

This section helps you prepare for the following certification exam objectives.	
Exam	Objective
	1.3 Install and configure storage
TestOut Network Pro	Install internal and external storage devices
	3.1 Explain basic cable types and their connectors, features, and purposes.
	 Hard drive cables Serial Advanced Technology Attachment (SATA) External SATA (eSATA)
CompTIA A+ Certification 220-1101	3.3 Given a scenario, select and install storage devices.
	• SSDs
	∘ SATA
	3.4 Given a scenario, install and configure motherboards, central processing units (CPUs), and add-on cards.
	Motherboard connector types

SATAeSata

Video/Demo	Time
₱ 5.2.1 SATA	6:45
	<u>5:50</u>
Total Video Time	12:35

Lab/Activity

5.2.4 Install SATA Devices

Fact Sheets

■ 5.2.3 SATA Installation Facts

Number of Exam Questions

10 questions

Total Time

About 40 minutes

5.3: Optical Media

Lecture Focus Questions:

- How much data does a compact disc (CD) typically hold? How much data does a digital versatile disc (DVD) hold? How much data does a Blu-ray disc (BD) hold?
- An optical drive speed is identified as 24x10x70. What does each of the numbers indicate?
- A DVD drive and a Blu-ray drive can both read data at 4x speeds. How does the
 drive's speed compare to the amount of data that can be transferred?
- How are Blu-ray drives made compatible with CD, DVD, and Blu-ray discs?
- What is the difference between BD-R and BD-RE discs?
- Which type of connector attaches an optical drive to the motherboard?

The key terms for this section include:

Term	Definition
Optical drive	A disc drive that uses laser light or electromagnetic waves within or near the visible light spectrum as part of the process of reading or writing data to or from optical discs.
Optical media	A flat, circular disc used to store large amounts of data.
Compact disc (CD)	A digital optical disc data storage format with a data capacity of 700 MB.
Digital versatile disc (DVD)	An optical media standard that can be used to store large amounts of different types of data, such as computer data, video, and audio. Most DVD drives can read and write. Depending on the type of DVD, storage is typically somewhere between 4.7 and 9.39 GB.
Blu-ray disc (BD)	A newer digital optical disc storage format that is capable of greater storage capacity than DVDs.

Exam	Objective
	3.3 Given a scenario, select and install storage devices.
CompTIA A+ Certification 220- 1101	 Removable storage Optical drives

Video/Demo	Time
	5:26
5.3.2 DVD Drives	5:33
	<u>3:50</u>
Total Video Time	14:49

Fact Sheets

■ 5.3.4 Optical Media Facts

Number of Exam Questions

10 questions

Total Time

About 30 minutes

5.4: RAID

Lecture Focus Questions:

- How do striping and mirroring differ?
- What is parity?
- How does a Redundant Array of Independent Disks (RAID) 0 configuration improve disk read and write performance?
- With a RAID 0 configuration, what happens to the data if a drive in the set fails?
- What is the minimum number of disks required for a RAID 5 configuration?
- What advantages does RAID 5 have over RAID 1?
- How do RAID 5 and RAID 10 differ?

In this section, you will learn to:

- Create RAID arrays
- Implement a RAID solution

The key terms for this section include:

Term	Definition
RAID	A disk sub-system that combines multiple physical disks into a single logical storage unit.
Just a Bunch of Disks (JBOD)	A configuration that places multiple disks in a single logical storage unit.

This section helps you prepare for the following certification exam objectives:

Exam	Objective
	1.3 Install and configure storage
TestOut Network Pro	Implement a RAID solution
	3.3 Given a scenario, select and install storage devices.
CompTIA A+ Certification 220-1101	 Drive configuration Redundant Array of Independent (or Inexpensive) Disks (RAID) O, 1, 5, 10

Video/Demo	Time
■ 5.4.1 RAID	8:40
	<u>7:16</u>
Total Video Time	15:56

Lab/Activity

- 5.4.5 Create RAID Arrays
- 5.4.6 Implement a RAID Solution

Fact Sheets

- **■** 5.4.2 RAID Facts

Number of Exam Questions

10 questions

Total Time

About 60 minutes

5.5: File Systems

Lecture Focus Questions:

- What is the difference between a partition and a volume?
- What advantages does NTFS provide over FAT32?
- Why should you back up all data before formatting a drive?
- How can you reformat a drive from FAT to NTFS without losing the data?
- How would you convert a drive from NTFS to FAT32?
- Which operating systems can use NTFS?

In this section, you will learn to:

- Create volumes
- Format drives

The key terms for this section include:

Term	Definition
Directory/folder	A container in a volume that holds files or other directories. In Windows, this is also known as a folder.
Extended File Allocation Table (exFAT)	A file system designed to support large flash drives such as USB flash drives and SD cards.
File system	A means for naming, organizing, and storing data on a storage device.
New Technology File System (NTFS)	Microsoft's default file system.
Volume	A single accessible storage area within a file system.
Partition	A logical division of a storage device. Before a drive can be partitioned, it must first be initialized.

Exam	Objective
	1.3 Install and configure storage
TestOut PC Pro	Configure and manage storage
	4.4 Use and configure a ticketing system
	Close a help ticket
CompTIA A+ Certification 220- 1102	1.2 Given a scenario, use the appropriate Microsoft command-line tool.

- · Command line tools
 - diskpart
 - format
- 1.3 Given a scenario, use features and tools of the Microsoft Windows 10 operating system (OS).
 - Microsoft Management Console (MMC) snap-in
 - Disk Management (diskmgmt.msc)
 - Device Manager
- 1.8 Explain common OS types and their purposes.
 - Various filesystem types
 - New Technology File System (NTFS)
 - File Allocation Table 32 (FAT32)
 - Third extended filesystem (ext3)
 - Fourth extended filesystem (ext4)
 - Extensible File Allocation Table (exFAT)
- 1.9 Given a scenario, perform OS installations and upgrades in a diverse OS environment
 - Partitioning
 - GUID [globally unique identifier]
 - Partition Table (GPT)
 - Master boot record (MBR)
 - Drive Format
- 4.1 Given a scenario, implement best practices associated with documentation and support systems information management.
 - Ticketing systems
 - Clear, concise written communication
 - Progress notes
 - Problem resolution

Video/Demo	
	3:59
	8:39
	14:44
5.5.6 GPT Partitioning	4:05
	12:41

5.5.9 Create Volumes with Diskpart	6:38
	<u>4:59</u>
Total Video Time	55:45

Lab/Activity

- 5.5.11 Create Volumes
- 5.5.12 Format Drives

Fact Sheets

- 5.5.13 Disk Status Facts

Number of Exam Questions

10 questions

Total Time

About 110 minutes

5.6: Storage Management

Lecture Focus Questions:

- What are the requirements for creating a mount point?
- Which types of volumes support mount points?
- What are the prerequisites for extending a volume on a basic disk?
- What advantages do dynamic disks provide when extending volumes?
- What is the difference between an extended volume and a spanned volume?

In this section, you will learn to:

- Create mount points and extended volumes
- Shrink and split partitions
- Add space to existing volumes

The key terms for this section include:

Term	Definition
Extended volume	A volume with unallocated disk space on the same disk.
Mount point	An empty folder on an existing volume that points to another partition. Data saved to the folder is physically saved on the referenced partition.
Spanned volume	A volume with unallocated disk space on a different disk.

Exam	Objective
	1.3 Install and configure storage
TestOut Network Pro	Configure and manage storagePerform disk maintenance
CompTIA A+	1.3 - Given a scenario, use features and tools of the Microsoft Windows 10 operating system (OS).
Certification 220-1102	 Microsoft Management Console (MMC) snap-in Disk Management (diskmgmtmsc)

Video/Demo	Time
5.6.1 Add Storage	6:31
5.6.2 Create Mount Points and Extending Volumes	8:52
5.6.3 Shrink and Split Partitions	<u>3:34</u>
Total Video Time	18:57

Lab/Activity

• 5.6.5 Add Space to Existing Volumes

Fact Sheets

Number of Exam Questions

10 questions

Total Time

About 46 minutes

5.7: Storage Spaces

Lecture Focus Questions:

- Which components do you use to create storage spaces?
- What is the difference between a storage pool and a storage space?
- Which hardware devices can you use to make storage pools?
- What are the benefits of using storage pools?
- You are comparing the hardware required for two-way mirroring and three-way mirroring. What is the minimum number of disks required for each data resiliency type?
- How does thin provisioning allow you to allocate more storage space to users than is available in the pool?

In this section, you will learn to:

Implement storage spaces

The key terms for this section include:

	this section include.
Term	Definition
Storage space	A Windows function that lets you group physical disks into storage pools and create virtual disks from the available capacity.
Two-way mirror resiliency	A type of resiliency that writes to two storage devices and requires at least two storage devices. This option protects you from a single storage device failure.
Three-way mirror resiliency	A type of resiliency that writes to three storage devices and requires at least five storage devices. This option provides redundancy for the data if two storage devices fail at one time.
Parity resiliency	A type of resiliency that writes parity information across the physical disks using bitwise arithmetic. It requires that you have at least three storage devices and provides fault tolerance against only one failure at a time.
Simple data provisioning	An option that adds space from the storage pool to the storage space. When you select the Simple option, all data in the storage space is lost if one of the drives fails.
Thin provisioning	An option that lets you allocate storage spaces larger than the disk space available in the pool.

Exam	Objective
	1.3 Install and configure storage
TestOut Network Pro	Configure and manage storage

Video/Demo	Time
5.7.1 Storage Spaces	9:32
	<u>10:06</u>
Total Video Time	19:38

Lab/Activity

• 5.7.4 Implement Storage Spaces

Fact Sheets

■ 5.7.3 Storage Space Facts

Number of Exam Questions

10 questions

Total Time

About 47 minutes

5.8: Disk Optimization

Lecture Focus Questions:

- What tasks does the Disk Cleanup app perform?
- What causes fragmentation? How does defragmenting improve how a system performs?
- Why should you not defragment a solid-state drive (SSD)?
- How is a lost cluster different from a cross-linked file?
- Which utility could you use to detect and mark bad clusters?

In this section, you will learn to:

- Optimize disks in Windows
- Optimize disks in Linux
- Optimize disks in macOS
- Perform disk maintenance

The key terms for this section include:

Term	Definition
Defragmentation	The process of moving or rewriting parts of a file to contiguous sectors on the hard disk drive. Defragmentation increases the speed of data access and retrieval.
Disk cluster	A unit of disk space allocation for files and directories.
Lost cluster	A file that has been deleted from the directory listing, but the file allocation table (FAT) still shows the clusters allocated to the file.
Cross-linked file	A file that claims the same cluster as another file.
Orphaned files	Files that exist on the hard drive but are not associated with a directory in the index.
Bad sector	A portion of the hard disk that cannot be used.

Exam	Objective
	1.3 Install and configure storage
TestOut PC Pro	Perform disk maintenance
CompTIA A+	1.1 Given a scenario, install and configure laptop hardware and components.
Certification 220-1101	 Hardware/device replacement Hard disk drive (HDD)/solid-state drive (SSD) migration

HDD/SSD replacement

3.3 Given a scenario, select and install storage devices.

- Hard drives
 - Speeds
 - 5,400rpm
 - 7,200rpm
 - 10,000rpm
 - 15,000rpm
- SSDs
 - Non-volatile Memory Express (NVMe)
 - SATA
 - Peripheral Component Interconnect Express (PCIe)
 - o M2

1.2 Given a scenario, use the appropriate Microsoft command-line tool.

- Command-line tools
 - chkdsk

CompTIA A+ Certification 220-1102

1.3 Given a scenario, use features and tools of the Microsoft Windows 10 operating system (OS).

- Additional tools
 - Disk Cleanup (cleanmgrexe)
 - Disk Defragment (dfrgui.exe)

Video/Demo	Time
■ 5.8.1 Storage Optimization	12:48
5.8.2 Optimize Disks in Windows	9:50
5.8.3 Optimize Disks in Linux	5:37
5.8.4 Optimize Disks in macOS	<u>4:52</u>
Total Video Time	33:07

Lab/Activity

5.8.6 Perform Disk Maintenance

Fact Sheets

Number of Exam Questions

10 questions

Total Time *About 61 minutes*

5.9: Storage and RAID Troubleshooting

Lecture Focus Questions:

- A hard disk is performing slowly. What can you do to speed up its performance?
- A system fails to boot, displaying an Operating System Not Found error message. What could cause this issue?
- A hard disk connected to the motherboard is not recognized by the Basic Input/Output System (BIOS)/Unified Extensible Firmware Interface (UEFI) firmware. What is the cause of this issue?
- A hard disk is making noise. What should you do?
- A computer system has a solid-state drive (SSD) installed. What should you do
 to optimize the useable lifespan of this device?
- The operating system (OS) cannot find the Redundant Array of Independent Disks (RAID) array. What could cause this issue?
- RAID stops working, but has the appropriate driver loaded. What could cause this issue?

In this section, you will learn to:

Troubleshoot SATA devices

The key terms for this section include:

The key terms for this section include.		
Term	Definition	
Self-Monitoring, Analysis, and Reporting Technology (S.M.A.R.T.)	S.M.A.R.T. is a monitoring system that detects drive errors. If S.M.A.R.T. detects the number of errors that indicate a complete hard disk failure is imminent, a warning is displayed during system boot.	
Input/output operations per second (IOPS)	The measurement of the number of input/output operations that can be performed per second.	
BIOS	Firmware that initializes hardware at startup and provides runtime services to the operating system.	
Defragmentation	A process that reduces file fragments by grouping together file pieces on a hard drive.	
Mean time before failure (MTBF)	A measurement of a hardware component's reliability, typically stated in hours or thousands of hours.	
TRIM	An SSD function that configures the operating system to communicate with an SSD device and tell it the blocks of data on the device that are no longer required and can be deleted.	
UEFI	A software program specification that connects firmware to the operating system. UEFI is eventually expected to replace BIOS.	

RAID

RAID is a data storage technology that combines multiple physical disk drives into one or more logical storage units. Using RAID can provide data redundancy, performance improvement, or both.

This section helps you prepare for the following certification exam objectives:

Exam	Objective
TestOut Network Pro	4.1 Troubleshoot hardware componentsTroubleshoot storage devices
CompTIA A+ 220-1101	 5.3 Given a scenario, troubleshoot and diagnose problems with storage drives and RAID arrays. Common symptoms Grinding noises Clicking sounds Bootable device not found Data loss/corruption RAID failure Self-monitoring, Analysis, and Reporting Technology (S.M.A.R.T) failure Extended read/write times Input/output operations per second (IOPS) Missing drives in OS
CompTIA A+ 220-1102	 1.3 Given a scenario, use features and tools of the Microsoft Windows 10 operating system (OS). Additional tools Disk Defragment (dfrgui.exe)

Video/Demo	Time
■ 5.9.1 Storage and RAID Troubleshooting	7:58
5.9.3 SSD Storage Issues	<u>4:27</u>
Total Video Time	12:25

Lab/Activity

5.9.5 Troubleshoot SATA Devices

Fact Sheets

■ 5.9.2 Storage and RAID Troubleshooting Facts

5.9.4 SSD Maintenance Facts

Number of Exam Questions

10 questions

Total Time

About 45 minutes

6.0 System Implementation

6.1: Windows Pre-Installation

Lecture Focus Questions:

- Under which circumstances should you choose a clean Windows installation?
- What is the advantage of a dual-boot system?
- When would you choose a Windows upgrade rather than a clean installation?
- Which types of media can you install Windows from?

In this section, you will learn to:

Verify system compatibility

The key terms for this section include:

Term	Definition
Clean installation	An installation performed on an existing or new system that installs a fresh instance of an operating system with default settings and overwrites any existing data on the storage device. It is also known as a custom install.
Upgrade installation	An installation performed on an existing system that is running an earlier version of Windows. The installation upgrades Windows to a newer version while preserving the existing data, settings, and applications currently installed.
Repair installation	An installation that installs a new build over the current installation. This process repairs registry entries and working files without losing applications or user information.

This section helps you prepare for the following certification exam objectives:

Exam	Objective
	2.1 Install, update, and configure an operating system
TestOut PC Pro	Install, update, and configure Windows
	1.9 Given a scenario, perform OS installations and upgrades in a diverse OS environment.
CompTIA A+ Certification 220-1102	 Types of installations Upgrade Clean install Repair installation Other considerations

87

- Third party drivers
- Upgrade considerations
 - Backup files and user preferences
 - Application and driver support/backward compatibility
 - Hardware compatibility '

Video/Demo	Time
	3:26
6.1.3 Verify System Compatibility	<u>3:17</u>
Total Video Time	6:43

Fact Sheets

Number of Exam Questions

10 questions

Total Time

About 22 minutes

6.2: Windows Installation

Lecture Focus Questions:

- What is a repair installation?
- When can you use an upgrade installation?
- How is Windows updated after installation?

In this section, you will learn to:

- Prepare disks for installation
- Create bootable media
- Configure a workstation for network boot
- Install a workstation image using PXE

This section helps you prepare for the following certification exam objectives:	
Exam	Objective
	1.3 Install and configure storage
	Implement a RAID solution
TestOut PC Pro	2.1 Install, update, and configure an operating system
	Install, update, and configure Windows
	4.4 Use and configure a ticketing system
	Close a help ticket
	3.3 Given a scenario, select and install storage devices.
CompTIA A+ Certification 220- 1101	 Drive configurations Redundant Array of Independent (or Inexpensive) Disks (RAID) 0, 1, 5, 10
	1.9 Given a scenario, perform OS installations and upgrades in a diverse OS environment.
CompTIA A+ Certification 220- 1102	 Boot methods USB Optical media Network Solid state/flash drive Internet-based External/hot-swappable device

- Internal hard drive (partition)
- Types of installations
 - Upgrade
 - Recovery partition
 - Clean install
 - Image deployment
 - Repair installation
 - Remote network installation
 - Other considerations
 - Third-party drivers
- Drive format
- 4.1 Given a scenario, implement best practices associated with documentation and support systems information management.
 - Ticketing systems
 - Clear, concise written communication
 - Progress notes
 - Problem resolution

Video/Demo	Time
■ 6.2.1 Windows Installation	11:20
☐ 6.2.2 Prepare Disks for Installation	8:09
☐ 6.2.4 Create Bootable Media	4:29
6.2.5 Configure Workstation for Network Boot	4:26
☐ 6.2.7 Install Windows	4:30
■ 6.2.9 Post-Installation	<u>4:14</u>
Total Video Time	37:08

Lab/Activity

- 6.2.3 Prepare Disks for Installation
- 6.2.6 Install a Workstation Image Using PXE

Fact Sheets

Number of Exam Questions

10 questions

Total Time

About 82 minutes

6.3: Cloud Computing

Lecture Focus Questions:

- What is cloud computing?
- What are the advantages of cloud computing?
- What is the difference between Platform as a Service (PaaS) and Software as a Service (SaaS)?

The key terms for this section include:

Term	Definition
Cloud computing	A combination of software, data access, computation, and storage services provided to clients through the internet.
Public cloud	A cloud that can be accessed by anyone. Public cloud-based computing resources (such as platforms, applications, and storage) are made available to the general public by a cloud service provider. For example, Google provides many publicly accessible cloud applications, such as Gmail and Google Docs.
Private cloud	A cloud that provides resources to a single organization. Private clouds can be hosted internally, but because of the expense and expertise required to do so, they are typically hosted externally by a third party.
Community cloud	A cloud designed to be shared by several organizations. Access is granted only to the users within the organizations who are sharing the community cloud infrastructure.
Hybrid cloud	A cloud that is a combination of public, private, and community cloud resources from different service providers. The goal behind a hybrid cloud is to expand the functionality of a given cloud service by integrating it with other cloud services.
Infrastructure as a Service (laaS)	A service that delivers infrastructure to the client, such as processing, storage, networks, and virtual environments. The client deploys and runs software without purchasing servers, data center space, or network equipment.
Platform as a Service (PaaS)	A service that delivers everything a developer needs to build an application. The deployment comes without the cost and complexity of buying and managing the underlying hardware and software layers.
Software as a Service (SaaS)	A service that delivers software applications to the client either over the internet or on a local area network.

