TestOut

TestOut PC Pro – English 6.0.x

Objective Mappings:

TestOut PC Pro 2018
CompTIA A+ 220-1001

CompTIA A+ 220-1002

Powered by LABSIM

Contents

This document contains six objective mappings. Click on a mapping to view its contents.

Objective Mapping: LabSim Section to TestOut PC Pro 6.0 Objectives

The TestOut PC Pro course covers the following PC Pro 6.0 exam objectives:

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1.4	Linux Basics	
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2.3	Change Management	
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5.7	Storage Management	1.3 Given a scenario, install and configure storage Configure and manage storage
5.8	Storage Spaces	1.3 Given a scenario, install and configure storage Configure and manage storage
5.9	Disk Optimization	1.3 Given a scenario, install and configure storage Perform disk maintenance
5.10	Storage Troubleshooting	4.1 Given a scenario, troubleshoot hardware components Troubleshoot storage devices
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6.9	Network Utilities	2.4 Given a scenario, configure PC networking
		
		    Use network utilities
		
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		    Use networking utilities to view, test, and troubleshoot network configuration, communication, and connectivity issues

6.10	Network Troubleshooting	4.3 Given a scenario, troubleshoot networking Troubleshoot a network connection
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		Manage printing
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		Configure printer properties
		Configure network printing
8.4	Printing Management	1.4 Given a scenario, install and configure a printer
		Configure printer properties
		Manage printing

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9.6	Mobile Device Networking	1.6 Given a scenario, manage mobile devices Configure mobile device connectivity Use common mobile device features 2.2 Given a scenario, use operating system features and utilities Use core macOS and iOS features
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		Troubleshoot mobile devices
10.0	**System Implementation**	
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		Configure Windows workgroup and domain settings
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		Install, update, and configure Windows
		2.2 Given a scenario, use operating system features and utilities
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		Manage files and folders
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		Configure file access permissions
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		Share and secure files and folders
		2.4 Given a scenario, configure PC networking
		Configure network drive mappings
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		Manage files and folders Configure file access permissions
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		Use Windows features and command line utilities
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		Configure local users and groups
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12.12	System Recovery	2.5 Given a scenario, implement disaster prevention and recovery methods Implement image-level backup and recovery

		Implement file-level backup and recovery
		3.1 Given a scenario, implement tools to detect, remove, and prevent malware
		Restore a PC or mobile device
12.13	Virtual Memory	2.7 Given a scenario, configure virtualization
		Install and configure a virtual machine
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		Troubleshoot common issues Apply common solutions
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		Configure boot options
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		Troubleshoot system startup Troubleshoot malfunctioning systems
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13.2	Incident Response	
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		Implement remote wipe capabilities
		3.3 Given a scenario, implement security best practices
		Require a screen saver password

13.4	Social Engineering	
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13.6	Malware Protection	3.1 Given a scenario, implement tools to detect, remove, and prevent malware Install and configure antivirus and anti-malware utilities

13.7	Authentication	3.3 Given a scenario, implement security best practices
		
		      Enforce password settings
		      Manage Linux passwords

13.8	File Encryption	3.3 Given a scenario, implement security best practices Implement drive encryption
13.9	Network Security	
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13.11	Proxy Servers	3.3 Given a scenario, implement security best practices Use a proxy server
13.12	VPN	2.6 Given a scenario, implement remote access Configure a VPN connection
13.13	Security Troubleshooting	3.1 Given a scenario, implement tools to detect, remove, and prevent malware

		Install and configure antivirus and anti-malware utilities
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Objective Mapping: TestOut PC Pro 6.0 Objectives to LabSim Section

The TestOut PC Pro course and certification exam cover the following PC Pro 6.0 objectives:

#	Domain	Section
1.0	**Hardware**	
1.1	Given a scenario, 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 Select and install expansion cards	3.2, 3.3, 3.5, 3.8, 3.9, 3.11
1.2	Given a scenario, configure hardware components Configure boot options Configure BIOS/UEFI settings Implement firmware updates	3.10 12.10, 12.15
1.3	Given a scenario, install and configure storage Install internal and external storage devices Configure and manage storage Implement a RAID solution Perform disk maintenance	4.2 5.2, 5.4, 5.6, 5.7, 5.8, 5.9
1.4	Given a scenario, install and configure a printer Select and install a printer Configure printer properties Configure network printing Manage printing	8.2, 8.3, 8.4