Exam	Objective
CompTIA A+ Certification 220-1101	4.1 Summarize cloud computing concepts

- Common cloud models
 - Private cloud
 - Public cloud
 - Hybrid cloud
 - o Community cloud
 - Infrastructure as a Service (laaS)
 - Software as a Service (SaaS)
 - Platform as a Service (PaaS)
- Cloud characteristics
 - Shared resources
 - Metered utilization
 - Rapid elasticity
 - High availability
 - File synchronization

Video/DemoTime▣ 6.3.1 Cloud Computing Overview12:42Total Video Time12:42

Fact Sheets

Number of Exam Questions

10 questions

Total Time

About 28 minutes

6.4: Virtualization

Lecture Focus Questions:

- How can virtualization help you provide legacy software to users?
- What is a hypervisor?
- How do you enable Hyper-V in a Windows environment?

In this section, you will learn to:

- Use VirtualBox
- Use VMware Player
- Use Hyper-V
- Create virtual machines
- Create virtual hard disks

The key terms for this section include:

Term	Definition
Hypervisor	A thin layer of software that resides between the virtual operating system and the hardware. A hypervisor allows virtual machines to interact with hardware without going through the host operating system.
Virtual machine	A software implementation of a computer that functions like a physical computer, including application execution.
Virtual hard disk	A file created within the host operating system that simulates a hard disk for the virtual machine.
vSwitch	Software that facilitates the communication between virtual machines by checking data packets before moving them to a destination. A vSwitch may be software installed on the virtual machine, or it may be part of the server firmware.
vRouter	Software that performs the tasks of a physical router. Because virtual routing frees the IP routing function from specific hardware, you can move routing functions around a network.

Exam	Objective
	2.7 Configure virtualization
TestOut PC Pro	 Install and configure a hypervisor Install and configure a virtual machine Create and add virtual hard disks
	4.1 Summarize cloud-computing concepts.
CompTIA A+ 220-1101	 Desktop virtualization Virtual desktop infrastructure (VDI) on premises

VDI in the cloud

4.2 - Summarize aspects of client-side virtualization.

- Purpose of virtual machines
 - o Sandbox
 - Test development
 - o Application virtualization
 - Legacy software/OS
 - o Cross-platform virtualization

Video/Demo	Time
■ 6.4.1 Virtualization Overview	8:23
☐ 6.4.3 Use VMWare Player	4:42
☐ 6.4.4 Use Hyper-V	<u>5:42</u>
Total Video Time	18:47

Lab/Activity

- 6.4.6 Create Virtual Machines
- 6.4.7 Create Virtual Hard Disks

Fact Sheets

Number of Exam Questions

10 questions

Total Time

About 63 minutes

7.0 System Management 1

7.1: Windows System Tools

Lecture Focus Questions:

- What configuration tasks can you perform using Control Panel?
- Which tool lets you view running tasks and current memory use?
- How does Msconfig differ from Msinfo32? When are you more likely to use Msconfig instead of Msinfo32?
- Which of the following utilities typically shows the same information included in the other two utilities: Msconfig, Msinfo32, or Dxdiag?
- How should you typically modify settings in the registry?

In this section, you will learn to:

- Use Task Manager
- Use Control Panel
- Use Management Consoles
- View System Information
- Use Regedit
- Use Event Viewer
- Explore system commands

Key terms for this section include the following:

Terms	Definitions
Process	An instance of a computer program that is being executed.
Service	A program that processes requests from other applications or users.
Microsoft Management Console (MMC)	A framework that provides a common user interface for performing system administration tasks.
Windows Firewall	A security application created by Microsoft and built into Windows.
Computer Management	A collection of Windows administrative tools, or snap-ins, that you can use to manage a computer.
Microsoft Terminal Services Client	A remote management service that allows users to take control of remote computers over a network connection.
Windows Update	A Microsoft service for Windows that automates downloading and installing software updates over a network or the internet.

Open Database Connectivity (ODBC) The standard application programming interface for accessing database management systems (DBMS).

This section helps you p	prepare for the following certification exam objectives:
Exam	Objective
	1.2 Given a scenario, use appropriate Microsoft command-
	line tools.
	 Navigation
	o cd
	o dir
	o md
	o rmdir
	Drive navigation inputs C:\ or D:\ or x:\
	 Command-line tools
	ipconfig
	o ping
	hostname
	netstat
	nslookup
	o chkdsk
	net user
	o net use
	tracert
CompTIA A+	format
Certification 220-1102	o xcopy
	o copy
	robocopy
	o gpupdate
	o gpresult
	shutdown
	o sfc
	o [command name] /?
	o diskpart
	o pathping
	winver
	1.2 Civer a generic use features and tools of the Microsoft
	1.3 Given a scenario, use features and tools of the Microsoft
	Windows 10 operating system (OS).
	Task Manager
	Services
	ServicesStartup
	Startup Performance
	o i chomano

Processes Users

- Microsoft Management Console (MMC) snap-in
 - Event viewer (eventvwr.msc)
 - Disk Management (diskmqmt.msc)
 - Device Manager (devmgmt.msc)
 - Local Users and Groups (lusrmgr.msc)
 - Performance Monitor (perfmon.msc)
- Additional tools
 - System Information (msinfo32.exe)
 - System Configuration (msconfig.exe)
 - Registry Editor (regedit.exe)

Video/Demo	Time
	11:21
	7:20
☐ 7.1.5 Use Management Consoles	6:27
¬ 7.1.7 View System Information	6:06
	5:36
	5:12
¬ 7.1.10 Use Event Viewer	7:49
¬ 7.1.12 Explore System Commands	<u>5:24</u>
Total Video Time	55:15

Lab/Activity

• 7.1.14 Use System Commands

Fact Sheets

- □ 7.1.2 Task Manager Facts
- □ 7.1.4 Control Panel Facts
- □ 7.1.6 Management Consoles Facts
- □ 7.1.11 Windows System Tool Facts
- □ 7.1.13 System Command Facts

Number of Exam Questions

10 questions

Total Time

About 103 minutes

7.2: Windows Settings

Lecture Focus Questions:

- How can you customize the look and feel of the Windows desktop environment?
- How does indexing optimize the process for finding files on Windows?
- Where can you adjust the speed of the cursor in Windows?
- How do you extend the display of a computer to a second monitor?

In this section, you will learn to:

- Personalize Windows
- Configure region and language options
- Index files

The key terms for this section include:

The Rey terms for this coolien morage.		
Term	Definition	
Setting	A configuration that defines how an application, operating system, or a piece of hardware performs or appears.	
Permission	Authorization granted to a user or group to access and perform other tasks on a network resource.	
Indexing	A method of searching and organizing files and content on a PC.	
Lock screen	A security measure that displays an image with the date and time when the computer is locked. You can add preferred apps (such as the calendar) to the lock screen.	
Theme	A group of settings that allows you to customize the way the Windows desktop appears.	
Taskbar	The area located at the bottom of the Windows desktop that displays icons for open and pinned apps. You can right-click the icon for additional actions.	

Exam	Objective
	1.4 Given a scenario, use the appropriate Microsoft Windows 10 Control Panel utility.
	Indexing Options
CompTIA A+220- 1102	1.5 Given a scenario, use the appropriate Windows settings.
	Time and LanguageUpdate and SecurityPersonalizationApps
	Privacy

- System
- Devices
- Network and Internet
- Gaming
- Accounts

Video/Demo	Time
	4:20
7.2.2 Configure Region and Language Options	2:46
☐ 7.2.3 Index Files	<u>4:31</u>
Total Video Time	11:37

Fact Sheets

■ 7.2.4 Settings Facts

Number of Exam Questions

10 questions

Total Time

About 27 minutes

7.3: Performance Monitoring

Lecture Focus Questions:

- Which system components are commonly monitored to troubleshoot system performance?
- When examining system performance statistics, what is the difference between counters and objects?
- What should you do if the processor utilization in a system is consistently over 90%?
- What should you do if the amount of memory being utilized in a system is close to the amount of RAM installed?
- What should you do if the page file utilization in a system is near 100%?
- What causes thrashing? Which performance statistic can you use to identify thrashing?
- Which statistics should you examine to diagnose a network adapter bottleneck?

In this section, you will learn to:

Monitor system performance

Key terms for this section include the following:

Terms	Definitions
Bottleneck	A congestion that occurs when a component is unable to keep up with demand and subsequently slows down other processes or functions.
Processor utilization	The amount (percentage) of time the processor spends doing non-idle tasks.
Thrashing	A situation that occurs when a computer's virtual memory resources become saturated, leading to a constant state of paging.
Page file	The Windows swap file that holds the virtual memory used to supplement the physical memory installed in a computer.
Network utilization	The percentage of traffic sent and received over a network connection.
Counter	A device that tracks the number of times an event or process occurs. A counters records a specific statistic, such as the amount of free memory or the number of bytes sent on a network card.
Object	A statistical group, often corresponding to a specific type of hardware device or software process (such as the processor or memory).

Exam	Objective
CompTIA A+ Certification 220-1102	1.3 Given a scenario, use features and tools of the Microsoft Windows 10 operating system (OS).

- Task Manager
 - Services
 - Startup
 - Performance
 - Processes
 - Users
- Microsoft Management Console (MMC) snap-in
 - Event Viewer (eventvwr.msc)
 - Performance Monitor (perfmon.msc)
- Additional tools
 - Resource Monitor (resmon.exe)

Video/Demo	Time
■ 7.3.1 Performance Monitoring	6:23
☐ 7.3.2 Monitor System Performance	<u>6:44</u>
Total Video Time	13:07

Fact Sheets

□ 7.3.3 Performance Monitoring Facts

Number of Exam Questions

10 questions

Total Time

About 29 minutes

7.4: Windows Application Management

Lecture Focus Questions:

- What is the difference between a traditional desktop application and an application from the Microsoft Store?
- What are important system requirements to check before installing a new application?
- What is the difference between a 32-bit and a 64-bit operating system?
- How can older applications be configured to run on newer versions of Windows?

In this section, you will learn to:

- Manage Windows applications
- Configure application compatibility
- Schedule tasks
- Manage Microsoft Store apps
- Repair programs

The key terms for this section include:

Term	Definition
Application	A software program that performs a specific task or function on a computer or device.
Compatibility Mode	A Windows feature that allows you to run an older program using settings from a previous version of Windows.
Program Files	A standard folder in the Microsoft Windows operating system in which applications are typically installed.
64-bit processor	A central processing unit that can process 64 bits of data at a time, to a maximum address memory of 200 gigabytes for a high-end workstation.
32-bit processor	A central processing unit that can process 32 bits of data at a time, to a maximum address memory of 4 gigabytes.

Exam	Objective
	2.2 Use operating system features and utilities
TestOut PC Pro	Manage applications and processes
O a rest TIA A s	1.3 Given a scenario, use features and tools of the Microsoft Windows 10 operating system (OS).
CompTIA A+ Certification 220-1102	 Microsoft Management Console (MMC) snap-in Task Scheduler (taskschd.msc)

- 1.7 Given a scenario, apply application installation and configuration concepts.
 - System requirements for applications
 - 32-bit vs. 64-bit dependent application requirements
 - Dedicated graphics card vs. integrated
 - Video random-access memory (VRAM) requirements
 - RAM requirements
 - Central processing unit (CPU) requirements
 - External hardware tokens
 - Storage requirements
 - OS requirements for applications
 - Application to OS compatibility
 - 32-bit vs. 64-bit OS
 - Distribution methods
 - Physical media vs. downloadable
 - o ISO mountable
 - Other considerations for new applications
 - Impact to device
 - Impact to network
 - Impact to operation
 - Impact to business
- 1.10 Identify common features and tools of the macDS/desktop OS.
 - Installation and uninstallation of applications
 - App Store

Video/Demo	Time	
₱ 7.4.1 Windows Application Installation	7:18	
7.4.2 Manage Windows Applications	4:01	
7.4.4 Configure Application Compatibility	6:17	
	4:42	
	3:09	
Total Video Time	25:27	

Lab/Activity

- 7.4.9 Manage Applications
- 7.4.10 Repair Programs

Fact Sheets

<u>A</u>	7.4.3 Desktop Application Management Facts
<u>A</u>	7.4.5 Application Compatibility Facts
<u>A</u>	7.4.8 Microsoft Store Applications Facts

Number of Exam Questions

10 questions

Total Time

About 75 minutes

7.5: Linux Application Management

Lecture Focus Questions:

- What is a software package?
- Which Linux distributions use the yum command to manage software? Which distributions use apt-get or apt?
- Which yum command searches online repositories for a particular package, downloads it, and installs it?
- Which yum command downloads and installs the latest updates for packages installed on the system?
- Which apt-get or apt command uninstalls a package from the system?
- Which apt-get or apt command updates all the installed packages on a system?
- Which option can you use with the ps command to view all processes running on the system?
- How can you get help with a Linux command?

In this section, you will learn to:

- Install Linux software
- Manage apps on Linux
- Manage Linux processes

Key terms for this section include the following:

Terms	Definitions	
Linux	An open source and freely distributed operating system based on UNIX that was created by Linus Torvalds of Finland.	
This section helps you prepare for the following certification exam objectives:		
E	xam Objective	

Exam	Objective
	2.1 Install, update, and configure an operating system
	 Install, update, and configure Linux
TestOut PC Pro	2.2 Use operating system features and utilities
	 Use common Linux command line utilities Manage applications and processes
CompTIA 220-	1.11 Identify common features and tools of the Linux client/desktop OS.
1102	Common commandssu/sudoapt-get

o yum

- o ps
- Best practices
 - Updates/patches
- Tools
 - Shell/terminal

Video/Demo	Time
	4:49
¬ 7.5.2 Manage Apps on Linux	2:05
☐ 7.5.3 Manage Processes on Linux	<u>5:18</u>
Total Video Time	12:12

Lab/Activity

7.5.5 Manage Linux Processes

Fact Sheets

☐ 7.5.4 Linux Application Management Facts

Number of Exam Questions

10 questions

Total Time

About 40 minutes

7.6: Digital Content Management

Lecture Focus Questions:

- What is the difference between a personal software license and an enterprise (or volume) software license?
- What does an End User License Agreement (EULA) contain?
- How does open source software differ from software protected by a proprietary license agreement?
- How are open source development projects funded?
- How does online software activation work?
- What are common Digital Rights Management (DRM) technologies?

The key terms for this section include:

Term	Definition
Digital Rights Management	Software and hardware security limitations meant to protect digital content and prevent piracy.
Proprietary	Exclusive ownership or holding exclusive rights to something.
Open source	Software or operating system source code that is distributed under the GNU General Public License free to anyone. The software or operating system source code can be modified and redistributed under the GPL without fees.
End User License Agreement	A legal contract detailing the terms of use between a software application author or publisher and the end user of that application.

Exam	Objective
	 4.6 Explain the importance of prohibited content/activity and privacy, licensing, and policy concepts. Licensing/digital rights management (DRM)/end-user
CompTIA A+ Certification 220-1102	license agreement (EULA) o Valid licenses
	 Non-expired licenses
	 Personal use license vs. corporate use license
	 Open-source license

Video/Demo	Time
₱ 7.6.1 Software Licensing	6:09
₱ 7.6.2 Digital Rights Management (DRM)	<u>5:26</u>
Total Video Time	11:35

Fact Sheets

☐ 7.6.3 Digital Content Management Facts

Number of Exam Questions

10 questions

Total Time

About 27 minutes

7.7: Virtual Memory

Lecture Focus Questions:

- What is the benefit of using virtual memory?
- · How does virtual memory work?
- What is the purpose of swapping?
- What is the benefit of using a separate hard disk for the paging file?
- What condition causes disk thrashing? How can you reduce its effects?

In this section, you will learn to:

Configure virtual memory

The key terms for this section include:

Term	Definition
Virtual memory	Simulated memory that is implemented as a page file on a hard drive.
Paging	The process of moving data from RAM to hard disk and back again. This process is also called swapping.
Virtual Memory Manager (VMM)	The utility that manages swapping data between physical memory and the hard disk.
Disk thrashing	The condition where the physical memory is so insufficient that data must be continuously moved from physical RAM to disk and back again.

This section helps you prepare for the following certification exam objectives:

Exam	Objective
	3.2 Given a scenario, install the appropriate RAM.
CompTIA A+ Certification 220- 1101	RAM typesVirtual RAM

Video/Demo	Time
₱ 7.7.1 Windows Virtual Memory	5:48
7.7.2 Manage Virtual Ram	<u>4:06</u>
Total Video Time	9:54

Lab/Activity

• 7.7.4 Configure Virtual Memory

Fact Sheets

Number of Exam Questions

10 questions

Total Time

About 37 minutes

7.8: Windows and Application Troubleshooting

Lecture Focus Questions:

- What are common causes of the black/blue screen of death?
- What are troubleshooting options for boot problems in Windows?
- How do you use the System File Checker (SFC) to check for corrupted files?
- What can you do if a service fails to start when Windows loads?
- What can you do if there are low memory warnings?
- What is a simple fix for most USB controller resource warnings?
- What can you do if the operating system is not found?

In this section, you will learn to:

- Troubleshoot Windows services
- Troubleshoot Windows applications

The key terms for this section include:

Term	Definition
Blue screen of death (BSOD)	An error screen in Windows that displays when an error is so severe that Windows can no longer continue to function. Starting with Windows 11, the background for this error message is now black.
Basic Input/Output System (BIOS)	Firmware that initializes the boot process at startup and provides runtime services.
Unified Extensible Firmware Interface (UEFI)	Firmware designed to replace BIOS firmware and used to initialize the boot process.

Exam	Objective
	4.2 Troubleshoot software components
TestOut PC Pro	Troubleshoot common issues
	3.1 Given a scenario, troubleshoot common Windows OS problems.
CompTIA A+ Certification 220-1102	 Common symptoms Blue screen of death (BSOD) Sluggish performance Boot problems Frequent shutdowns

- Services not starting
- o Applications crashing
- Low memory warnings
- USB controller resources warning
- System instability
- No OS found
- Slow profile load
- Time drift
- Common troubleshooting steps
 - Reboot
 - Restart services
 - Uninstall/reinstall/update applications
 - Add resource
 - Verify requirements
 - System file check
 - Repair Windows
 - Restore
 - Reimage
 - o Roll back update
 - Rebuild Windows profiles

Video/Demo	Time
■ 7.8.1 Troubleshooting Windows Part 1	9:07
₱ 7.8.3 Troubleshooting Windows Part 2	5:59
7.8.5 Troubleshoot Windows Applications	6:41
☐ 7.8.6 Troubleshoot Windows Services	<u>5:27</u>
Total Video Time	27:14

Fact Sheets

□ 7.8.2 Troubleshooting Windows Facts Part 1

7.8.4 Troubleshooting Windows Facts Part 2

Number of Exam Questions

10 questions

Total Time

About 48 minutes

7.9: Scripting Basics

Lecture Focus Questions:

- What is scripting?
- What are some common uses for scripting?
- Which scripting languages are used on different operating systems?

In this section, you will learn to:

- Recognize different scripting languages
- Recognize possible use cases for scripting

Key terms for this section include the following:

Term	Definition
Script	Text files with commands and structures specific to a scripting language.
Scripting language	An interpreted programming language used in a text file, usually human-readable.
Use case	An example of how a technology can be used in a real-life example.