1.5	Given a scenario, configure networking devices	6.2, 6.8 7.1
	Install and configure wired and wireless network adapters and cables Install and configure internet connection devices	
1.6	Given a scenario, manage mobile devices	9.2, 9.6
	Install basic hardware components on laptop computers Configure mobile device connectivity Use common mobile device features	
2.0	**Software**	
2.1	Given a scenario, install, update, and configure an operating system	3.13 4.3, 4.5 10.3 12.5, 12.8, 12.10
	Install, update, and configure Windows Install, update, and configure macOS Install, update, and configure Linux Manage device drivers Configure and optimize video adapter settings Manage audio device settings Configure local users and groups	
2.2	Given a scenario, use operating system features and utilities	9.3, 9.5, 9.6 10.3 12.1, 12.7, 12.8
	Use Windows features and command line utilities Use core macOS and iOS features Use common Linux command line utilities Manage applications and processes Configure power options and settings	
2.3	Given a scenario, manage file systems	11.2, 11.3, 11.4, 11.5
	Manage files and folders Configure file access permissions Share and secure files and folders	
2.4	Given a scenario, configure PC networking	6.6, 6.9

		Configure client IP addressing, DNS, and DHCP Configure Windows workgroup and domain settings Configure wired and wireless networking for a SOHO Use network utilities Configure network drive mappings	7.3, 7.4 10.2 11.4
2.5	Given a scenario, implement disaster prevention and recovery methods Implement image-level backup and recovery Implement file-level backup and recovery Install surge protection and a UPS		2.5 12.12
2.6	Given a scenario, implement remote access Configure Remote Desktop connection Configure a VPN connection		12.6 13.12
2.7	Given a scenario, configure virtualization Enable hardware virtualization in BIOS/UEFI Install and configure a hypervisor Install and configure a virtual machine Create and add virtual hard disks		10.5 12.13
3.0	**Security**		
3.1	Given a scenario, implement tools to detect, remove, and prevent malware Install and configure antivirus and anti-malware utilities Restore a PC or mobile device Recover files corrupted by malware Configure operating system updates		12.10, 12.11, 12.12 13.6, 13.13
3.2	Given a scenario, implement mobile device security Implement access control and authentication Implement device encryption		9.7 13.3

		Implement device location Implement remote wipe capabilities	
3.3	Given a scenario, implement security best practices Enforce password settings Require a screen saver password Manage Linux passwords Implement drive encryption Configure a firewall Use a proxy server Configure BIOS/UEFI security settings		13.3, 13.5, 13.7, 13.8, 13.10, 13.11
4.0	**Troubleshooting**		
4.1	Given a scenario, troubleshoot hardware components Troubleshoot system startup Troubleshoot system power Troubleshoot CPU installation Troubleshoot system memory Troubleshoot storage devices Troubleshoot malfunctioning systems Troubleshoot mobile devices Troubleshoot printer issues		3.4, 3.6, 3.9 5.10 8.6 9.8 12.15
4.2	Given a scenario, troubleshoot software components Troubleshoot common issues Apply common solutions		12.14
4.3	Given a scenario, troubleshoot networking Troubleshoot a network connection Use networking utilities to view, test, and troubleshoot network configuration, communication, and connectivity issues		6.9, 6.10

Objective Mapping: LabSim Section to CompTIA 220-1001 Objectives

The TestOut PC Pro course covers the following CompTIA A+ Certification 220-1001 exam objectives:

Section	Title	Objectives
1.0	**Computing Overview**	
1.1	Course Introduction	

1.2	Hardware Basics	1.2 Given a scenario, install components within the display of a laptop.
		
		    Microphone
		
		3.1 Explain basic cable types, features, and their purposes.
		
		    Multipurpose cables
		        o Thunderbolt
		    Peripheral cables
		        o Serial
		    Hard drive cables
		        o SATA
		        o IDE
		        o SCSI
		    Adapters
		        o DVI to HDMI
		        o USB to Ethernet
		        o DVI to VGA
		