I his section helps you prepare for the following certification exam objectives:			
Exam	Objective		
2.4 Identify the basics of scripting.			
	·		
	 Script file types 		
	o .bat		
	o .ps1		
	o .vbs		
	o .sh		
CompTIA A+ Certification	o . js		
	o .py		
	Use cases for scripting		
220-1102	 Basic automation 		
	 Restarting machines 		
	 Remapping of network drives 		
	 Installation of applications 		
	 Automated backups 		
	 Gathering of information/data 		
	 Initiating updates 		
	Other considerations when using scripts Unintentionally introducing malware		
	 Unintentionally introducing malware 		
	 Inadvertently changing system settings 		

Browser or system crashes due to mishandling of resources

Video/Demo	Time
型 7.9.1 Scripting	5:57
¬ 7.9.2 Scripting Types	5:25
	<u>2:54</u>
Total Video Time	14:16

Fact Sheets

☐ 7.9.4 Scripting Facts

Number of Exam Questions

10 questions

Total Time

About 30 minutes

8.0 System Management 2

8.1: Active Directory

Lecture Focus Questions:

- What are the advantages of a workgroup?
- How is a workgroup different from a domain?
- What is an organizational unit (OU)?
- If a GPO is applied to an organizational unit, how does it affect objects in the OU?

In this section, you will learn to:

- Join a domain
- Join a workstation to a domain
- Manage Active Directory objects
- Create user accounts
- Create OUs
- Delete OUs
- Use Group Policy

The key terms for this section include:

Term	Definition
Policy	A set of rules and guidelines that establish the way that business is conducted within an organization.
Workgroup	Microsoft's implementation of peer-to-peer networking.
Domain	An administratively defined collection of network resources that share a common directory database and security policies.

This section helps you prepare for the following certification exam objectives.		
Exam	Objective	
	1.1 Identify basic features of Microsoft Windows editions	
	 Feature differences Domain access vs.workgroup 	
CompTIA A+ 220-1102	1.3 Given a scenario, use features and tools of the Windows 10 operating system (OS)	
	 Microsoft Management Console (MMC) snap-in Group Policy Editor (gpedit.msc) 	
	` , ,	

1.6 Given a scenario, configure Microsoft Windows networking features on a client/desktop

- Workgroup vs. domain setup
 - Shared resources
 - Printers
 - File servers
 - Mapped drives

2.1 Summarize various security measures and their purposes

- Active Directory
 - Login script
 - Domain
 - Group Policy/updates
 - Organizational units
 - o Home folder
 - Folder redirection
 - Security groups

2.5 Given a scenario, manage and configure basic security settings in the Microsoft OS

- Users and groups
 - Local vs. Microsoft account
 - Standard user
 - Administrator
 - Guest user
 - Power user

Video/Demo	Time	
■ 8.1.1 Workgroup vs. Domain Setup	3:15	
■ 8.1.2 Active Directory Overview	3:30	
■ 8.1.3 Join a Domain	8:44	
8.1.5 Manage Active Directory Objects	9:21	
■ 8.1.10 Group Policy	3:18	
■ 8.1.11 Use Group Policy	6:08	
Total Video Time	34:16	

Lab/Activity

- 8.1.4 Join a Workstation to a Domain
- 8.1.7 Create User Accounts
- 8.1.8 Create OUs
- 8.1.9 Delete OUs

Fact Sheets

■ 8.1.6 Active Directory Facts■ 8.1.12 Group Policy Facts

Number of Exam Questions

10 questions

Total Time

About 103 minutes

8.2: Users and Groups

Lecture Focus Questions:

- How can groups simplify security administration?
- What is the difference between local authentication and domain authentication?
- What is a distribution group used for?
- What is Windows Hello?
- What is User Account Control (UAC)?

In this section, you will learn to:

- Manage local users and groups
- Authenticate using online user accounts
- Manage users and groups
- Manage UAC settings

The key terms for this section include:

Term	Definition
User account	An account that identifies a specific user. You can assign rights and permissions to a user's account.
Group	A collection of user accounts you can use to assign rights and permissions to multiple users.

Exam	Objective
	2.1 Install, update, and configure an operating system
TestOut PC Pro	Configure local users and groups
	1.3 Given a scenario, use features and tools of the Microsoft operating system (OS).
	 Microsoft Management Console (MMC) snap-in Local Users and Groups (lusrmgr.msc)
CompTIA A+	1.5 Given a scenario, use the appropriate Windows settings
220-1102	• Accounts
	2.5 Given a scenario, manage and configure basic security settings in the Microsoft Windows OS.
	Users and Groups Local vs. Microsoft account

- Standard account
- Administrator
- Guest user
- Power user
- Login OS options
 - Username and password
 - Personal identification number (PIN)
 - Fingerprint
 - Facial recognition
 - Single sign-on (SSO)
- Run administrator vs. standard user
 - User Account Control (UAC)

Video/Demo	Time
■ 8.2.1 Users and Groups	5:10
■ 8.2.3 Login Options	3:44
8.2.5 Manage Local Users and Groups	7:25
8.2.6 Authenticate with Online User Accounts	3:49
□ 8.2.9 Manage UAC Settings	<u>7:15</u>
Total Video Time	27:23

Lab/Activity

8.2.8 Manage Users and Groups

Fact Sheets

- 8.2.2 User and Group Facts
- 8.2.4 Login Option Facts
- 8.2.7 Online Authentication Facts
- 8.2.10 UAC Facts

Number of Exam Questions

10 questions

Total Time

About 70 minutes

8.3: Remote Services

Lecture Focus Questions:

- What is the difference between Remote Desktop and Remote Assistance?
- What are the security concerns associated with remote access?
- What are the three ways you can send a Remote Assistance invitation?
- What is the Remote Desktop Connection tool used for?

In this section, you will learn to:

- Use Remote Desktop
- Use Remote Assistance
- Use Screen Sharing
- Configure remote services
- Use video conferencing software

This section helps you prepare for the following certification exam objectives.		
Exam	Objective	
	2.6 Implement remote access	
TestOut PC Pro	Configure Remote Desktop Connection	
	4.9 Given a scenario, use remote access technologies.	
CompTIA A+ 220-1102	 Methods/Tools Remote Desktop Protocol (RDP) Virtual network computer (VNC) Secure Shell (SSH) Remote monitoring and management (RMM) Microsoft Remote Assistance (MSRA) Third-party tools Screen-sharing software Video-conferencing File transfer software Desktop management Security considerations of each access method 	

Video/Demo	
■ 8.3.1 Remote Access Technologies	4:29
■ 8.3.3 Remote Desktop	2:26
□ 8.3.4 Use Remote Desktop	4:06
■ 8.3.6 Remote Assistance	3:19

8.3.8 Use Remote Assistance	2:36
■ 8.3.11 Use Video Conferencing Software	<u>2:57</u>
Total Video Time	19:53

Lab/Activity

• 8.3.9 Configure Remote Services

Fact Sheets

- 8.3.2 Remote Access Technologies Facts
- 8.3.5 Remote Desktop Facts
- 8.3.7 Remote Assistance Facts
- 8.3.10 Screen Sharing Facts

Number of Exam Questions

10 questions

Total Time

About 62 minutes

8.4: VPN

Lecture Focus Questions:

- How does a remote access virtual private network (VPN) differ from a host-tohost VPN?
- Which devices are configured as the VPN tunnel endpoints with a site-to-site VPN?
- What does Point-to-Point Tunneling Protocol (PPTP) use for encryption? What does Layer Two Tunneling Protocol (L2TP) use?
- What is the difference between Authentication Header (AH) and Encapsulating Security Payload (ESP) when used with IPsec?

In this section, you will learn to:

- Set up a VPN connection
- Configure a VPN connection

This section helps you prepare for the following certification exam objectives:

Exam	Objective
	2.6 Implement remote access
TestOut PC Pro	Configure a VPN connection
	4.9 Given a scenario, use remote access technologies.
CompTIA A+ 220-1102	Methods/toolsVPN

Video/Demo	Time
■ 8.4.1 Virtual Private Networks (VPN)	9:01
■ 8.4.2 Set Up a VPN Connection	<u>3:36</u>
Total Video Time	12:37

Lab/Activity

8.4.4 Configure a VPN Connection

Fact Sheets

■ 8.4.3 VPN Facts

Number of Exam Questions

10 questions

Total Time *About 40 minutes*

8.5: Updates

Lecture Focus Questions:

- What are two reasons updates are released for an operating system?
- How does keeping a system up to date increase security?
- Which tasks can be completed using Windows Update?
- How are updates applied on Linux and macOS operating systems?

In this section, you will learn to:

- Use Windows Update
- Configure Windows Update
- Update Linux
- Update macOS

Exam	Objective
	2.1 Install, update, and configure an operating system
	Install, update, and configure Windows
TestOut PC Pro	3.1 Implement tools to detect, remove, and prevent malware
	Configure operating system updates
0 714 4 000	1.5 Given a scenario, use the appropriate Windows settings.
CompTIA A+ 220- 1101	Update and security
CompTIA A+ 220-	3.2 Given a scenario, troubleshoot common personal computer (PC) security issues.
1102	 Common symptoms OS update failures

Video/Demo	
■ 8.5.1 Updates	3:46
■ 8.5.2 Use Windows Update	2:08
■ 8.5.5 Update Linux	3:50
■ 8.5.6 Update macOS	<u>2:04</u>
Total Video Time	11:48

Lab/Activity

8.5.4 Configure Windows Update

Fact Sheets

■ 8.5.3 Update Facts

Number of Exam Questions

10 questions

Total Time

About 39 minutes

8.6: System Backup

Lecture Focus Questions:

- Which type of data is backed up with a system image backup?
- Why should you test restore methods?
- Where should you store backup media?
- Which types of media can Backup and Restore write to?
- What is the difference between Backup and Restore and File History?

In this section, you will learn to:

- · Create backups in Windows
- Create backups in Linux
- Restore data on Linux
- Use Time Machine on macOS
- Restore data on macOS
- Back up a computer
- Configure File History
- Restore data from File History

The key terms for this section include:

Term	Definition
Backup	An archived copy of data that you can use to restore corrupt or lost data in the event of a hardware or system failure.
System state	Data that includes all the files required to boot and run the computer.
User data	Data that includes all data files saved and modified by users or applications that users run.
Application data	Data that includes files installed by an application and application configuration files.

Exam	Objective
	2.5 Implement disaster prevention and recovery methods
TestOut PC Pro	Implement image-level backup and recoveryImplement file-level backup and recovery
103104110110	4.4 Use and configure a ticketing system
	Close a help ticket
CompTIA A+ 220- 1102	1.9 Given a scenario, perform OS installations and upgrades in a diverse OS environment.

- Upgrade considerations
 - o Backup files and user preferences
- 1.10 Identify common features and tools of the macOS/desktop OS.
 - Best practices
 - o Backups
 - System Preferences
 - o Time Machine
- 1.11 Identify common features and tools of the Linux client/desktop OS.
 - Best practices
 - Backups
- 4.3 Given a scenario, implement workstation backup and recovery methods.
 - Backup and recovery
 - o Full
 - Incremental
 - Differential
 - Synthetic
 - Backup testing
 - Frequency
 - Backup rotation schemes
 - o Onsite vs. off site
 - Grandfather-father-son (GFS)
 - o 3-2-1 backup rule

Video/Demo	Time
■ 8.6.1 System Backup	4:32
8.6.3 Create Backups in Windows	2:48
8.6.4 Create Backups in Linux	3:50
■ 8.6.5 Restore Data on Linux	3:22
8.6.6 Use Time Machine on macOS	4:26
8.6.7 Restore Data on macOS	<u>4:13</u>
Total Video Time	23:11

Lab/Activity

8.6.8 Back Up the Computer

- 8.6.9 Configure File History
- 8.6.10 Restore Data from File History

Fact Sheets

■ 8.6.2 Backup Facts

Number of Exam Questions

10 questions

Total Time

About 75 minutes

8.7: System Recovery

Lecture Focus Questions:

- Which system recovery methods can you use when you are unable to boot the computer?
- What are the advantages of using a recovery disc/partition to recover a system?
- Which methods can you use to recover lost data files?
- When should a system image backup be restored in the recovery process?

In this section, you will learn to:

- Use restore points
- Create a restore point
- Use Windows system recovery tools

Exam	Objective
	2.5 Implement disaster prevention and recovery methods
TestOut PC Pro	 Implement image-level backup and recovery Implement file-level backup and recovery
	2.3 Given a scenario, detect, remove, and prevent malware using the appropriate tools and methods.
	 Tools and methods Recovery console
CompTIA A+ 220-1102	3.1 Given a scenario, troubleshoot common Windows OS problems.
	 Common troubleshooting steps Repair Windows Restore Reimage

Video/Demo	Time
■ 8.7.1 Windows System Recovery	4:00
■ 8.7.2 Use Restore Points	4:25
8.7.4 Use Windows System Recovery Tools	6:28
■ 8.7.6 Use File Recovery Tools	<u>3:19</u>
Total Video Time	18:12

Lab/Activity

- 8.7.3 Create a Restore Point
- 8.7.5 Boot into the Windows Recovery Environment

Fact Sheets

■ 8.7.7 System Recovery Facts

Number of Exam Questions

10 questions

Total Time

About 58 minutes

8.8: Windows Boot Errors

Lecture Focus Questions:

- What are the general stages of the Windows startup process?
- What should you do if you hear a series of beeps when the system powers on and nothing displays on the monitor?
- Which symptoms may indicate a corrupt or missing boot sector?
- How do you correct a corrupt MBR or partition table?

In this section, you will learn to:

- Modify the boot order
- Configure the boot order
- Use Advanced Boot Options
- Use the bootrec command
- Troubleshoot system startup

Exam	Objective
	1.1 Select and install PC components
	 Install and connect a power supply Install and connect a motherboard Install a CPU and CPU fan Install memory modules
	1.2 Configure hardware components
	Configure boot optionsConfigure BIOS/UEFI settings
TestOut PC Pro	1.3 Install and configure storage
	Install internal and external storage devices
	2.1 Install, update, and configure an operating system
	Install, update, and configure Windows
	2.2 Use operating system features and utilities
	Use Windows features and command line utilities
	4.1 Troubleshoot hardware components

- Troubleshoot system startup
- Troubleshoot system power
- Troubleshoot CPU installation
- Troubleshoot system memory
- Troubleshoot storage devices
- Troubleshoot malfunctioning systems

4.2 Troubleshoot software components

- Troubleshoot common issues
- 1.2 Given a scenario, use the appropriate Microsoft commandline tool.
 - Command-line tools
 - sfc

CompTIA A+ 220-1102

3.1 Given a scenario, troubleshoot common Windows OS problems.

- Common symptoms
 - o Boot problems
- Common troubleshooting steps
 - Reboot
 - Restore

Video/Demo	Time
■ 8.8.1 Windows Boot Process	4:59
■ 8.8.3 Modify the Boot Order	6:58
8.8.5 Use Advanced Boot Options	6:56
■ 8.8.7 Use the bootrec Command	<u>4:24</u>
Total Video Time	23:17

Lab/Activity

- 8.8.4 Configure the Boot Order
- 8.8.9 Troubleshoot System Startup 1
- 8.8.10 Troubleshoot System Startup 2
- 8.8.11 Troubleshoot System Startup 3
- 8.8.12 Troubleshoot System Startup 4

Fact Sheets

- 8.8.2 Boot Process Facts
- 8.8.6 Windows Boot Options

132

■ 8.8.8 Startup Error Facts

Number of Exam Questions 10 questions

Total Time *About 109 minutes*

9.0 File Management

9.1: Manage Files on Windows

Lecture Focus Questions:

- How can you cause the output of a command to list one screen at a time when using Command Prompt in Windows?
- How do you repeat a command by causing the most recent command to appear in Command Prompt?
- Which function does the cd .. command provide?
- Which dir command can you use to display files that are not read-only?
- Which command removes subdirectories and files in the current directory?
- What are the main differences between the copy command and the xcopy command?
- Which two file attributes can you not assign at the same time?

In this section, you will learn to:

Manage files and folders

The key terms for this section include:

Term	Definition
File extension association	A mechanism that identifies the program used to create a file.
File attribute	Metadata that gives certain qualities to a file after the attribute has been assigned.
Command Prompt	A command line tool used for executing commands and managing files and folders.

Exam	Objective
	2.2 Use operating system features and utilities
	Use Windows features and command line utilities
TestOut PC Pro	2.3 Manage file systems
	Manage files and foldersConfigure file access permissions
CompTIA A+ Certification 220-1102	1.2 Given a scenario, use the appropriate Microsoft command-line tool.

- Navigation
 - o cd
 - o dir
 - o md
 - o rmdir
 - Drive navigation inputs
 - C:\ or D:\ or x:\
- Command-line tools
 - o xcopy
 - o copy
 - robocopy

Video/Demo	Time
9.1.1 Windows File and Folder Properties	4:02
	6:05
	5:08
9.1.6 Manage Directories from the Command Prompt	6:47
9.1.7 Manage Files from the Command Prompt	<u>10:44</u>
Total Video Time	32:46

Lab/Activity

- 9.1.5 Manage Files
- 9.1.9 Manage Files and Folders

Fact Sheets

- 9.1.3 File Management Facts
- 9.1.8 File Management Commands

Number of Exam Questions

10 questions

Total Time

About 77 minutes

9.2: NTFS and Share Permissions

Lecture Focus Questions:

- How are share permissions different from NTFS permissions?
- Which permissions (share or NTFS) apply to both local and network accessed files?
- What does it mean if permissions are cumulative?
- Which actions can you complete within a folder if you have the Modify permission to that folder?
- How does inheritance work regarding NTFS permissions?

In this section, you will learn to:

- Share and secure folders
- Configure share and NTFS permissions
- · Configure basic and advanced folder sharing on Windows

The key terms for this section include:

Term	Definition
NTFS permissions	Permissions used to manage and secure files and folders within an NTFS file system.
Shared folder	A set of files that are made available to other users over a network.
Share permissions	Permissions used to control the level of access users have when accessing files over the network.

This section helps you prepare for the following certification exam objectives.	
Exam	Objective
	2.3 Manage file systems
TestOut PC Pro	 Manage files and folders Configure file access permissions Share and secure files and folders
CompTIA A+	2.5 Given a scenario, manage and configure basic security settings in the Microsoft Windows OS.
220-1102	 NTFS vs. share permissions Inheritance

Video/Demo	Time
9.2.1 NTFS and Share Permissions	6:58
9.2.3 Configure Basic Folder Sharing on Windows	6:28

9.2.4 Configure Advanced Folder Sharing on Windows	10:13
9.2.5 Configure Share and NTFS Permissions	3:35
9.2.6 Configure NTFS Permissions	<u>10:17</u>
Total Video Time	37:31

Lab/Activity

- 9.2.7 Share and Secure Folders
- 9.2.8 Configure NTFS Permissions

Fact Sheets

■ 9.2.2 NTFS and Share Permissions Facts

Number of Exam Questions

10 questions

Total Time

About 77 minutes

9.3: File Encryption

Lecture Focus Questions:

- Which encryption method encrypts individual files so that only the owner and authorized users can decrypt the file and read it?
- Why is it important to not move files encrypted with EFS to a non-NTFS partition?
- How does file encryption differ from disk encryption?
- What is the role of a TPM when implementing whole disk encryption?
- Which editions of Windows provide BitLocker support?
- How can BitLocker be implemented on Windows systems that don't have a TPM chip on the motherboard?
- Which protocols are commonly used to establish a VPN? Which protocol is typically used for web transactions?
- Which protocols are commonly used to encrypt and secure wireless communications?

In this section, you will learn to:

- Configure file encryption
- Use BitLocker
- Use BitLocker To Go

The key terms for this section include:

Term	Definition
Encryption	A process that makes digital materials accessible only through authorized decryption software or devices.
File encryption	A process that encrypts the contents of an individual file.
Disk encryption	A process that encrypts the entire contents of a hard drive.
Data transmission encryption	A process that uses encryption to protect data sent through a network.
BitLocker partition	A volume that contains the boot files.
Trusted Platform Module (TPM)	A special hardware chip that generates and stores cryptographic keys.
File Encryption Key (FEK)	A symmetric encryption key used to both encrypt and decrypt a file.

Exam	Objective
	3.3 Implement security best practices
TestOut PC Pro	Implement drive encryption

2.5 Given a scenario, manage and configure basic security settings in the Microsoft Windows OS.

CompTIA A+ 220-1102

- BitLocker
- BitLocker To Go
- Encryption File System (EFS)

Video/Demo	Time
9.3.1 File Encryption	4:29
	7:58
9.3.5 BitLocker	5:45
□ 9.3.6 Use BitLocker	4:56
	4:48
Total Video Time	27:56

Lab/Activity

• 9.3.4 Configure File Encryption

Fact Sheets

■ 9.3.2 File Encryption Facts

■ 9.3.8 BitLocker Facts

Number of Exam Questions

10 questions

Total Time

About 60 minutes

9.4: Linux File Management

Lecture Focus Questions:

- Which Linux command displays the current working directory?
- Which Linux command displays a listing of all files and subdirectories in the current directory?
- Which Linux command navigates between directories?
- Which Linux commands copy and move data?
- Which Linux command deletes data?
- Which Linux command can you use to view the contents of files?
- Which Linux command can you use to edit a text file?
- Which Linux commands manage file and folder ownership and permissions?

In this section, you will learn to:

- Manage the Linux file system
- Manage Linux file ownership

Key terms for this section include the following:

Term	Definition
File system	A system that organizes a computer's files on a hard drive.
man utility_name	A utility used at the shell prompt to view the syntax along with the options that can be used.
Second Extended Filesystem (ext2)	One of the oldest Linux file systems.
Third Extended Filesystem (ext3)	An updated version of ext2 that supports journaling.
Fourth Extended Filesystem (ext4)	The fourth-generation file system in the ext file system family.
swap	A file system used for virtual memory.
Network File System (NFS)	A distributed file system used for file sharing on Unix and Linux.
Virtual File Allocation Table (VFAT)	A FAT32 file system for Linux.
Extended File System (XFS)	High performing and flexible file system.
B Tree File System (Btrfs)	A Linux file system with copy-on-write functions. Sometimes referred to as butter FS or better FS.

Exam	Objective
TestOut PC Pro	2.2 Use operating system features and utilities

- Use Windows features and command line utilities
- 2.3 Manage file systems
 - Manage files and folders
- 1.8 Explain common OS types and their purposes
 - Various filesystem types
 - New Technology File System (NTFS)
 - File Allocation Table 32 (FAT32)
 - Third extended filesystem (ext3)
 - Fourth extended filesystem (ext4)
 - Extensible File Allocation Table (exFAT)
- 1.11 Identify common features and tools of the Linux client/desktop OS.

CompTIA 220-1102

- Common commands
 - o Is
 - pwd
 - o mv
 - o cp
 - o rm
 - chmod
 - o chown
 - o su/sudo
 - o df
 - man
 - o cat
 - nano

Video/Demo	Time
9.4.1 Use Linux Shell Commands	11:04
9.4.4 Manage the Linux File System	10:44
	7:16
9.4.6 Edit File Contents	10:04
9.4.7 Manage Ownership and Permissions	<u>6:20</u>
Total Video Time	45:28

Lab/Activity

- 9.4.3 Use Shell Commands
- 9.4.9 Manage the Linux File System

• 9.4.10 Manage Linux File Ownership

Fact Sheets

- 9.4.2 Linux Shell Facts
- 9.4.8 Linux File Management Facts

Number of Exam Questions

10 questions

Total Time

About 102 minutes

10.0 Peripheral Devices

10.1: Peripheral Devices

Lecture Focus Questions:

- What are the three types of peripheral devices?
- Which connector is used by most peripheral devices?
- Which peripheral devices require little to no configuration?
- How can you verify that a device is compatible with a particular computer?
- Which peripheral devices require special software or drives to function?
- What is the difference between an input device and an output device?

Key terms for this section include the following:

Term	Definition
Digitizer	A device that captures an analog signal and turns it into digital data. Examples include graphics tables, document scanners, and 3D scanners.
Input device	A device that sends data to a computer.
Input/output (I/O) device	A device that can input data to a computer and accept output data from a computer. Examples include CD-ROMs, DVD-ROMS, USB flash drives, hard disk drives, network adapters, and Bluetooth adapters.
Keyboard, video, mouse (KVM) switch	A switch that allows multiple computers to use a single keyboard, mouse, and monitor.
Lumen	A unit of measurement that indicates an amount of light.
Near-field communication (NFC)	A set of communication protocols that allow devices to communicate when they are within 1.6 inches of one another. NFC devices are commonly used in retail stores and restaurants with Tap Pay phone apps.
Output device	A device used to send or display data from a computer.

Exam	Objective
	1.1 Given a scenario, install and configure laptop hardware and components.
CompTIA 220- 1101	 Physical privacy and security components Biometrics Near-field scanner features
	1.2 Compare and contrast the display components of mobile devices.

- Microphone
- Touch screen/digitizer
- 1.5 Given a scenario, use the appropriate Windows settings.
 - Devices
 - Gaming

CompTIA 220-1102

1.10 Identify common features and tools of the macOS/desktop OS.

- System Preferences
 - Scanners

Video/DemoTime☑ 10.1.1 Peripheral Devices3:27Total Video Time3:27

Fact Sheets

■ 10.1.2 Peripheral Device Facts

Number of Exam Questions

10 questions

Total Time

About 19 minutes

10.2: Display Devices

Lecture Focus Questions:

- What are some of the specifications used by display devices?
- What are the benefits of a higher resolution?
- What is the refresh rate?

In this section, you will learn to:

- Configure advanced display settings in Windows
- Select and configure dual monitors
- Configure display settings in Linux and macOS

Key terms for this section include the following:

Term	Definition
Color depth	The number of bits used for each color component of a single pixel.
Resolution	A measurement of an image's sharpness and clarity. The more pixels that make up an image, the higher its resolution.

Exam	Objective
	2.1 Install, update, and configure an operating system
TestOut PC Pro	Configure and optimize video adapter settings
	1.2 Compare and contrast the display components of mobile devices.
CompTIA A+ 220- 1101	 Types Liquid crystal display (LCD) Organic light-emitting diode (OLED) Mobile display components
CompTIA A L 220	1.10 Identify common features and tools of the macOS/desktop OS.
CompTIA A+ 220- 1102	 System Preferences Displays

Video/Demo	
10.2.1 Configure Display Settings in Windows	5:32
10.2.2 Configure Advanced Display Settings in Windows	8:24

10.2.4 Configure Display Settings in Linux	1:36
10.2.5 Configure Display Settings in macOS	<u>5:08</u>
Total Video Time	20:40

Lab/Activity

• 10.2.3 Select and Configure Dual Monitors

Fact Sheets

■ 10.2.6 Display Device Facts

Number of Exam Questions

10 questions

Total Time

About 48 minutes

10.3: Display, Video, and Projector Troubleshooting

Lecture Focus Questions:

- Which components comprise the video system in a PC?
- What can cause no output on a video monitor?
- The output on a video monitor displays in VGA mode. What could cause this?
- A monitor suddenly shuts off during use. What could cause this?
- What can cause the output of an LCD to look pixilated and chunky?
- What are causes of a dim LCD screen?
- Which setting can you change to stop an LCD from flickering?
- How can you remove image retention on a plasma display?
- An LCD monitor has dead and stuck pixels. How can you fix this issue?
- What setting can affect the size of images and icons?

Key terms for this section include the following:

Term	Definition
Artifact	Part of an image that stays on-screen after the screen is cleared of the image.
Burn-in	When an image displays on a screen for too long and becomes permanently stuck. It is also known as image retention (IR).
Codec	A standard for compressing and decompressing audio and/or video.
Video Graphics Array (VGA) mode	A simplified startup mode that can help you troubleshoot video card issues that interrupt Windows OS functions.

Exam	Objective
	2.1 Install, update, and configure an operating system
TestOut PC Pro	Configure and optimize video adapter settings
	5.4 Given a scenario, troubleshoot video, projector, and display issues.
CompTIA 220- 1101	 Common symptoms Incorrect data source Physical cabling issues Burned-out bulb Fuzzy image Display burn-in Dead pixels Flashing screen Audio issues Dim image

o Intermittent projector shutdown

Video/Demo	Time
■ 10.3.1 Video Troubleshooting	8:53
■ 10.3.3 Projector Troubleshooting	<u>3:46</u>
Total Video Time	12:39

Fact Sheets

□ 10.3.2 Video Troubleshooting Facts

□ 10.3.4 Projector Troubleshooting Facts

Number of Exam Questions

10 questions

Total Time

About 33 minutes

10.4: Device Driver Management

Lecture Focus Questions:

- Which type of hardware devices use direct memory access (DMA) channels to communicate directly with random-access memory (RAM)?
- When is it necessary to manually configure a device?
- Which system rights are required to install devices?
- What is the function of the driver?
- What is the importance of driver signing? What should you be aware of when using a driver that is not signed?
- How do you safely remove a hot swappable component?
- How do you verify that a device is compatible with the version of Windows you are running before you purchase it?
- Where are the best places to obtain the most up-to-date version of a driver for each of the following: a Windows system, a macOS system, and a Linux system?

In this section, you will learn to:

- Install and manage device drivers on Windows
- Manage devices on Linux
- Manage devices on macOS

Key terms for this section include the following:

Term	Definition
Direct memory access	Conduits used by high-speed devices to bypass the CPU and communicate directly with RAM.
Driver	A program that enables the operating system to interact with hardware devices.
Hot swappable device	A device that can be added and removed without shutting down the computer. For example, thumb drives are hot swappable.
Interrupt request (IRQ)	A communication method that allows a device to interrupt the CPU and request processing time.
Input/output (I/O) address	A data address that allows two devices in a computer to send information to each other.

Exam	Objective
	2.1 Install, update, and configure an operating system
TestOut PC Pro	Manage device drivers
	2.2 Use operating system features and utilities

Use common Linux command line utilities

1.3 Given a scenario, use features and tools of the Microsoft Windows 10 operating system (OS).

- Microsoft Management Console (MMC) snap-in
 - Device Manager (devmgmt.msc)
- Additional tools
 - System Information (msinfo32.exe)
 - System Configuration (msconfig.exe)

CompTIA 220-1102

1.4 Given a scenario, use the appropriate Microsoft Windows 10 Control Panel utility.

- · Devices and Printers
- Device Manager

1.11 Identify common features and tools of the Linux client/desktop OS.

- Best practices
 - Updates/patches

Video/Demo	
■ 10.4.1 Device Installation	4:21
☐ 10.4.2 Install and Manage Device Drivers on Windows	11:26
☐ 10.4.3 Manage Devices on Linux	5:09
☐ 10.4.4 Manage Devices on macOS	3:08
Total Video Time	24:04

Lab/Activity

10.4.7 Manage Devices

Fact Sheets

- □ 10.4.5 Hardware Device Facts
- □ 10.4.6 Device Driver Installation Facts

Number of Exam Questions

10 questions

Total Time

About 57 minutes

10.5: Device Driver Troubleshooting

Lecture Focus Questions:

- What are the first items you should check when you have installed a new device and it is not working properly?
- How do you verify that a device is recognized and enabled in Device Manager?
- What should you do if the system crashes during startup before you can log on?
- If you cannot boot the system into Safe Mode, which steps should you take to boot the system?
- Once you get a system started after reducing it to a minimal state, how do you identify a component that has a problem?

In this section, you will learn to:

- Update and roll back device drivers
- Enable and disable devices in Device Manager
- Use the Last Known Good Configuration, Safe Mode, and restore points to recover from device-related errors
- Update hardware device firmware

Key terms for this section include the following:

Term	Definition
Roll	Revert a system that has received an update or other change to its previous
back	state.

This section helps you prepare for the following sertification exam objectives:	
Exam	Objective
	1.2 Configure hardware components
	Configure boot optionsConfigure BIOS/UEFI settings
TestOut PC Pro	Implement firmware updates
	2.1 Install, update, and configure an operating system
	Manage device drivers
CompTIA 220-	1.3 Given a scenario, use features and tools of the Microsoft Windows 10 operating system (OS).
1002	 Microsoft Management Console (MMC) snap-in Device Manager (devmgmt.msc) Additional tools

System Configuration (msconfig.exe)

1.4 Given a scenario, use the appropriate Microsoft Windows 10 Control Panel utility.

Device Manager

1.9 Given a scenario, perform OS installations and upgrades in a diverse OS environment.

- Types of installations
 - Third-party drivers
- 3.1 Given a scenario, troubleshoot common Windows OS problems.
 - Common troubleshooting steps
 - Repair Windows
 - Restore
 - Roll back updates

Video/Demo	Time
■ 10.5.1 Device Driver Troubleshooting	4:58
☐ 10.5.2 Troubleshoot Devices	3:13
☐ 10.5.3 Work with Legacy Devices and Drivers	<u>3:02</u>
Total Video Time	

Lab/Activity

- 10.5.5 Manage Devices 1
- 10.5.6 Manage Devices 2

Fact Sheets

■ 10.5.4 Device Troubleshooting Facts

Number of Exam Questions

10 questions

Total Time

About 51 minutes

11.0 Networking

11.1: Networking Overview

Lecture Focus Questions:

- What is the role of host devices in a peer-to-peer network?
- What benefits does implementing a network provide to an organization?
- How do you determine which portion of a IPv4 address is the network ID and the host ID?
- What type of network is created when you pair wireless earbuds to a cell phone?
- Which device connects multiple networks together?

The key terms for this section include:

The key terms for this section include:		
Term	Definition	
Network	A group of interconnected computers and devices that can share information information with each other	
Subnet	A portion of a network with a common network address.	
Nodes or hosts	Devices that reside on the network. Hosts can range from a computer, tablet, mobile phone, gaming console, IoT device, or server.	
Transmission media	The medium that is used to carry electrical or radio signals between connected network hosts.	
Network Interfaces	Converts the digital network data into a signal that can be transmitted along the transmission medium.	
Protocols	Rules or standards that describe how hosts communicates and exchange data.	
Peer-to-peer	Network in which hosts can both share and access data.	
Client-server	Network in which hosts have specific roles.	
Storage Attached Network (SAN)	A special type of network that provides high-speed access to storage across the network. Specialized hardware is used to store and provide access to needed data.	
Body Area Network (BAN)	A very small network that consists of wearable or implanted devices such as a smart watch, fitness trackers, or medical implants.	
Personal Area Network (PAN)	A small network for communication between personal devices such as wireless earbuds and a cell phone.	
Local Area Network (LAN)	A network in a small geographic area, like an office. A LAN typically uses wires to connect systems together.	

Wireless Local Area Network (WLAN)	Same as LAN but uses wireless connection.
Campus Area Network (CAN)	Sometimes referred to as a corporate area network, this network type is established when multiple LANs are connected together within a limited area, such as a college campus or between multiple buildings that are owned by the same organization.
Metropolitan Area Network (MAN)	A network that covers an area as small as a few city blocks to as large as an entire metropolitan city.
Wide Area Network (WAN)	Group of LANs that are geographically isolated but are connected to form a large internetwork.
Wireless Mesh Network (WMN)	A group of wireless mesh nodes that communicate with one another to share the network connection across a large area. Each device in the WMN uses the others as relays to avoid the need for infrastructure.
Wireless Wide Area Network (WWAN)	Similar to WLAN but uses different technology to connect to the internet. Also known as 4G, 5G, or LTE networks.
Internetwork	A network with geographically disperse connections that connect multiple LANs.
Internet	Large, world-wide, public network.
Intranet	Private network that uses internet technologies.
Extranet	Private network that uses internet technologies but its resources are made available to trusted external users.
- 1	

Exam	Objective
	2.7 Compare and contrast Internet connection types, network types, and their features.
CompTIA A+ 220- 1101	 Network Types Local Area Network (LAN) Wide area network (WAN) Personal area network (PAN) Metropolitan area network (MAN) Storage area network (SAN) Wireless local area network (WLAN)

Video/Demo	Time
■ 11.1.1 Networking Introduction	8:20
■ 11.1.2 Network Types	<u>7:04</u>
Total Video Time	15:24

Fact Sheets

□ 11.1.3 Networking Facts

Number of Exam Questions

10 questions

Total Time

About 31 minutes

11.2: Networking Ports and Protocols

Lecture Focus Questions:

- What is the main difference between Transmission Control Protocol (TCP) and User Datagram Protocol (UDP)?
- What are the steps of the 3-way handshake?
- What are some of the most common uses of UDP?
- Which protocols does email use?
- What port does Hypertext Transfer Protocol Secure (HTTPS) use?

The key terms for this section include:

Term	Definition
TCP	A connection-oriented protocol. This means that when data is sent between two hosts, the TCP protocol ensures that every packet sent is received before sending the next packet.
UDP	A connectionless protocol. Instead of verifying that each packet sent is received, UDP sends the packets one at time and the receiver processes them as they come in.
Port	A part of a computing device that can connect to peripherals or cables. A computer port is like a door into the system. There are 65,536 possible network ports. The port number tells the host device the type of traffic sent and where to send it to.
3-way handshake	The process two devices go through to establish a TCP connection.

Exam	Objective	
	2.1 Compare	e and contrast Transmission Control Protocol (TCP) and
	User Datagr	am Protocol (UDP) ports, protocols, and their purposes.
CompTIA A+ 220-1101	0	and protocols 20/21—File Transfer Protocol (FTP) 22—Secure Shell (SSH) 23—Telnet 25—Simple Mail Transfer Protocol (SMTP) 53—Domain Name System (DNS) 67/68—Dynamic Host Configuration Protocol (DHCP) 80—Hypertext Transfer Protocol (HTTP) 110—Post Office Protocol 3 (POP3) 137/139—Network Basic Input/Output System (NetBIOS)/NetBIOS over TCP/IP (NetBT) 143—Internet Mail Access Protocol (IMAP) 161/162—Simple Network Management Protocol (SNMP)

- 389—Lightweight Directory Access Protocol (LDAP)
- 443—Hypertext Transfer Protocol Secure (HTTPS)
- 445—Server Message Block (SMB)/Common Internet File System (CIFS)
- 3389—Remote Desktop Protocol (RDP)
- TCP vs. UDP
 - Connectionless
 - DHCP
 - Trivial File Transfer Protocol (TFTP)
 - Connection-oriented
 - HTTPS
 - SSH

Video/Demo	Time
11.2.1 TCP and UDP	6:20
11.2.3 Ports and Protocols	<u>7:14</u>
Total Video Time	13:34

Fact Sheets

- 11.2.2 TCP/IP Protocol Facts
- □ 11.2.4 Ports and Protocols Facts

Number of Exam Questions

10 questions

Total Time

About 34 minutes

11.3: Client-Side Network Configuration

Lecture Focus Questions:

- Which numbering system is most used in computers and electronic systems?
- Which values does the hexadecimal numbering system use?
- What is a physical address? Logical address?
- How many bits is an IPv4 address?
- How many bits is an IPv6 address?
- How can an IPv6 address be shortened?

In this section, you will learn to:

- Configure TCP/IP properties
- Configure TCP/IP settings
- Configure alternate TCP/IP settings

The key terms for this section include:

The key terms for this section include:		
Term	Definition	
Decimal Numbering System	The decimal numbering system is the most used number system across the world. Decimal is a base-10 number system that consists of the digits 0,1,2,3,4,5,6,7,8,9.	
Binary Numbering System	Binary is the number system that computers and most electronic systems use. Because these systems work on electricity, there are only two states, on and off. This is represented using the numbers 1 and 0.	
Hexadecimal Numbering System	A base-16 number system that consists of the decimal numbers 0-9 and also uses letters A-F to represent values 10-15.	
MAC address	A 48-bit physical address that is a unique identifier for all network adapters.	
Logical address	Network addresses assigned by software.	
IPv4 address	A 32-bit logical address that consists of four decimal numbers separated by a dot that can range from 0 to 255 (ex. 192.168.1.50).	
Subnet mask	Used to identify which octets in the IPv4 address are the host ID and which are the network ID.	
Default gateway	Responsible for forwarding data packets to destinations outside of the network.	
IPv4 address class	Identifies the range of IP addresses and the default subnet mask used for the range.	
Automatic Private IP Addressing (APIPA)	A feature that allows a device to automatically assign itself an IP address on the 169.254.0.0 network when a DHCP server or manual configuration is unavailable.	