		3.2 Identify common connector types.
		
		    RJ-11
		    RJ-45
		    RS-232
		    DB-9
		    SCSI
		
		3.6 Explain the purposes and uses of various peripheral types.
		
		    ADF/flatbed scanner

			Barcode scanner/QR scanner Mouse Keyboard Touchpad Game controllers Camera/webcam Microphone
1.3	Windows Basics		
1.4	Linux Basics		
1.5	macOS Basics		
2.0	**PC Technician Responsibilities**		
2.1	Protection and Safety		
2.2	Professionalism		
2.3	Change Management		
2.4	PC Tools		
2.5	PC Maintenance		

2.6	Troubleshooting Process Overview		5.1 Given a scenario, use the best practice methodology to resolve problems.
			
			Always consider corporate policies, procedures, and impacts before implementing changes
			
			1. Identify the problem
			   o Question the user and identify user changes to computer and perform backups before making changes
			   o Inquire regarding environmental or infrastructure changes
			   o Review system and application logs
			2. Establish a theory of probable cause (question the obvious)
			   o If necessary, conduct external or internal research based on symptoms
			3. Test the theory to determine cause
			   o Once the theory is confirmed, determine the next steps to resolve problem
			   o If theory is not confirmed re-establish new theory or escalate
			4. Establish a plan of action to resolve the problem and implement the solution
			5. Verify full system functionality and, if applicable, implement preventive measures

		6. Document findings, actions, and outcomes
3.0	**System Components**	

3.1	Cases and Form Factors	3.5 Given a scenario, install and configure motherboards, CPUs, and add-on cards.
		
		Motherboard form factor
		   o ATX
		   o mATX
		   o ITX
		   o mITX

3.2	Power Supplies	3.2 Identify common connector types. Molex 3.7 Summarize power supply types and features. Input 115V vs. 220V Output 5.5V vs. 12V 24-pin motherboard adapter Wattage rating Number of devices/types of devices to be powered

3.3	Motherboards and Buses	3.4 Given a scenario, select, install and configure storage devices.
		
		Magnetic hard drives
		   o Sizes - 3.5
		
		3.5 Given a scenario, install and configure motherboards, CPUs, and add-on cards.
		
		Motherboard connectors types
		   o Front panel connector
		   o Internal USB connector
		CMOS battery
		Expansion cards
		   o Video cards - Onboard

3.4	Motherboard Troubleshooting	5.2 Given a scenario, troubleshoot problems related to motherboards, RAM, CPUs, and power.
		
		 Common symptoms
		   o Unexpected shutdowns
		   o System lockups
		   o POST code beeps
		   o Blank screen on bootup
		   o BIOS time and setting resets
		   o Attempts to boot to incorrect device
		   o Continuous reboots
		   o No power
		   o Overheating
		   o Loud noise
		   o Intermittent device failure
		   o Fans spin – no power to other devices
		   o Indicator lights
		   o Smoke
		   o Burning smell
		   o Proprietary crash screens (BSOD/pin wheel)
		   o Distended capacitors
		   o Log entries and error messages

3.5	Processors	3.5 Given a scenario, install and configure motherboards, CPUs, and add-on cards.
		
		 Motherboard connectors types
		   o Socket types
		 CPU features
		   o Single-core
		   o Multicore
		   o Virtual technology
		   o Hyperthreading
		   o Speeds
		   o Overclocking
		   o Integrated GPU
		 Compatibility
		   o AMD
		   o Intel

3.6	Processor Troubleshooting	

3.7	Memory	3.3 Given a scenario, install RAM types.

		RAM types
		   o SODIMM
		   o DDR2
		   o DDR3
		   o DDR4
		Error correcting
		Parity vs. non-parity

3.8	Memory Installation	3.3 Given a scenario, install RAM types. Single channel Dual channel Triple channel
3.9	Memory Troubleshooting	5.2 Given a scenario, troubleshoot problems related to motherboards, RAM, CPUs, and power. Common symptoms o Log entries and error messages

3.10	BIOS/UEFI	3.5 Given a scenario, install and configure motherboards, CPUs, and add-on cards.
		
		BIOS/UEFI settings
		   o Boot options
		   o Security - Drive encryption - TPM
		   o Security - Drive encryption - LoJack
		   o Security - Drive encryption - Secure boot

3.11	Expansion Cards	3.5 Given a scenario, install and configure motherboards, CPUs, and add-on cards.
		
		Motherboard connectors types
		   o PCI
		   o PCIe
		   o Riser card

3.12	Video	3.1 Explain basic cable types, features, and their purposes.
		
		Video cables
		   o VGA
		   o HDMI
		   o Mini-HDMI
		   o DisplayPort
		   o DVI
		   o DVI-DDVI-I
		