Unicast address

Unicast address

A 128-bit address made up of eight 16-bit blocks.

An address assigned to a single interface for the purpose of allowing one host to send and receive data. Packets sent to a unicast address are delivered to the interface identified by that address.

An address that represents a dynamic group of hosts. Packets sent to a multicast address are sent to all interfaces identified by that address.

Anycast address

A unicast address that is assigned to more than one interface, typically belonging to different hosts.

This section helps you prepare for the following certification exam objectives:		
Objective		
2.5 Given a scenario, install and configure basic wired/wireless small office/home office (SOHO) networks.		
 Internet Protocol (IP) addressing Pv4 Private addresses 		
 Public addresses IPv6 Automatic Private IP Addressing (APIPA) Static 		
StaticDynamicGateway		
1.6 Given a scenario, configure Microsoft Windows networking features on a client/desktop.		
Client network configuration		
 Internet Protocol (IP) addressing scheme Domain Name System (DNS) settings Subnet mask Gateway Static vs. dynamic Public network vs. private network File Explorer navigation – network paths 		

Video/Demo	Time
11.3.1 Device Addressing	7:54
11.3.2 IPv4 Addressing	10:27
11.3.4 IP Version 6	7:04
☐ 11.3.6 Configure TCP/IP Properties	4:40

Total Video Time 30:05

Lab/Activity

- 11.3.7 Configure TCP/IP Settings on Windows 10
- 11.3.8 Configure TCP/IP Settings on Window 11

Fact Sheets

- 11.3.3 IPv4 Address Facts
- □ 11.3.5 IPv6 Facts

Number of Exam Questions

10 questions

Total Time

About 75 minutes

11.4: Services Provided by Network Devices

Lecture Focus Questions:

- What network resources can a server provide access to?
- What are the components of a FQDN?
- What is IoT?
- What are the most common IoT communication protocols?
- What CPUs can be used in an embedded system?

In this section, you will learn to:

- Configure DHCP on a Windows Server
- Configure DNS on a Windows Server
- Configure Smart Devices

The key terms for this section include:

Term	Definition
Domain Name System	Translates hostnames to IP addresses
Fully Qualified Domain Name (FQDN)	A domain name that spells out each level of the hierarchy.
Forward lookup zone	DNS record that matches a hostname to its IP address
Reverse lookup zone	DNS record that matches a IP address to its hostname
Dynamic Host Configuration Protocol (DHCP)	Automatically assigns the IP configuration when a device connects to the network
Simple Mail Transfer Protocol (SMTP)	Used for outgoing emails and operates on port 25
Post Office Protocol version 3 (POP3)	Used for incoming emails and operates on port 110. Emails are downloaded to the local computer and then removed from the email server.
Internet Message Access Protocol (IMAP)	Used for incoming emails and operates on port 143. Emails are kept on the email server allowing users to access their email from multiple devices.
Load balancer	Internet appliance that monitors servers and distributes network traffic so one server does not get overwhelmed
Spam gateway	Internet appliance that monitors incoming and outgoing emails to reduce the amount of spam affecting the network.
Proxy server	An internet appliance typically configured to monitor all incoming and outgoing network traffic and determines if the traffic is allowed or not.

Unified Threat The unified threat management (UTM) internet appliance Management (UTM) combines multiple functions into one single device. Appliance IoT is a system of connected computing devices and other things that use unique identifiers and the ability to send data Internet of Things (IoT) over a network without requiring human interaction. Internet of Everything IoE is another name for IoT. (loE) An embedded system is a complete computer system that Embedded System is designed to perform a specific dedicated task. The application-specific integrated circuit chip is created to Application-specific integrated circuit (ASIC) perform a single function. System-on-chip (SoC) A System-on-chip incorporates all components on the board A field-programmable gate array is physically setup like a Field-Programmable ASIC or SoC, but the programming is configured by the Gate Array (FPGA) end-user. Industrial Control Industrial control systems (ICSs) handle the workflow and automation process for all sorts of machinery. Systems (ICS) PLC is a specialized controller that can be programmed to Programmable logic perform specific tasks. Multiple PLCs can be combined and controller (PLC) configured to work together to carry out complex tasks. Supervisory control and SCADA controllers are used to monitor and control PLC data acquisition systems. They gather data and adjust the system based on (SCADA) the data acquired from sensors. The HMI can be either a touch-screen control panel or software running on a typical computer system. The HMI Human-machine interface (HMI) allows the operator to make configuration changes in the ICS. Distributed control A DCS is a customized all-in-one package that contains the needed PLCs, SCADA controller, and HMI. system (DCS) Modbus is a special network protocol that controller Modbus

This section helps you prepare for the following certification exam objectives:

Exam	Objective
	2.4 Summarize services provided by networked hosts
CompTIA A+ 220- 1101	 Server Roles DNS DHCP Fileshare Print servers Mail servers Syslog

systems use to communicate with each other.

- Web servers
- Authentication, authorization, and accounting (AAA)
- Internet appliances
 - Spam gateways
 - Unified threat management (UTM)
 - Load balancers
 - Proxy servers
- Legacy/embedded systems

2.6 Compare and contrast common network configuration concepts.

- DNS
 - Address (A)
 - Authentication, authorization, accounting, and auditing (AAAA)
 - Mail exchanger (MX)
- DHCP
 - Leases
 - Reservations
 - Scope

Video/Demo	Time
11.4.1 Server Roles	13:26
☐ 11.4.3 Explore Server Roles	5:29
☐ 11.4.4 Configure DHCP on a Windows Server	7:19
☐ 11.4.5 Configure DNS on a Windows Server	7:16
■ 11.4.6 Internet Appliances	10:06
11.4.8 Internet of Things	9:03
☐ 11.4.9 Smart Devices	7:03
11.4.12 Embedded Systems (SCADA)	8:02
Total Video Time	1:07:44

Lab/Activity

• 11.4.11 Configure Smart Devices

Fact Sheets

- □ 11.4.2 Server Role Facts
- □ 11.4.7 Internet Appliances Facts
- □ 11.4.10 Internet of Things Facts
- □ 11.4.13 Embedded Systems (SCADA) Facts

Number of Exam Questions

10 questions

Total Time

About 110 minutes

11.5: Wireless Networking

Lecture Focus Questions:

- Which Institute of Electrical and Electronics Engineers (IEEE) standard defines how wireless networks operate?
- How many non-overlapping channels are in the 2.4 GHz range? 5 GHz range?
- What encryption algorithm does WPA2 use?
- Which wireless access method allows a device to connect to the wireless network by pressing a button?

In this section, you will learn to:

- Install a wireless network adapter
- Configure a wireless connection
- Connect to a wireless network
- Create a home wireless network
- Secure a home wireless network
- Configure a wireless profile
- Configure Bluetooth connections

The key terms for this section include:

The key terms for this section include.		
Term	Definition	
Wireless channel	A method that allows the frequency of the wireless network to be fine-tuned. Each channel is approximately 20 MHz wide.	
802.11	IEEE designation for all wireless networking standards.	
Multiple-input multiple-output (MIMO)	An enhancement that allows multiple antennas to use the same radio frequency.	
Channel bonding	A method that combines channels into one to increase bandwidth.	
Multi-user multiple-input multiple-output (MU-MIMO)	An enhancement to MIMO that allows the antennae on the access point to divide streams between multiple devices.	
802.1x authentication	Secure authentication method for wired and wireless networks.	
Open network	Wireless network that requires no authentication.	
Captive portal	Authentication method that forces a user to agree to terms or pay a fee before accessing the wireless network.	
Pre-shared key (PSK)	Wireless authentication method that uses a passphrase to authenticate users.	

Wireless authentication method that allows for Wi-Fi Protected Setup automatic connection between a device and the

wireless access point.

Wi-Fi Protected Access

Encryption protocol used on most wireless networks today. Versions 2 and 3 are the latest versions in use.

Bluetooth

Wireless communication technology that allows two devices to connect to each other over a short distance.

Radio Frequency Identification (RFID)

A communication method that uses radio waves to transmit data from small circuit boards called RFID tags to special scanners.

Near Field Communication (NFC)

A communication method that allows two-way communication between two devices within a few centimeters of each other.

This section helps you prepare for the following certification exam objectives.

Exam

Objective

1.5 Configure networking devices

 Install and configure wired and wireless network adapters and cables

TestOut PC Pro

2.4 Configure PC Networking

- Configure wired and wireless networking for a SOHO
- 1.4 Given a scenario, configure basic mobile-device network connectivity and application support.
 - Bluetooth
 - Enable Bluetooth
 - Enable pairing
 - Find a device for pairing
 - Enter the appropriate PIN code
 - Test connectivity

CompTIA A+

220-1101

- 2.3 Compare and contrast protocols for wireless networking.
 - Frequencies
 - o 2.4 GHz
 - o 5 GHz
 - Channels
 - Regulations
 - 2.4 GHz vs. 5 GHz
 - Bluetooth
 - 802.11

	 a b g n ac (WiFi5) ax (WiFi6) Long-Range Fixed wireless Licensed Unlicensed Power Regulatory requirements for wireless power NFC Radio-frequency identification (RFID)
CompTIA A+ 220-1102	 Protocols and encryption WiFi Protected Access 2 (WPA2) WPA3 Temporal Key Integrity Protocol (TKIP) Advanced Encryption Standard (AES) Authentication Remote Authentication Dial-In User Service (RADIUS) Terminal Access Controller Access-Control System (TACACS+) Kerberos Multifactor

Video/Demo Time		
■ 11.5.1 Wireless Networking	11:25	
☐ 11.5.2 Install a Wireless Network Adapter	2:49	
11.5.4 Wireless Security	9:39	
■ 11.5.6 Wireless Encryption and Authentication	5:47	
☐ 11.5.8 Configure a Wireless Connection	5:27	
11.5.13 Infrared, Bluetooth, and NFC	4:31	
☐ 11.5.14 Configure Bluetooth Connections	<u>5:11</u>	
Total Video Time	44:49	

Lab/Activity

- 11.5.9 Connect to a Wireless Network
- 11.5.10 Create a Home Wireless Network
- 11.5.11 Secure Home Wireless Network

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• 11.5.12 Configure a Wireless Profile

Fact Sheets

- □ 11.5.3 Wireless Networking Facts
- □ 11.5.5 Wireless Security Facts
- □ 11.5.7 Wireless Encryption and Authentication Facts
- □ 11.5.15 Infrared, Bluetooth, and NFC Facts

Number of Exam Questions

10 questions

Total Time

About 123 minutes

11.6: SOHO Configuration

Lecture Focus Questions:

- What is the first configuration change you should perform on a new wireless router?
- What authentication protocol is typically used by DSL providers?
- What technology allows multiple computers to share a single public IP address on the internet?
- What does the Universal Plug and Play (UPnP) feature do?

In this section, you will learn to:

- Configure a small office/home office (SOHO router)
- Configure a wireless router
- Configure a wireless infrastructure
- Perform a firmware update
- Update firmware

The key terms for this section include:

Term	Definition
Small office/home office network	A SOHO network is a smaller network that does not make use of servers to handle network resources or enterprise level switches to connect devices. Wireless networks used in most homes would be considered SOHO networks.
Network Address Translation (NAT)	NAT is a protocol that allows multiple computers to share a single public IP address on the internet.
Screened subnet	A screened subnet, also known as a demilitarized zone (DMZ), is used to place a device on the network that should be open to external users while still protecting the internal network.

Exam	Objective
	1.2 Configure hardware components
TestOut PC Pro	Implement firmware updates
	2.9 Given a scenario, configure appropriate security settings on small office/home office (SOHO) wireless and wired networks.
CompTIA A+ 220-1102	 Home router settings Change default passwords IP filtering Firmware updates

- Content filtering
- o Physical placement/secure locations
- Dynamic Host Configuration Protocol (DHCP) reservations
- Static wide-area network (WAN) IP
- Universal Plug and Play (UPnP)
- Screened subnet
- Wireless specific
 - Changing the service set identifier (SSID)
 - Disabling SSID broadcast
 - Encryption settings
 - Disabling guest access
 - Changing channels
- Firewall settings
 - Disabling unused ports
 - Port forwarding/mapping

Video/Demo	Time
11.6.1 SOHO Configuration ■ 11.6.1 SOHO Configuration	7:52
☐ 11.6.3 Configure a SOHO Router	6:37
☐ 11.6.4 Configure a Wireless Router	8:39
11.6.6 Perform a Firmware Update	<u>4:25</u>
Total Video Time	27:33

Lab/Activity

• 11.6.7 Update Firmware

Fact Sheets

- □ 11.6.2 SOHO Configuration Facts
- □ 11.6.5 Windows Network Profile Facts

Number of Exam Questions

10 questions

Total Time

About 60 minutes

11.7: Networking Hardware

Lecture Focus Questions:

- Which networking device connects two networks together?
- What is the main difference between a hub and switch?
- Which Power over Ethernet (PoE) standard can provide up to 100 watts of power?
- Which internet connection is provided over coaxial cable?
- Which internet connection uses light to transmit data?

In this section, you will learn to:

- Explore network switch settings
- Select and install a network adapter
- Configure a cable internet connection
- Configure a DSL internet connection
- Connect to a VPN

The key terms for this section include:

The key terms for this section include:		
Term	Definition	
Wireless access point (WAP)	A networking device that provides connection to a wireless network.	
Router	A networking device that connects two networks together.	
Hub	A networking device that connects internal hosts using Ethernet cables. When data comes in, the hub forwards it to all connected devices.	
Switch	A networking device that connects internal hosts using Ethernet cables. When data comes in, the switch forwards it to the intended recipient.	
Patch panel	A special panel where Ethernet cables are terminated.	
Virtual LAN (VLAN)	A virtual network that is configured on a network switch.	
Power over Ethernet	Technology that can provide power to devices over an Ethernet cable.	
Software-defined networking	A networking controller that allows the network administrator to manage network devices remotely.	
Symmetric	Internet connections that have the same upload and download speeds.	
Asymmetric	Internet connections that have different upload and download speeds.	
Cable internet	An internet connection that uses the existing cable TV infrastructure to provide access to the internet.	

Digital subscriber line An internet connection that provides high-speed digital data transmission over existing telephone lines. (DSL)

Internet that uses fiber optic cables to provide access to the Fiber internet

internet.

A network that uses radio signals sent and received from a Satellite internet

satellite.

A network that uses a cellular phone infrastructure for internet Cellular internet

access.

Wireless internet service provider

Networks that use antennae pointed at a large antenna on

land to provide access to the internet.

(WISP) This section helps you prepare for the following certification exam objectives: 1.5 Configure networking devices TestOut PC Pro Install and configure wired and wireless network adapters and cables 2.2 Compare and contrast common networking hardware. Routers Switches **Access Points** Patch Panel Firewall Power over Ethernet (PoE) Hub

- Cable modem
- Digital subscriber line (DSL)
- Optical network terminal (ONT)

CompTIA A+ 220-1101

- Network interface card (NIC)
- Software-defined networking (SDN)
- 2.6 Compare and contrast common network configuration concepts.
 - Virtual LAN (VLAN)
 - Virtual private network (VPN)
- 2.7 Compare and contrast Internet connection types, network types, and their features.
 - Internet connection types

- Satellite
- Fiber
- Cable
- o DSL
- Cellular
- Wireless Internet service provider (WISP)

1.6 Given a scenario, configure Microsoft Windows networking features on a client/desktop.

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- Establish network connections
 - Virtual private network (VPN)
 - Wireless
 - Wired
 - Wireless wide area network (WWAN)

Video/Demo	Time
11.7.1 Network Infrastructure	10:01
11.7.2 Explore Network Switch Settings	7:11
11.7.4 Internet Connection Types	9:53
☐ 11.7.9 Connect to a VPN	<u>3:39</u>
Total Video Time	30:44

Lab/Activity

- 11.7.6 Select and Install a Network Adapter
- 11.7.7 Configure a Wireless Infrastructure
- 11.7.8 Configure a DSL Internet Connection

Fact Sheets

- □ 11.7.3 Network Infrastructure and Device Facts
- □ 11.7.5 Internet Connection Type Facts

Number of Exam Questions

10 questions

Total Time

About 87 minutes

11.8: Command Line Network Utilities

Lecture Focus Questions:

- Which network utility shows the current IP configuration in Linux?
- Which network utility would you use to test the connection between two devices?
- Which network utility shows each hop a packet makes?

In this section, you will learn to:

- Use ping and pathping
- Use ipconfig command
- Use ip command
- Use tracert and traceroute
- Use nslookup
- Use dig
- Explore configuration information

The key terms for this section include:

The key terms for this section include.	
Term	Definition
ipconfig	Utility used to view or modify current IP configuration in Windows.
ip	Utility used to view or modify current IP configuration in Linux.
hostname	Utility used to view or modify the device name.
ping	Utility used to test the connection between two devices.
tracert/traceroute	Utility used to see the path a packet takes.
pathping	Utility used to see the path a packet takes along with additional information such as latency and packet loss.
netstat	Utility used to view network statistics.
nslookup	Utility used to view or modify current DNS configuration in Windows.
dig	Utility used to view or modify current DNS configuration in Linux.
net	Windows utility used in conjunction with other commands to manage network resources and connections.
chkdsk	Windows utility used to check the health of a hard drive.

Exam	Objective
	2.2 Use operating system features and utilities
TestOut PC Pro	Use common Linux command line utilities
CompTIA A+ 220- 1102	1.2 Configure hardware components

- Command-Line Tools
 - ipconfig
 - o ping
 - hostname
 - netstat
 - nslookup
 - chkdsk
 - o net user
 - net use
 - tracert
 - pathping
- 1.11 Identify common features and tools of the Linux client/desktop OS.
 - Common commands
 - o ip
 - o dig

Video/Demo	
11.8.1 Command Line Network Utilities	4:52
☐ 11.8.2 Use ping and pathping	5:46
☐ 11.8.3 Use ipconfig Command	6:59
☐ 11.8.4 Use ip Command (Linux)	3:24
☐ 11.8.5 Use tracert and traceroute	4:29
☐ 11.8.6 Use nslookup	3:38
☐ 11.8.7 Use dig (Linux)	6:35
11.8.8 Other Network Command Line Utilities	<u>3:06</u>
Total Video Time	38:49

Lab/Activity

- 11.8.10 Use the Linux ip Command
- 11.8.11 Explore Configuration Information 1
- 11.8.12 Explore Configuration Information 2
- 11.8.13 Explore Configuration Information 3

Fact Sheets

■ 11.8.9 Command Line Network Utilities Facts

Number of Exam Questions

10 questions

Total Time

About 102 minutes

11.9: Network Troubleshooting

Lecture Focus Questions:

- What should you do first when troubleshooting any network issue?
- What is the localhost IP address?
- What are common causes of jitter?
- What is the difference between full-duplex and half-duplex?

In this section, you will learn to:

- Troubleshoot network connectivity
- Fix a network connection

The key terms for this section include:

Term	Definition
Localhost	The IP address 127.0.0.1 (also known as the loopback address) is used to verify that the local TCP-IP protocol is installed and working properly.
Jitter	The variation in the latency of VoIP packets.
Latency	The amount of time it takes to send a network request and receive a response back.
Quality of Service (QoS)	A feature in some routers and switches that assigns priority to different types of network traffic.
Port flapping	A problem in which a port on the network switch continuously turns off and on three or more times per second for at least 10 seconds.

Exam	Objective
TestOut PC Pro	4.3 Troubleshoot networking
	 Troubleshoot a network connection Use networking utilities to view, test, and troubleshoot network configuration, communication, and connectivity issues
	4.4 Use and configure a ticketing system
	Create a help ticketClose a help ticket
CompTIA A+ 220-1101	2.5 Given a scenario, install and configure basic wired/wireless small office/home office (SOHO) networks.
	 Internet Protocol (IP) addressing IPv4

Static

5.7 Given a scenario, troubleshoot problems with wired and wireless networks.

- Common symptoms
 - Intermittent wireless connectivity
 - Slow network speeds
 - Limited connectivity
 - Jitter
 - Poor Voice over Internet Protocol (VoIP) quality
 - Port flapping
 - High latency
 - External interference

1.2 Configure hardware components

- Command-Line Tools
 - ipconfig
 - ping
- 4.1 Given a scenario, implement best practices associated with documentation and support systems information management.