		3.2 Identify common connector types.
		
		BNC
		
		3.5 Given a scenario, install and configure motherboards, CPUs, and add-on cards.
		
		Expansion cards
		   o Video cards - Onboard
		   o Video cards - Add-on card
		
		3.6 Explain the purposes and uses of various peripheral types.
		
		Monitors

3.13	Audio	3.5 Given a scenario, install and configure motherboards, CPUs, and add-on cards. Expansion cards o Sound cards 3.6 Explain the purposes and uses of various peripheral types. Speakers

3.14	Cooling	3.5 Given a scenario, install and configure motherboards, CPUs, and add-on cards.
		
		Cooling mechanism
		   o Fans
		   o Heat sink
		   o Liquid

		o Thermal paste
4.0	**Peripheral Devices**	

4.1	Peripheral Devices	1.2 Given a scenario, install components within the display of a laptop.
		
		Types
		    o LCD
		    o OLED
		
		3.6 Explain the purposes and uses of various peripheral types.
		
		ADF/flatbed scanner
		Barcode scanner/QR scanner
		VR headset
		Mouse
		Keyboard
		Touchpad
		Signature pad
		Game controllers
		Camera/webcam
		Microphone
		Projector
		    o Lumens/brightness
		KVM
		Magnetic reader/chip reader
		NFC/tap pay device

4.2	USB	3.1 Explain basic cable types, features, and their purposes.
		
		Multipurpose cables
		    o USB
		    o USB-C
		    o USB 2.0
		    o USB 3.0
		
		3.2 Identify common connector types.
		
		USB
		Micro-USB

		Mini-USB
		USB-C
		
		3.5 Given a scenario, install and configure motherboards, CPUs, and add-on cards.
		
		    Expansion cards
		        o USB expansion card
		
		3.6 Explain the purposes and uses of various peripheral types.
		
		    External storage drives

4.3	Display Devices	

4.4	Video Troubleshooting	3.6 Explain the purposes and uses of various peripheral types.
		
		    Projector
		        o Lumens/brightness
		
		5.4 Given a scenario, troubleshoot video, projector, and display issues.
		
		    Common symptoms
		        o VGA mode
		        o No image on screen
		        o Overheat shutdown
		        o Dead pixels
		        o Artifacts
		        o Incorrect color patterns
		        o Dim image
		        o Flickering image
		        o Distorted image
		        o Distorted geometry
		        o Burn-in
		        o Oversized images and icons
		        o Multiple failed jobs in logs

4.5	Device Driver Management	2.5 Summarize the properties and purposes of services provided by networked hosts. Legacy/embedded systems

		3.4 Given a scenario, select, install and configure storage devices. Configurations o Hot swappable
4.6	Device Driver Troubleshooting	
5.0	**Storage**	

5.1	Storage Devices	1.1 Given a scenario, install and configure laptop hardware and components.
		
		Hardware/device replacement
		   o Hard drive - SSD vs. hybrid vs. magnetic disk
		
		3.1 Explain basic cable types, features, and their purposes.
		
		Hard drive cables
		   o SCSI
		
		3.2 Identify common connector types.
		
		SCSI
		
		3.4 Given a scenario, select, install and configure storage devices.
		
		Solid-state drives
		   o M2 drives
		   o NVME
		Hybrid drives
		Hybrid drives
		Flash
		   o SD card
		   o CompactFlash
		   o Micro-SD card
		   o Mini-SD card
		   o xD
		
		3.5 Given a scenario, install and configure motherboards, CPUs, and add-on cards.

		Motherboard connectors types
5.2	SATA	3.1 Explain basic cable types, features, and their purposes. Hard drive cables o SATA 3.2 Identify common connector types. eSATA 3.4 Given a scenario, select, install and configure storage devices. Solid-state drives o SATA 2.5 3.5 Given a scenario, install and configure motherboards, CPUs, and add-on cards. Motherboard connectors types o SATA
5.3	Optical Media	3.4 Given a scenario, select, install and configure storage devices. Optical drives o CD-ROM/CD-RW o DVD-ROM/DVD-RW/DVD-RW DL o Blu-ray o BD-R o BD-RE 3.6 Explain the purposes and uses of various peripheral types. Optical DVD drive
5.4	RAID	3.4 Given a scenario, select, install and configure storage devices. Configurations