CompTIA A+ 220-1102

- Ticketing systems
 - User information
 - Device information
 - Description of problems
 - Categories
 - Severity
 - Escalation levels
 - Clear, concise written communication
 - o Problem description
 - Progress notes
 - Problem resolution

Video/Demo	Time
■ 11.9.1 Network Troubleshooting	8:31
11.9.2 Troubleshoot Network Connectivity	<u>7:17</u>
Total Video Time	15:48

Lab/Activity

11.9.4 Fix a Network Connection 1

• 11.9.5 Fix a Network Connection 2

Fact Sheets

□ 11.9.3 Network Troubleshooting Facts

Number of Exam Questions

10 questions

Total Time

About 55 minutes

12.0 Mobile Devices

12.1: Laptops

Lecture Focus Questions:

- Why don't processors for laptop computers require the large heat sink and fan combinations that desktop PCs use to dissipate heat?
- How can you continue to use a notebook when a component fails?
- What kinds of components are typically built into a notebook computer?
- What steps should you take when repairing or replacing a notebook component?
- What is the function of the docking station?
- How do you add devices to a notebook computer?
- How do you identify the location of components and replacement procedures for notebook systems?

In this section, you will learn to:

Replace internal laptop components

Key terms for this section include the following:

Term	Definition
Backlight	The light that illuminates an LCD screen so that images on the screen are visible.
Bezel	The plastic casing around an electronic device's screen.
Inverter	A power supply that converts DC power from a computer to AC power for a screen.
Port replicator	A device that connects several external devices such as: monitor, mouse, keyboard to a USB port.
Liquid crystal display (LCD)	An electronic display system that switches pixels on and off using liquid crystals that rotate polarized light.
Light-emitting diode (LED)	A semiconductor device that emits light when an electric current passes through it.

Exam	Objective
	1.6 Manage mobile devices
TestOut PC Pro	Install basic hardware components on laptop computers
CompTIA A+ 220- 1101	1.1 Given a scenario, install and configure laptop hardware and components

- Hardware/device replacement
 - Keyboard/keys
 - Random-access memory (RAM)
 - Hard disk drive (HDD)/solid-state drive (SSD) migration
 - HDD/SSD replacement
 - Wireless cards

Video/Demo	Time
º 12.1.1 Laptops	5:07
■ 12.1.2 External Laptop Ports and Functions	5:38
12.1.5 Change a Laptop Hard Drive	2:26
12.1.6 Install Laptop Memory	3:32
12.1.7 Install a Laptop Keyboard	3:18
☐ 12.1.8 Replace Internal Laptop Components	<u>12:30</u>
Total Video Time	32:31

- □ 12.1.3 Laptop Facts
- □ 12.1.4 Laptop Special Keys Facts
- □ 12.1.9 Laptop Upgrade and Repair Facts

Number of Exam Questions

10 questions

Total Time

About 58 minutes

12.2: Mobile Device Displays and Components

Lecture Focus Questions:

- What types of displays are available?
- What is the benefit of using organic light-emitting diode (OLED) displays?
- What non-display devices are integrated in the display?
- What components allow you to see liquid crystal displays (LCDs)?

In this section, you will learn to:

Replace LCD components

The key terms for this section include:

Term	Definition
LCD	A flat panel display that uses liquid crystals.
In-plane switching (IPS)	An LCD display technology that uses liquid crystals between two glass panels.
Twisted nematic (TN)	An LCD display technology that provides fast pixel response times and crisper pictures.
Vertical Alignment (VA)	An LCD display technology in which the liquid crystals align vertically to the glass substrates.
OLED	A light emitting diode (LED) technology in which a pixel emits light when electricity is applied to it.
Inverter	A device that provides power to the LCD screen's backlight.

Exam	Objective
	1.6 Manage mobile devices
TestOut PC Pro	Install basic hardware components on laptop computers
	1.2 Compare and contrast the display components of mobile devices.
CompTIA A+ 220- 1101	 Types Liquid crystal display (LCD) In-plane switching (IPS) Twisted nematic (TN) Vertical alignment (VA) Organic light-emitting diode (OLED)

- Mobile display components
- WiFi antenna connector/placement
- Camera/webcam
- Microphone
- Touch screen/digitizer
- Inverter

Video/Demo	Time
12.2.1 Display Components	6:05
☐ 12.2.2 Replace LCD Components	<u>7:16</u>
Total Video Time	13.21

■ 12.2.3 Mobile Device Displays and Components Facts

Number of Exam Questions

10 questions

Total Time

About 29 minutes

12.3: Laptop Power Management

Lecture Focus Questions:

- What are the names of the Windows power states?
- What is the purpose of each power state?
- What options are available and what changes can you make to those options?

In this section, you will learn to:

- Understand each of the power states
- Edit power options
- Create a power plan

Key terms for this section include the following:

Term	Definition
Hibernate	A system power state where the system appears to be shutdown and an image of the system RAM has been saved to disk.
Standby	A system power state where power is cut to all peripherals, storage device(s), and screen. Power to system RAM remains on, allowing for the system to resume quickly.
Sleep	A system power state where the system appears to be shutdown, but volatile memory is refreshed and some components remain powered so the computer can wake up quickly if it receives input from a keyboard, LAN, or USB device.

Exam	Objective
	2.2 Use operating system features and utilities
TestOut PC Pro	Configure power options and settings
CompTIA A+ 220-	1.1 Given a scenario, install and configure laptop hardware and components
1101	 Hardware/device replacement Battery
	1.4 Given a scenario, use the appropriate Microsoft Windows 10 Control Panel utility
CompTIA A+ 220- 1102	Power OptionsHibernate
	Power plansSleep/suspend

- Standby
- o Choose what closing the lid does
- Turn on fast startup
- Universal Serial Bus (USB) selective suspend

Video/Demo	Time
■ 12.3.1 Portable Power	4:53
12.3.3 Batteries	3:20
☐ 12.3.5 Configure Power Options	<u>3:53</u>
Total Video Time	12:06

Lab/Activity

- 12.3.6 Edit Power Options
- 12.3.7 Create a Power Plan

Fact Sheets

- □ 12.3.2 Laptop Power Facts
- □ 12.3.4 Battery Facts

Number of Exam Questions

10 questions

Total Time

About 57 minutes

12.4: Mobile Devices

Lecture Focus Questions:

- What is the difference between a laptop computer and mobile device?
- Which operating systems run on mobile devices?
- What features are commonly included in mobile devices?

Key terms for this section include the following:

Term	Definition
Accelerometer	A tool to detect the physical movements of a tablet by measuring its linear acceleration in one dimension.
Global Positioning System (GPS)	A space-based navigation system that provides location and time information in all weather conditions anywhere on or near the Earth where there is an unobstructed line of sight to four or more GPS satellites.
Gyroscope	A feature that measures the vertical and horizontal orientation of the device.
International Mobile Equipment Identity (IMEI)	A unique number given to each mobile phone. The number is typically found behind the battery.
International mobile subscriber identity (IMSI)	A unique identifier that defines a subscriber in the wireless world, including the country and mobile network to which the subscriber belongs. The IMSI is one of the pieces of information stored on a SIM card.
Software development kit (SDK)	A set of software development tools that allows the creation of applications for a certain software package, software framework, hardware platform, computer system, video game console, operating system, or similar development platform.
Android Package (APK)	The package file format used by the Android operating system for the distribution and installation of mobile apps and middleware.
Primary Rate Interface (PRI)	A telecommunications interface standard used on an Integrated Services Digital Network (ISDN) to carry multiple Digital Signal 0 (DS0) voice and data transmissions between the network and a user.
Preferred Roaming List (PRL)	A database residing in a wireless device that contains information used during the system selection and acquisition process.

Exam	Objective
TestOut PC Pro	1.6 Manage mobile devices

- Configure mobile device connectivity
- Use common mobile device features

1.3 Given a scenario, set up and configure accessories and ports of mobile devices

- Connection methods
 - Universal Serial Bus (USB)/USB-C/microUSB/miniUSB
 - Lightning
 - Serial interfaces
 - Near-field communication (NFC)

CompTIA A+ 220-1101

- o Bluetooth
- Hotspot
- Accessories
 - Touch pens
 - Headsets
 - Speakers
 - o Webcam
- Docking station
- Port replicator
- Trackpad/drawing pad

1.8 Compare and contrast common operating system types and their purposes.

CompTIA A+ 220-1102

- Cell phone/tablet operating systems
 - iPadOS
 - Android
 - o iOS

Video/Demo	Time
■ 12.4.1 Mobile Device Overview	9:08
■ 12.4.3 Mobile Device Connection Methods	5:17
■ 12.4.5 Mobile Device Accessories	<u>5:23</u>
Total Video Time	19:48

Fact Sheets

- □ 12.4.2 Mobile Device Facts
- □ 12.4.4 Mobile Connection Facts
- □ 12.4.6 Mobile Device Accessory Facts

Number of Exam Questions

10 questions

Total Time *About 45 minutes*

12.5: Mobile Device Network Connectivity

Lecture Focus Questions:

- How do you connect a mobile device to a network?
- How do you synchronize data between a mobile device and desktop PC or laptop computer?

In this section, you will learn to:

- Network mobile devices
- Synchronize mobile devices
- Configure email on mobile devices

The key terms for this section include:

The key terms for this section include.		
Term	Definition	
Bluetooth	A wireless technology standard for exchanging data over short distances from fixed and mobile devices and for building personal area networks (PANs).	
Hotspot	A physical location where you can obtain wireless internet access using a wireless local area network (WLAN) with a router connected to an internet service provider (ISP).	
Infrared port (IR)	A port on a mobile device that enables devices to exchange data without using cables.	
Lightning	A proprietary computer bus and power connector created by Apple Inc. to replace its previous proprietary 30-pin dock connector.	
Long-Term Evolution (LTE)	A mobile communications standard used by 5G.	
Mobile Virtual Private Network (Mobile VPN)	A VPN that provides mobile devices with secure access to network resources and software applications on their home network. The connection can be wireless or wired.	
Near Field Communication Connector (NFC)	A connector that emulates cryptographic smart card functionalities for RFID tags or memory cards.	
Tethering	A method that connects one device to another.	

Exam	Objective
	1.6 Manage mobile devices
TestOut PC Pro	Configure mobile device connectivity
	3.2 Implement mobile device security

- Implement access control and authentication
- Implement device encryption
- 1.4 Given a scenario, configure basic mobile-device network connectivity and application support.
 - Wireless/cellular data network (enable/disable)
 - o 2G/3G/4G/5G
 - Hotspot
 - Global System for Mobile Communications (GSM) vs. code-division multiple access (CDMA)
 - Preferred Roaming List (PRL) updates
 - Location services
 - o Global Positioning System (GPS) services
 - Cellular location services
 - Mobile device management (MDM)/mobile application management (MAM)

o Corporate email configuration

- Two-factor authentication
- Corporate application
- Mobile device synchronization
 - Recognizing data caps
 - Microsoft 365
 - ActiveSync
 - Calendar
 - Contacts
 - Commercial mail application
- 2.6 Compare and contrast common network configuration concepts.
 - Virtual private network (VPN)

1.6 Given a scenario, configure Microsoft Windows networking features on a client/desktop.

CompTIA A+ 220-1102

CompTIA A+

220-1101

Metered connections and limitations

ideo/Demo		Time
Þ	12.5.1 Wireless and Cellular Data Connections	9:44
₽	12.5.3 Networking Mobile Devices	5:11
Þ	12.5.4 MDM and Synchronization	8:43
₽	12.5.5 Synchronize Mobile Devices	5:16
₽	12.5.6 Configure MDM Solution	4:48

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☐ 12.5.8 Configure Email on Mobile Devices 2:45

Total Video Time 36:27

Lab/Activity

Fact Sheets

- □ 12.5.2 Wireless and Cellular Data Connections Facts
- □ 12.5.7 MDM and Synchronization Facts
- □ 12.5.9 Mobile Email Configuration Facts

Number of Exam Questions

11 questions

Total Time

About 75 minutes

12.6: Mobile Device Security

Lecture Focus Questions:

- What is biometric authentication?
- What is multifactor authentication?
- What is the set number of failed login attempts allowed on a mobile device?
- If you lose a mobile device, how can you find it?
- Which type of device encryption does not encrypt deleted files?

In this section, you will learn to:

- Secure mobile devices
- Configure iPad access control and authentication

Exam	Objective
	3.2 Implement mobile device security
TestOut PC Pro	 Implement access control and authentication Implement device encryption Implement device location
	1.1 Given a scenario, install and configure laptop hardware and components.
CompTIA A+ 220- 1101	 Physical privacy and security components Biometrics Near-field scanner features
	2.1 Summarize various security measures and their purposes.
	Mobile device management (MDM)
	2.7 Explain common methods for securing mobile and embedded devices.
CompTIA A+ 220- 1102	 Screen locks Facial recognition PIN codes Fingerprint Pattern Swipe Remote wipes Locator applications

- OS updates
- Device encryption
- Remote backup applications
- Failed login attempts restrictions
- Antivirus/anti-malware
- Firewalls
- · Policies and procedures
 - BYOD vs. corporate owned
 - o Profile security requirements
- Internet of Things (IoT)

Video/Demo	Time
■ 12.6.1 Mobile Device Security	7:09
☐ 12.6.3 Secure Mobile Devices	<u>5:45</u>
Total Video Time	12:54

Lab/Activity

• 12.6.4 Configure iPad Access Control and Authentication

Fact Sheets

□ 12.6.2 Mobile Device Security Facts

Number of Exam Questions

10 questions

Total Time

About 40 minutes

12.7: Laptop and Mobile Device Troubleshooting

Lecture Focus Questions:

- Which tools can you use to troubleshoot mobile devices?
- What are the common causes of touchscreen issues?
- What should you do if a mobile device's battery is swollen?
- What can cause a mobile device to perform poorly?
- What is the difference between a cell tower analyzer and a wireless network (Wi-Fi) analyzer?

In this section, you will learn to:

Maintain mobile devices

The key terms for this section include:

Term	Definition
App scanner	A troubleshooting tool that identifies issues in installed apps.
Wi-Fi analyzer	A troubleshooting tool for Wi-Fi connectivity issues that: identifies the number of broadcasting access points (APs); displays the signal strength and channel of each wireless network; and obtains wireless network information such as the network type, data activity, and service provider.
Cell tower analyzer	A troubleshooting tool for cellular network connectivity issues that: reports signal strength; interference; number of cell towers in the area; the location of each cell tower; and mobile network information such as the network type, data activity, and service provider.

Exam	Objective
	5.5 Given a scenario, troubleshoot common issues with mobile devices
	Common symptoms
	 Poor battery health
	 Swollen battery
CompTIA 220-	 Broken screen
1101	 Improper charging
	 Poor/no connectivity
	 Liquid damage
	 Overheating
	 Digitizer issues
	 Physically damaged ports
	 Malware

Cursor drift/touch calibration

Video/Demo	Time
12.7.1 Common Laptop Issues	7:57
12.7.5 Mobile Device Troubleshooting	12:07
☐ 12.7.6 Maintain Mobile Devices	<u>5:53</u>
Total Video Time	25:57

Fact Sheets

- □ 12.7.2 Laptop Maintenance Facts
- □ 12.7.3 Battery Recalibration Facts
- □ 12.7.4 Laptop Troubleshooting Facts
- 12.7.7 Mobile Device Troubleshooting Facts

Number of Exam Questions

10 questions

Total Time

About 56 minutes

13.0 Printing

13.1: Printer Overview

Lecture Focus Questions:

- What are the steps to configure a printer?
- What is the print spooler and why is it important?
- Where is the print queue?

In this section, you will learn to:

- Select and install a local printer
- Configure printer properties
- Manage print jobs
- Add a printer
- Manage printing

The key terms for this section include:

Term	Definition
Printer	The logical entity that is made up of the print device, the print driver, and the print spooler.
Printer port	The connection point for the print device to connect to a computer. Modern printers use USB connectivity and are configured as plug-and-play devices.
Print device	The physical, peripheral device connected to a computer that prints the output.
Print driver	The software that the computer uses to communicate with the print device. A print driver is specific to the printer make and model. Be sure the print driver is up to date.
Print queue	A space for print jobs that are waiting to be processed by the print device. Each printer has its own print queue.
Print spooler	An executable file that runs as a service on Windows to manage the printing process. If you turn off this service, you won't be able to print or see printers.

Exam	Objective
	1.4 Install and configure a printer
TestOut PC Pro	Select and install a printer
	4.4 Use and configure a ticketing system

Close a help ticket

3.6 Given a scenario, deploy and configure multifunction devices/printers and settings.

- Properly unboxing a device—set up location consideration
- Use appropriate drivers for a given OS
 - Printer Control Language (PCL) vs. PostScript
- Configuration settings

CompTIA A+ 220-1101

- Duplex
- Orientation
- Tray settings
- Quality
- Security
 - User authentication
 - Badging
 - Audit logs
 - Secured prints

Video/Demo	Time
■ 13.1.1 Printing Overview	4:27
☐ 13.1.3 Install a Local Printer	6:04
☐ 13.1.5 Configure Printer Properties	9:15
☐ 13.1.6 Manage Print Jobs	<u>4:55</u>
Total Video Time	

Lab/Activity

- 13.1.4 Select and Install a Printer
- 13.1.8 Add a Printer
- 13.1.9 Manage Printing

Fact Sheets

- □ 13.1.2 Printer Overview Facts
- □ 13.1.7 Printing Management Facts

Number of Exam Questions

10 questions

Total Time

About 81 minutes

13.2: Print Connectivity

Lecture Focus Questions:

- What is the difference between Bluetooth and Wi-Fi?
- How is a print server used?
- What is Server Message Block (SMB) and why is it important?
- What does an optical character recognition (OCR) scanner do?

In this section, you will learn to:

- Share a printer
- Configure a wireless network printer
- Configure network printing

The key terms for this section include:

Term	Definition
Ethernet printer	A printer that uses a network interface card in the computer to attach to an Ethernet router or hub on the network. You can use an Ethernet network for one or more computers and support many printers and systems simultaneously.
Local printer	A printer that requires a direct connection to a specific computer. A local printer can be connected by wire, wirelessly, or using Ethernet cable.
Network printer	A printer that has a network interface card that directly connects it to the network hub or switch.
Shared printer	A printer that connects directly to a computer and is configured as shared on the network.
Scan-to- folder	A feature that makes it easy to share large volume files on a network.
Wireless printer	A printer that communicates with wireless clients through radio frequency technologies such as Wi-Fi or Bluetooth. Wireless technologies help users to share print resources around an office or building without running cables.

Exam	Objective
	1.4 Install and configure a printer
TestOut PC Pro	 Select and install a printer Configure printer properties Configure network printing Manage printing

3.6 Given a scenario, deploy and configure multifunction devices/printers and settings.

- Device connectivity
 - o USB
 - Ethernet
 - Wireless
- CompTIA A+ 220-1101
- Public/shared devices
 - Printer share
 - Print server
- Network scan services
 - Email
 - o SMB
 - Cloud services

Video/Demo	
13.2.1 Printer Connectivity Methods	8:22
☐ 13.2.2 Share a Printer	4:12
13.2.3 Configure a Wireless Network Printer	3:11
□ 13.2.5 Network Scanning Methods	<u>6:57</u>
Total Video Time	

Lab/Activity

13.2.7 Configure Network Printing

Fact Sheets

- □ 13.2.4 Printer Connectivity Methods Facts
- □ 13.2.6 Network Scanning Method Facts

Number of Exam Questions

10 questions

Total Time

About 55 minutes

13.3: Printer Types and Components

Lecture Focus Questions:

- What are the steps in the laser imaging process?
- What are the parts of an ink cartridge?
- What are the two methods of thermal printing?
- What special purpose do matrix printers serve now?
- How is filament used in 3-D printing?

The key terms for this section include:

Term	Definition
Calibration	A process to improve print quality. Modern printers commonly have calibration programs to electronically perform adjustments, but changes to the settings may be done manually.
Carriage	An assembly that carries the printhead(s) back and forth with precise, controlled movement while printing.
Cartridge	A reservoir that carries ink or toner and is the main consumable component in a printer.
Duplexing assembly	An optional printer attachment that automatically turns over paper and reroutes it back through the printer for two-sided printing.
Extruder	On a 3-D printer, a simple extruder assembly includes stepper motor, nozzle and heater.
Platen roller	The platen roller moves material through the printer. It is made of rubber to grab and push the paper.
Print bed	The surface of a 3-D printer where the filament is deposited for building an object.
Printhead	The component in the printer that transfers ink to paper. Different printers may use different types of printheads. The printhead is usually mounted on the carriage assembly that moves back and forth.

Exam	Objective	
CompTIA A+ 220-1101	 3.7 Given a scenario, install and replace printer consumables. Laser Imaging drum, fuser assembly, transfer belt, transfer roller, pickup rollers, separate pads, duplexing assembly Imaging process: processing, charging, exposing, 	
	developing, transferring, fusing, and cleaning Maintenance: Replace toner, apply maintenance kit, calibrate, clean Inkjet	

- Ink cartridge, print head, roller, feeder, duplexing assembly, carriage belt
- Calibration
- Maintenance: Clean heads, replace cartridges, calibrate, clear jams
- Thermal
 - Feed assembly, heating element
 - Special thermal paper
 - Maintenance: Replace paper, clean heating element, remove debris
 - Heat sensitivity of paper
- Impact
 - Maintenance: Replace ribbon, replace print head, replace paper
- 3-D printer
 - Filament
 - Resin
 - Print bed

Video/Demo	Time
13.3.1 Laser Printers	7:46
■ 13.3.3 Inkjet Printers	6:29
13.3.5 Thermal Printers	4:58
■ 13.3.7 Impact Printers	7:04
13.3.9 3D Printers	<u>8:31</u>
Total Video Time	34:48

- □ 13.3.2 Laser Printing Facts
- □ 13.3.4 Inkjet Printer Facts
- □ 13.3.6 Thermal Printers Facts
- □ 13.3.8 Impact Printers Facts
- □ 13.3.10 3D Printer Facts

Number of Exam Questions

10 questions

Total Time

About 70 minutes

13.4: Printer Troubleshooting

Lecture Focus Questions:

- What are reasons that a printer won't print?
- How do you determine if a print driver is up to date?
- What could be the cause of a streak down a printed document?
- How do you clear a paper jam and more paper jams?

In this section, you will learn to:

Troubleshoot printing

The key terms for this section include:

Term	Definition
Paper feeder	A device that feeds paper into a printer. Single-cut sheets are fed automatically from a tray in the printer or fed by hand into a paper feeder.
Paper rollers	The cylindrical devices that tightly pinch the paper and move it through the printing process. A stepper motor advances the rollers.
Print Device	The physical, peripheral device connected to a computer. The print device is where the printed page output happens.
Print preferences	Printing preferences are settings such as orientation, page order, and paper source. You can also set preferences for options supported by a printer such as collating or stapling.
Orientation	The way the document is positioned on the paper. In portrait orientation, the long edge of the paper is vertical. In landscape orientation, the long edge of the paper is horizonal.

Exam	Objective	
	4.1 Troubleshoot hardware components	
TestOut PC Pro	Troubleshoot printer issues	
CompTIA A+ 220-1101	 5.6 Given a scenario, troubleshoot and resolve printer issues. Common symptoms Lines down the printed pages Garbled print Toner not fusing to paper 	
	Paper jamsFaded printIncorrect paper size	

- Paper not feeding
- Multipage misfeed
- Multiple prints pending in queue
- Speckling on printed pages
- Double-echo images on the print
- Incorrect chroma display
- Grinding noise
- Finishing issues
- Staple jams
- o Hole punch
- Incorrect page orientation

Video/Demo	Time
13.4.1 Printer Troubleshooting	9:50
☐ 13.4.2 Troubleshoot Printing	<u>3:46</u>
Total Video Time	13:36

□ 13.4.3 Printer Troubleshooting Facts

Number of Exam Questions

10 questions

Total Time

About 29 minutes

14.0 Security

14.1: Security Best Practices

Lecture Focus Questions:

- What Windows feature should be used to encrypt a volume?
- What is the minimum number of characters a password should have?
- Which Windows default accounts should be disabled?
- What is the concept of giving users only the resources needed to do their job called?

The key terms for this section include:

Term	Definition
Encryption	The process of converting cleartext, or unencrypted, data into an unreadable format by using a special key and mathematical algorithm.
Data at rest	Any data that is not currently being accessed.
Authentication	The process of proving a user's identity.
Principle of least privilege	The practice of giving users only the resources needed to perform their job.

Exam	Objective
	2.6 Given a scenario, configure a workstation to meet best practices for security.
	Data-at-rest encryptionPassword best practices
CompTIA A+ 220-1102	 Complexity requirements Length Character types Expiration requirements Basic input/output system (BIOS)/Unified Extensible Firmware Interface (UEFI) passwords End-user best practices Use screensaver locks Log off when not in use Secure/protect critical hardware (e.g., laptops) Secure personally identifiable information (PII) and passwords Account management Restrict user permissions

- Restrict login times
- Disable guest account
- Use failed attempts lockout
- Use timeout/screen lock
- Change default administrator's user account/password
- Disable AutoRun

Video/Demo	Time
14.1.1 Best Practices for Securing Workstations	7:23
■ 14.1.3 Best Practices for Account Management	<u>4:46</u>
Total Video Time	12:09

- □ 14.1.2 Workstation Security Facts
- □ 14.1.4 Security Policy Facts

Number of Exam Questions

10 questions

Total Time

About 33 minutes

14.2: Incident Response and Regulated Data

Lecture Focus Questions:

- Why is the chain of custody so important?
- What are the three methods of incident detection?
- What is the role of the first responder?
- Which law regulates how healthcare information is secured?
- Which law regulates how payment card information is secured?

The key terms for this section include:

Term	Definition
Passive detection	Detection of a security incident discovered when not actively looking for it.
Active detection	Detection of a security incident when actively looking for security incidents.
Proactive detection	Detection of a security incident when the organization is actively looking for security flaws in its systems.
Chain of custody	The documentation and procedures used to detail the handling of any evidence.
First responder	The person or team that should be immediately notified when a security incident is discovered.
Hot-wash meeting	Meeting to review a security incident and the remediation steps.
Payment Card Industry Data Security Standards (PCI DSS)	Technical and operational requirements for any organization that handles cardholder information for debit cards, credit cards, prepaid cards, any other type of payment cards.
Sarbanes-Oxley Act (SOX)	A law that regulates how publicly traded companies handle and maintain financial records
Gramm-Leach-Bliley Act (GLBA)	A law that requires financial institutions to safeguard a customer's information and detail the practices for sharing consumer information.
Family Educational Rights and Privacy Act (FERPA)	A law that provides educational institutes with the procedures to secure student records.
California Consumer Privacy Act (CCPA)	A law that allows California citizens to have control over the personal information that businesses collect on them.
General Data Protection Regulation (GDPR)	A law that applies to citizens in the European Union and provides many of the same rights as the CCPA.
Health Insurance Portability and Accounting Act (HIPAA)	A law defining how healthcare data must be secured.

This section helps you prepare for the following certification exam objectives:

Exam	Objective
	4.6 Explain the importance of prohibited content/activity and privacy, licensing, and policy concepts.
CompTIA A+ 220-1102	 Incident Response Chain of custody Inform management/law enforcement as necessary Copy of drive (data integrity and preservation) Documentation of incident Regulated Data Credit card transactions Personal government-issued information PII Healthcare data Data retention requirements

Video/Demo	Time
14.2.1 Incident Response	7:43
14.2.3 Regulated Data	<u>4:39</u>
Total Video Time	12:22

Fact Sheets

- □ 14.2.2 Incident Response Facts
- □ 14.2.4 Regulated Data Facts

Number of Exam Questions

10 questions

Total Time

About 33 minutes

14.3: Physical Security

Lecture Focus Questions:

- What should be the first line of security around the perimeter of the property?
- What type of door lock uses the physical traits of a person to provide access?
- What security measure should be implemented to prevent piggybacking?

In this section, you will learn to:

Use a Biometric Scanner

The key terms for this section include:

Term	Definition
Bollard	Metal pole installed in the ground to prevent vehicle access. Can be installed near the front of a building to prevent a vehicle from getting too close.
Piggybacking / tailgating	The process of someone attempting to enter a building by following closely behind an authorized person or sneaking in with a group of authorized people.
Access control vestibule (ACV)	A specialized entrance with two doors that creates a security buffer zone between two areas.
Magnetometer	A metal detector that users walk through to detect weapons or unauthorized equipment.
Biometrics	a person's physical traits (such as fingerprints or retinal scans) used to verify a person's identity.

	old distribution of the following continuation exam expeditions:
Exam	Objective
	2.1 Summarize various security measures and their purposes.Physical Security
	 Access control vestibule
OTIA A - 000	Badge reader
CompTIA A+ 220-	 Video surveillance
1102	 Alarm systems
	 Motion sensors
	o Door locks
	 Equipment locks
	o Guards
	Bollards
	Fences
	Physical security for staff

- Key fobs
- Smart cards
- Keys
- Biometrics
 - Retina scanner
 - Fingerprint scanner
 - Palmprint scanner
- Lighting
- Magnetometers

Video/Demo	Time
■ 14.3.1 Building Physical Access Measures	4:47
☐ 14.3.3 Use a Biometric Scanner	<u>2:14</u>
Total Video Time	7:01

□ 14.3.2 Building Physical Access Measure Facts

Number of Exam Questions

10 questions

Total Time

About 23 minutes

14.4: Logical Security Measures

Lecture Focus Questions:

- What does Windows use to manage and enforce the resources a user is authorized to access?
- What are the three categories authentication methods?
- What features does mobile device management software usually offer?
- What Windows applet is used to manage certificates?

In this section, you will learn to:

- Configure a screensaver password
- Require a screensaver password
- Elevate privileges on Linux
- Configure password policies on Windows
- Enforce password settings
- Manage Linux passwords
- Manage authentication on Windows
- Use Windows Certificate Manager

The key terms for this section include:

The key terms for this section include.		
Term	Definition	
Authentication	The process in which users provide credentials to prove their identity.	
Authorization	The process that defines the resources a user can access once authenticated.	
Principle of least privilege	The practice of giving users access to only the resources needed to perform their job.	
Access control list (ACL)	A mechanism used to manage and enforce user access to resources.	
Multi-factor authentication	A method of authenticating a user that consists of at least two authentication categories.	
Soft token	A digital key used to authenticate a user.	
Hard token	A hardware authentication device that the user must have possession of to authenticate.	
Mobile device management (MDM)	A software tool that implements the policies and procedures used by an organization to maintain security and permissions on mobile devices.	
Bring Your Own Device (BYOD)	Policy that allows employees to use their own computers and mobile devices for work purposes.	
Digital certificate	A file or electronic password to identify a user, computer, or an organization.	

This section helps you prepare for the following certification exam objectives:

Exam	Objective
	3.3 Implement security best practices
TestOut PC Pro	 Enforce password settings Require a screen saver password Manage Linux passwords
	1.3 Given a scenario, use features and tools of the Microsoft Windows 10 operating system (OS).
	 Microsoft Management Console (MMC) snap-in Certificate Manager (certmgr.msc)
	2.1 Summarize various security measures and their purposes.
	Logical security
CompTIA A+	 Principle of least privilege
220-1102	Access control lists (ACLs) Adultification (MEA)
	Multifactor authentication (MFA)Email
	∘ Email ∘ Hard token
	Soft token
	Short message service (SMS)
	Voice call
	 Authenticator application
	Mobile device management (MDM)

Video/Demo I	
14.4.1 Logical Security Measures	7:27
14.4.3 Configure a Screen Saver Password	2:00
☐ 14.4.5 Elevate Privileges on Linux	6:12
14.4.6 Configure Password Policies on Windows	7:28
14.4.9 Manage Authentication on Windows	7:06
14.4.10 Use Windows Certificate Manager	<u>2:32</u>
Total Video Time 32:4	

Lab/Activity

- 14.4.4 Require a Screen Saver Password
- 14.4.7 Enforce Password Settings
- 14.4.8 Manage Linux Passwords

Fact Sheets

□ 14.4.2 Logical Security Measures Facts

Number of Exam Questions 10 questions

Total Time *About 84 minutes*

14.5: Social Engineering Attacks

Lecture Focus Questions:

- Which threat exploits a vulnerability that has not yet been discovered by the developer?
- · What is the best defense against social engineering attacks?
- Which web server attacks can target improperly configured input fields?
- What is the best defense against password cracking attacks?

The key terms for this section include:

The key terms for th	is section include.
Term	Definition
Social engineering	The practice of exploiting people to gain access to unauthorized areas and systems.
Phishing	An attack that uses a malicious email crafted to look legitimate. The intent is to have a user click a link to a malicious website or download a malicious file.
Spear phishing	A phishing attack that is designed to target a specific person.
Whaling	A spear phishing attack that is designed to target a high-level employee, such as a CEO.
Vishing	A social engineering attack in which the hacker attempts to get sensitive information from a user over the phone.
Shoulder surfing	A social engineering attack in which the hacker gathers sensitive information by looking over a target's shoulder while the target is working on a computer.
Tailgating	A social engineering attack that allows the hacker to bypass access control systems by closely following a legitimate user into a building.
Impersonation	A social engineering attack in which the hacker attempts to gain access to the building by pretending to be a legitimate or authorized person.
Dumpster diving	A social engineering attack in which the hacker goes through the trash to find sensitive information.
Evil twin	A rogue access point that is configured to mimic a legitimate wireless network.
Denial of service (DoS)	An attack that is designed to overload the target with more data than it can handle, causing it to shut down. A distributed denial of service (DDoS) attack uses multiple computers to carry out the attack.
SQL injection	An attack designed to target databases.
Cross-site scripting (XSS)	An attack designed to target improperly configured input fields on a website.

On-path attack	An attack in which the attacker intercepts a communication. The attacker may obtain data from and/or manipulate the data before sending it to the intended recipient.
Brute force attack	A password cracking attack in which the attacker attempts to guess passwords by using a cracking tool that submits every possible letter, number, and symbol combination.
Dictionary attack	A password cracking attack in which the attacker uses a list of words and phrases to guess the decryption key.
MAC spoofing	A network attack in which the MAC address of the hacker's computer is changed to match the network's gateway and overwrite the switch's CAM table to intercept all communications.
Zero-day attack	Any attack that exploits a vulnerability that the developer is not aware of yet.
Operating system end of life	An operating system that is no longer supported by the vendor.
Bring Your Own Device (BYOD)	A policy that allows users to use their own personal devices for work purposes.
T1 1	and the control of th

Device (DTOD)	work purposes.	
This section helps you prepare for the following certification exam objectives:		
Exam	Objective	
	2.4 Explain common social-engineering attacks, threats, and vulnerabilities. • Social engineering	
	SpoofingOn-path attackBrute-force attack	
	 Βrute-force attack Dictionary attack 	
	 Insider threat 	
	 Structured Query Language (SQL) injection 	
	Cross-site scripting (XSS)Vulnerabilities	
	Non-compliant systems	

- Unpatched systems
- Unprotected systems (missing antivirus/missing firewall)
- o EOL OSs
- Bring your own device (BYOD)

Video/Demo	Time
14.5.1 Social Engineering	5:03
■ 14.5.3 Threats	8:28
■ 14.5.5 Vulnerabilities	<u>5:50</u>
Total Video Time	19:21

- □ 14.5.2 Social Engineering Facts
- □ 14.5.4 Threat Facts
- □ 14.5.6 Vulnerability Facts

Number of Exam Questions

10 questions

Total Time

About 45 minutes

14.6: Data Destruction and Disposal

Lecture Focus Questions:

- Which formatting method can you perform using the operating system tools?
- Which document should you obtain after destroying a hard drive?
- Which drive destruction methods can be performed only on mechanical hard drives?

In this section, you will learn to:

- Wipe a disk
- · Configure remote wipe

The key terms for this section include:

Term	Definition
High-level format	Formatting method that removes the pointers to the data on the drive, but not the data on the drive. The high-level format is the standard format that's done through the operating system tools.
Low-level format	Formatting method that writes new sectors and tracks to the drive and is typically done by the manufacturer when the drive is first assembled.
Degaussing	Hard drive destruction method that purges the entire hard disk all at once by exposing it to an extremely strong magnetic pulse.
Certificate of destruction (COD)	Document that details the method and date of a hard drive's destruction along with the chain of custody.

Exam	Objective
	3.2 Implement mobile device security
TestOut PC Pro	Implement remote wipe capabilities
	2.8 Given a scenario, use common data destruction and disposal methods.
CompTIA A+ 220- 1102	 Physical destruction Drilling Shredding Degaussing Incinerating Recycling or repurposing best practices Erasing/wiping Low-level formatting

- Standard formatting
- · Outsourcing concepts
 - Third-party vendor
 - Certification of destruction/recycling

Video/Demo	Time
14.6.1 Data Disposal and Destruction	4:42
☐ 14.6.2 Wipe a Disk	<u>7:19</u>
Total Video Time	12:01

Lab/Activity

• 14.6.4 Configure Remote Wipe

Fact Sheets

□ 14.6.3 Data Disposal and Destruction Facts

Number of Exam Questions

10 questions

Total Time

About 40 minutes

14.7: Malware Protection

Lecture Focus Questions:

- What is malware and how do I keep from getting it?
- Why is a rootkit so dangerous to a PC?
- What is the difference between a virus and a Trojan horse?
- How can Windows Defender help me with malware?
- What are some ways you can remove malware from a system?

In this section, you will learn to:

- Implement malware protection on Windows
- Configure Windows Defender
- Implement malware protection on Linux
- Implement malware protection on MacOS

The key terms for this section include:

The key terms for this section include:	
Term	Definition
Virus	Self-replicating malware that attaches in a legitimate program and hides there. When the program runs, the virus payload is also executed.
Boot-sector virus	A virus that injects itself in the boot sector and moves the Master Boot Record to another location on the hard drive. The virus then always executes before the MBR.
Trojan horse	Malware that provides a hacker covert remote access to the victim's system.
Keylogger	Malware that logs every keystroke the user makes and then sends the report back to the hacker.
Spyware	Malware that monitors and logs a user's activity on the device. This includes web browsing, applications, instant messaging, etc.
Ransomware	Malware that scans the system for user files and encrypts them. To regain access to files, the victim must pay a ransom.
Cryptominer	Malware that uses the victim computer's resources to mine for cryptocurrency on behalf of the hacker.
Rootkit	Malware that consists of programs that can give the hacker root (administrator) access to the target machine.
Malware definitions	A unique fingerprint for each discovered malware. Antimalware programs keep a database of definitions to detect and remove malware.
Sheep-dip computer	A special computer that is setup for malware analysis and remediation.

Windows Pre-Installation Environment (WinPE)

A lightweight version of Windows that boots from the USB drive and is typically used to help deploy Windows in an enterprise environment or for troubleshooting Windows issues.

Remediate infected systems

Disable System Restore (in Windows Home)

- Update anti-malware software
- Scanning and removal techniques (e.g., safe mode, preinstallation environment)
- Schedule scans and run updates
- Enable System Restore and create a restore point (in Windows Home)
- Educate the end user

Video/Demo	
14.7.1 Malware	6:12
14.7.3 Implement Malware Protection on Windows	6:31
14.7.5 Implement Malware Protection on Linux	7:11
☐ 14.7.6 Implement Malware Protection on macOS	7:10
14.7.7 Malware Removal Best Practice	<u>4:48</u>
Total Video Time	31:52

Lab/Activity

14.7.4 Configure Microsoft Defender Antivirus

Fact Sheets

- 14.7.2 Malware Facts
- □ 14.7.8 Malware Removal Best Practice Facts.

Number of Exam Questions

10 questions

Total Time

About 64 minutes

14.8: Firewalls

Lecture Focus Questions:

- What are the types of firewalls?
- What is the main function of a firewall?
- What are the most common firewall types based on methods of operations?

In this section, you will learn to:

Configure firewall settings

The key terms for this section include:

Term	Definition
Firewall	A device or software that inspects network traffic based on a set of rules.
Network appliances	Devices that exist on a network to provide certain services for that network.
Intrusion detection system (IDS)	A feature that detects intrusion attempts and alerts the system administrator.
Intrusion prevention system (IPS)	A feature that detects intrusions and takes actions to prevent it, including reporting, blocking, or dropping traffic when intrusions occur.

This section helps you prepare for the following certification exam objectives:

Exam	Objective
	3.3 Implement security best practices
TestOut PC Pro	Configure a firewall
	2.2 Compare and contrast common networking hardware.
	Firewall
CompTIA A+ 220-1101	2.4 Summarize services provided by networked hosts.
220-1101	 Internet appliances Unified threat management (UTM) User education regarding common threats
CompTIA A+	1.4 Given a scenario, use the appropriate Microsoft Windows 10 Control Panel utility.
220-1102	Windows Defender Firewall

1.6 Given a scenario, configure Microsoft Windows networking features on a client/desktop.

- Local OS firewall settings
 - Application restrictions and exceptions
 - Configuration
- 2.3 Given a scenario, detect, remove, and prevent malware using the appropriate tools and methods.
 - Tools and methods
 - Software firewalls
- 2.5 Given a scenario, manage and configure basic security settings in the Microsoft Windows OS.
 - Firewall
 - Activate/deactivate
 - Port security
 - Application Security

Video/Demo	
14.8.1 Firewalls	4:48
☐ 14.8.2 Configure Windows Firewall	4:07
14.8.5 Network Appliances	<u>2:25</u>
Total Video Time	

Lab/Activity

• 14.8.4 Configure Microsoft Defender Firewall

Fact Sheets

- □ 14.8.3 Firewall Facts
- □ 14.8.6 Network Appliance Facts

Number of Exam Questions

10 questions

Total Time

About 44 minutes

14.9: Proxy Servers

Lecture Focus Questions:

- What is the function of a proxy server? What are the ways it can be used to manage network traffic?
- What is the difference between a forward and a reverse proxy?
- · Where are the proxy settings on Windows?

In this section, you will learn to:

• Use and configure a proxy server

The key terms for this section include:

Term	Definition
Proxy server	A certain type of device or software that allows or denies network traffic to move across a network based on traffic content. It is often used to shape traffic and act as a firewall.

This section helps you prepare for the following certification exam objectives:

Exam	Objective
	3.3 Implement security best practices
TestOut PC Pro	Use a Proxy Server
	2.4 Summarize services provided by networked hosts.
CompTIA A+ 220- 1101	 Internet appliances Proxy servers
CompTIA A+ 220- 1102	1.6 Given a scenario, configure Microsoft Windows networking features on a client/desktop
	Proxy settings

Video/Demo	
14.9.1 Proxy Settings	4:26
☐ 14.9.2 Configure Proxy Settings	<u>3:41</u>
Total Video Time	8:07

Lab/Activity

• 14.9.4 Use a Proxy Server

Fact Sheets

□ 14.9.3 Proxy Server Facts

Number of Exam Questions

10 questions

Total Time

About 36 minutes

14.10: Install, Configure, and Secure Browsers

Lecture Focus Questions:

- What is the difference between trusted and untrusted sites?
- What are the advantages of using a password manager?
- What is the result of an invalid certificate?
- What are the advantages and disadvantages of using browser data synchronization?
- Which browser setting can cause web pages to run slower?
- Which browser settings needs to be protected and could be used to obtain data about the user?

In this section, you will learn to:

• Configure browser settings

The key terms for this section include:

Term	Definition
Hashing	A form of security that applies an algorithm to a string of characters. Hashing is used in network communication to authenticate the origin of the message and validate the integrity of data.
Extensions and plug-ins	Small applications you can install on a browser.
Trusted and untrusted sources	Sites on the internet that are or are not certified by a certificate authority (CA).
Password manager	Software you can use to save and create passwords.
Invalid certificates	Certificates that aren't be validated by a certificate authority.
Pop-up blockers	Software you can add to a browser that blocks incoming pop ups through operating system and browser settings.
Ad blockers	Software you can add to the browser to block incoming advertisements on visited websites.
Browser data	Information stored in the browser settings. The browser collects the data for the convenience and functionality with other web pages.
Browser cache	Stored information from previous web pages, such as logos, pictures, and backgrounds. This generally makes searching the internet faster.
In private browsing	A function of a web browser that limits the amount of browser data it can collect during web searches.

Browser data synchronization

A function that allows users to use the same browser settings on multiple devices. The user can update edits or changes to the browser in real time on multiple devices.

This section helps you prepare for the following certification exam objectives:

Exam	Objective
	2.10 Given a scenario, install and configure browsers and relevant security settings.
	Browser download/installation
	 Trusted sources Hashing Untrusted sources Extension and plug-ins
CompTIA A+ 220- 1102	 Trusted sources Untrusted sources Password managers Secure connections/sites-valid certificates Settings
	 Pop-up blocker Clearing browser data Clearing Cache Private browsing mode Sign-in/browser data synchronization Ad blockers

Video/Demo	Time
14.10.1 Browsers	7:05
14.10.3 Install Browser and Extensions	5:21
14.10.4 Browser Settings	3:54
14.10.5 Configure Browser Settings	<u>5:18</u>
Total Video Time	21:38

Fact Sheets

- 14.10.2 Browser Facts
- □ 14.10.6 Browser Setting Facts

Number of Exam Questions

10 questions

Total Time

About 42 minutes

14.11: Security Troubleshooting

Lecture Focus Questions:

- How can you prevent unwanted notifications?
- Where do you look for and remove unwanted notifications?
- What can certificate warnings mean for the user on the internet?
- How can redirection be dangerous for the user?
- What can be an issue if a user finds that a group policy has changed even though the administrator has not made any adjustments?

The key terms for this section include:

Symptoms	Definition
No internet	A symptom that a PC might have a virus or greyware running in the background and taking most of the bandwidth. The virus can infect the browser or an application that communicates with the internet.
Desktop alerts	Digital messages such as pop-up notifications that allow the user to respond quickly to high priority messages.
False alerts	Fake notifications usually pertaining to the OS, browser, and application settings. These alerts typically direct the user to take actions that compromise security.
Altered system or files	A symptom of a breach. Altered files or OS settings can mean that the user's system has been accessed for data theft and altered.
Unwanted notifications	Alerts configured by an app that is of no value to the user. Unwanted notifications typically display a direct link to a site.
Random/frequent pop-ups	Messages that display on web pages to get the user to click embedded links. Typically, they redirect the user to malicious websites.
Certificate warnings	A notification that the site the user is trying to access doesn't have a valid certificate. It may indicate that the site is malicious.
Redirection	An action that takes a user to a different site than the user intended to go.

This section helps you prepare for the following certification exam objectives:

Exam	Objective
	4.2 Troubleshoot software components
TestOut PC Pro	Troubleshoot common issuesApply common solutions
CompTIA A+ 220- 1102	3.2 Given a scenario, troubleshoot common personal computer (PC) security issues.

- Common symptoms
 - o Unable to access the network
 - Desktop alerts
 - False alerts regarding antivirus protection
 - Altered system or personal files
 - Unwanted notifications within the OS
 - OS update failures
- Browser-related symptoms
 - o Random/frequent pop-ups
 - Certificate warnings
 - Redirection

3.5 Given a scenario, troubleshoot common mobile OS and application security issues.

- Security concerns
 - Android (APK) source
 - Developer mode
 - Root access/jailbreak
 - Bootleg/malicious application
- Common symptoms
 - Sluggish response time
 - Data-usage limit notification
 - Limited Internet connectivity
 - No Internet connectivity
 - Fake security warnings

Video/Demo	Time
14.11.1 Troubleshoot PC Security Issues	6:35
14.11.3 Troubleshoot Mobile OS Security Issues	<u>3:20</u>
Total Video Time	9:55

Fact Sheets

- □ 14.11.2 Troubleshoot PC Security Facts
- □ 14.11.4 Troubleshoot Mobile OS Security Facts

Number of Exam Questions

10 questions

Total Time

About 30 minutes

15.0: Capstone Exercises

Summary

Lab/Activity

- 15.1 Build a Computer From Scratch
- 15.2 Troubleshoot a Malfunctioning Computer
- 15.3 Troubleshoot System Startup
- 15.4 Create a Home Office Network
- 15.5 Configure the Windows Operating System
- 15.6 Troubleshoot a Mobile Device
- 15.7 Configure Linux
- 15.8 Lab Sandbox

Total Time

About 96 minutes

Practice Exams

A.0: TestOut PC Pro - Practice Exams

TestOut PC Pro Certification Practice Exam (19 questions)

B.0: CompTIA A+ Core 1 (220-1101) - Practice Exams

CompTIA A+ Core 1 (220-1101) Certification Practice Exam (90 questions)

C.0: CompTIA A+ Core 2 (220-1102) - Practice Exams

CompTIA A+ Core 2 (220-1102) Certification Practice Exam (90 questions)

Appendix A: Approximate Time for the Course

The total time for the LabSim for TestOut PC Pro course is approximately **86 hours and 35 minutes**. Time is calculated by adding the approximate time for each section which is calculated using the following elements:

- Video/demo times
- Text Lessons (5 minutes assigned per text lesson)
- Simulations (12 minutes assigned per simulation)
- Questions (1 minute per question)

Additionally, there are approximately another **56 hours and 35 minutes** of Practice Test material at the end of the course.

The breakdown for this course is as follows:

Module Sections 1.0: Course Introduction		Time	Videos	Labs	Text	Exams
1.1: Course Introduction		104	48	36	10	10
	Total	1:44	0:48	0:36	0:10	0:10
2.0: PC Technician Responsibilities						
2.1: Protection and Safety		35	15	0	10	10
2.2: Environmental Controls		58	26	12	10	10
2.3: Professionalism		20	5	0	5	10
2.4: Change Management		20	5	0	5	10
2.5: PC Maintenance		19	4	0	5	10
2.6: PC and Networking Tools		21	6	0	5	10
2.7: Troubleshooting Process Overview		20	5	0	5	10
2.8: Support Systems		71	27	24	10	10
2.9: Documentation		30	10	0	10	10
•	Total	4:54	1:43	0:36	1:05	1:30
3.0: Hardware						
3.1: Network Media		44	14	0	20	10
3.2: Cables and Connectors		80	37	12	20	11
3.3: Cases and Motherboards		55	18	12	15	10
3.4: Motherboard Troubleshooting		48	9	24	5	10
3.5: Memory		31	11	0	10	10
3.6: Memory Installation		72	28	24	10	10
3.7: Memory Troubleshooting		51	12	24	5	10
3.8: BIOS/UEFI		92	48	24	10	10
3.9: Processors		62	18	12	20	12
3.10: Processor Troubleshooting		46	7	24	5	10
3.11: Video and Expansion Cards		76	27	24	15	10
3.12: Audio		58	21	12	15	10
3.13: Cooling		23	8	0	5	10

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2 14. Dawar Cumpling		45	10	12		10
3.14: Power Supplies	Total	45	18 4:36	12 3:24	5 2:40	10 2:23
4.0: Operating Systems Basics	TOLAI	15:05	4:30	5:24	2:40	2:23
4.1: Operating System		21	6	0	5	10
4.2: Windows Basics		74	39	0	25	10
4.3: Linux Basics		26	11	0	5	10
4.4: macOS Basics		45	29	0	5	11
T.T. Mucos busies	Total	2:46	1:25	0:00	0:40	0:41
5.0: Storage	- Otal			0.00		V. 12
5.1: Storage Devices		24	9	0	5	10
5.2: SATA		40	13	12	5	10
5.3: Optical Media		30	15	0	5	10
5.4: RAID		60	16	24	10	10
5.5: File Systems		110	56	24	20	10
5.6: Storage Management		46	19	12	5	10
5.7: Storage Spaces		47	20	12	5	10
5.8: Disk Optimization		61	34	12	5	10
5.9: Storage and RAID Troubleshooting		45	13	12	10	10
	Total	7:43	3:15	1:48	1:10	1:30
6.0: System Implementation						
6.1: Windows Pre-Installation		22	7	0	5	10
6.2: Windows Installation		82	38	24	10	10
6.3: Cloud Computing		28	13	0	5	10
6.4: Virtualization		63	19	24	10	10
	Total	3:15	1:17	0:48	0:30	0:40
7.0: System Management 1	Total					
7.0: System Management 1 7.1: Windows System Tools	Total					
7.1: Windows System Tools	Total	3:15	1:17	0:48	0:30	0:40
7.1: Windows System Tools 7.2: Windows Settings	Total	3:15 103	1:17 56	0:48 12	0:30 25	0:40 10
7.1: Windows System Tools	Total	3:15 103 27	1:17 56 12	0:48 12 0	0:30 25 5	10 10
7.1: Windows System Tools7.2: Windows Settings7.3: Performance Monitoring7.4: Windows Application Management	Total	3:15 103 27 29	1:17 56 12 14	0:48 12 0 0	0:30 25 5 5	10 10 10
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7.1: Windows System Tools 7.2: Windows Settings 7.3: Performance Monitoring 7.4: Windows Application Management 7.5: Linux Application Management 7.6: Digital Content Management 7.7: Virtual Memory 7.8: Windows and Application Troubleshooting 7.9: Scripting Basics 8.0: System Management 2 8.1: Active Directory 8.2: Users and Groups		3:15 103 27 29 75 40 27 37 48 30 6:56	1:17 56 12 14 26 13 12 10 28 15 3:06	0:48 12 0 0 24 12 0 12 0 12 0 48 12	0:30 25 5 5 15 5 5 10 5 1:20	10 10 10 10 10 10 10 10 10 10 10 10 10 1
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7.1: Windows System Tools 7.2: Windows Settings 7.3: Performance Monitoring 7.4: Windows Application Management 7.5: Linux Application Management 7.6: Digital Content Management 7.7: Virtual Memory 7.8: Windows and Application Troubleshooting 7.9: Scripting Basics 8.0: System Management 2 8.1: Active Directory 8.2: Users and Groups 8.3: Remote Services 8.4: VPN 8.5: Updates		3:15 103 27 29 75 40 27 37 48 30 6:56 103 70 62 40 39	1:17 56 12 14 26 13 12 10 28 15 3:06 35 28 20 13 12	0:48 12 0 0 24 12 0 12 0 1:00 48 12 12 12 12	0:30 25 5 5 15 5 10 5 1:20 10 20 20 5 5	10 10 10 10 10 10 10 10 10 10 10 10 10 1
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7.1: Windows System Tools 7.2: Windows Settings 7.3: Performance Monitoring 7.4: Windows Application Management 7.5: Linux Application Management 7.6: Digital Content Management 7.7: Virtual Memory 7.8: Windows and Application Troubleshooting 7.9: Scripting Basics 8.0: System Management 2 8.1: Active Directory 8.2: Users and Groups 8.3: Remote Services 8.4: VPN 8.5: Updates 8.6: System Backup 8.7: System Recovery		3:15 103 27 29 75 40 27 37 48 30 6:56 103 70 62 40 39 75 58	1:17 56 12 14 26 13 12 10 28 15 3:06 35 28 20 13 12 24 19	0:48 12 0 0 24 12 0 12 0 12 0 1:00 48 12 12 12 12 12 12 36 24	25 5 5 15 5 5 10 5 1:20 10 20 20 5 5 5	10 10 10 10 10 10 10 10 10 10 10 10 10 1

9.1: Manage Files on Windows		77	33	24	10	10
9.2: NTFS and Share Permissions		77	38	24	5	10
9.3: File Encryption		60	28	12	10	10
9.4: Linux File Management		102	46	36	10	10
	Total	5:16	2:25	1:36	0:35	0:40
10.0: Peripheral Devices						
10.1: Peripheral Devices		19	4	0	5	10
10.2: Display Devices		48	21	12	5	10
10.3: Display, Video, and Projector Troubleshoo	ting	33	13	0	10	10
10.4: Device Driver Management		57	25	12	10	10
10.5: Device Driver Troubleshooting		51	12	24	5	10
	Total	3:28	1:15	0:48	0:35	0:50
11.0: Networking						
11.1: Networking Overview		31	16	0	5	10
11.2: Networking Ports and Protocols		34	14	0	10	10
11.3: Client-Side Network Configuration		75	31	24	10	10
11.4: Services Provided by Network Devices		110	68	12	20	10
11.5: Wireless Networking		123	45	48	20	10
11.6: SOHO Configuration		60	28	12	10	10
11.7: Networking Hardware		87	31	36	10	10
11.8: Command Line Network Utilities		102	39	48	5	10
11.9: Network Troubleshooting		55	16	24	5	10
	Total	11:17	4:48	3:24	1:35	1:30
12.0: Mobile Devices						
12.1: Laptops		58	33	0	15	10
12.2: Mobile Device Displays and Components		29	14	0	5	10
12.3: Laptop Power Management		57	13	24	10	10
12.4: Mobile Devices		45	20	0	15	10
12.5: Mobile Device Network Connectivity		75	37	12	15	11
12.6: Mobile Device Security		40	13	12	5	10
12.7: Laptop and Mobile Device Troubleshooting	g	56	26	0	20	10
	Total	6:00	2:36	0:48	1:25	1:11
13.0: Printing						
13.1: Printer Overview		81	25	36	10	10
13.2: Print Connectivity		55	23	12	10	10
13.3: Printer Types and Components		70	35	0	25	10
13.4: Printer Troubleshooting		29	14	0	5	10
	Total	3:55	1:37	0:48	0:50	0:40
14.0: Security						
14.1: Security Best Practices		33	13	0	10	10
14.2: Incident Response and Regulated Data		33	13	0	10	10
14.3: Physical Security		23	8	0	5	10
14.4: Logical Security Measures		84	33	36	5	10
14.5: Social Engineering Attacks		45	20	0	15	10
14.6: Data Destruction and Disposal		40	13	12	5	10
I not bata besti detion and bisposal		70	13	12	,	10
14.7: Malware Protection		64	32	12	10	10
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14.9: Proxy Servers		36	9	12	5	10
14.10: Install, Configure, and Secure Browsers		42	22	0	10	10
14.11: Security Troubleshooting		30	10	0	10	10
To	tal	7:54	3:05	1:24	1:35	1:50
Total Course Time 87:27	(hh	:mm)				
Practice Exams						
A.0: TestOut PC Pro - Practice Exams		Numbe	r of Que	stions	Time (hh:mm)
A.2: TestOut PC Pro Exam Domain Review		99			19:48	
A.3: TestOut PC Pro Certification Practice Exam		19			3:48	
To	otal	118			23:36	
B.0: CompTIA A+ Core 1 (220-1101) - Practice Exams		Numbe	r of Que	stions	Time (hh:mm)
B.2: CompTIA A+ Core 1 (220-1101) Domain Review		100			1:40	
B.3: CompTIA A+ Core 1 (220-1101) Practice Exam Questions		787			13:07	
B.4: CompTIA A+ Core 1 (220-1101) Certification Practice Exa	m	90			1:30	
To	tal	977			16:17	
C.0: CompTIA A+ Core 2 (220-1102) - Practice Exams		Numbe	r of Que	stions	Time (hh:mm)
C.2: CompTIA A+ Core 2 (220-1102) Domain Review		80			1:20	
C.3: CompTIA A+ Core 2 (220-1102) Practice Exam Questions		792			13:12	
C.4: CompTIA A+ Core 2 (220-1102) Certification Practice Exa	m	90			1:30	
To	otal	962			16:02	
Total Practice Exam Time 55	:55	(hh:mm)			