		o RAID 0, 1, 5, 10
5.5	File Systems	
5.6	File System Creation	
5.7	Storage Management	
5.8	Storage Spaces	
5.9	Disk Optimization	3.4 Given a scenario, select, install and configure storage devices. Magnetic hard drives o 5,400rpm o 7,200rpm o 10,000rpm o 15,000rpm
5.10	Storage Troubleshooting	5.3 Given a scenario, troubleshoot hard drives and RAID arrays. Common symptoms o Slow performance o Loud clicking noise o Failure to boot o Drive not recognized o OS not found o RAID not found o RAID stops working o Proprietary crash screens (BSOD/pin wheel) o S.M.A.R.T. errors
6.0	**Networking**	
6.1	Networking Overview	2.7 Compare and contrast Internet connection types, network types, and their features. Network types o LAN o WAN o PAN o MAN

		○ WMN

6.2	Network Hardware	2.2 Compare and contrast common networking hardware devices.
		
		Routers
		Switches
		    ○ Managed
		    ○ Unmanaged
		Access points
		Firewall
		Network interface card
		Repeater
		Hub
		Bridge
		Patch panel
		Power over Ethernet (PoE)
		    ○ Injectors
		    ○ Switch
		Ethernet over Power
		
		2.5 Summarize the properties and purposes of services provided by networked hosts.
		
		Server roles
		    ○ Web server
		    ○ File server
		    ○ Print server
		    ○ DHCP server
		    ○ DNS server
		
		3.5 Given a scenario, install and configure motherboards, CPUs, and add-on cards.
		
		Expansion cards
		    ○ Network interface card

6.3	Networking Media	3.1 Explain basic cable types, features, and their purposes.
		
		Network cables
		    ○ Ethernet - Cat 5
		    ○ Ethernet - Cat 5e
		    ○ Ethernet - Cat 6

			o Ethernet - Plenum o Ethernet - Shielded twisted pair o Ethernet - Unshielded twisted pair o Ethernet - 568A/B o Fiber o Coaxial o Speed and transmission limitations 3.2 Identify common connector types. RJ-11 RJ-45 RS-232 RG-59 RG-6

6.4	Ethernet		2.2 Compare and contrast common networking hardware devices.
			
			Routers
			Network interface card
			Repeater
			Hub
			Bridge
			Patch panel
			Power over Ethernet (PoE)
			    o Switch
			Ethernet over Power
			
			3.1 Explain basic cable types, features, and their purposes.
			
			Network cables
			    o Ethernet - Cat 5
			    o Ethernet - Cat 5e
			    o Ethernet - Cat 6
			    o Ethernet - Unshielded twisted pair
			    o Fiber
			    o Coaxial
			    o Speed and transmission limitations

6.5	IP Networking	2.1 Compare and contrast TCP and UDP ports, protocols, and their purposes.

		Ports and protocols
		  o 21 – FTP
		  o 22 – SSH
		  o 23 – Telnet
		  o 25 – SMTP
		  o 53 – DNS
		  o 80 – HTTP
		  o 110 – POP3
		  o 143 – IMAP
		  o 443 – HTTPS
		  o 3389 – RDP
		  o 137-139 – NetBIOS/NetBT
		  o 445 – SMB/CIFS
		  o 427 – SLP
		  o 548 – AFP
		  o 67/68 – DHCP
		  o 389 – LDAP
		  o 161/162 – SNMP
		TCP vs. UDP

6.6	IP Configuration	2.6 Explain common network configuration concepts.
		
		IP addressing
		  o Static
		  o Dynamic
		  o APIPA
		  o Link local
		DNS
		IPv4 vs. IPv6
		Subnet mask
		Gateway

6.7	IP Version 6	2.6 Explain common network configuration concepts. IP addressing IPv4 vs. IPv6

6.8	Internet Connectivity	2.2 Compare and contrast common networking hardware devices.
		
		    Cable/DSL modem
		
		2.3 Given a scenario, install and configure a basic wired/wireless SOHO network.
		
		    Cable/DSL modem configuration
		
		2.7 Compare and contrast Internet connection types, network types, and their features.
		
		    Internet connection types
		      o Cable
		      o DSL
		      o Dial-up
		      o Fiber
		      o Satellite
		      o ISDN
		      o Cellular - Tethering
		      o Cellular - Mobile hotspot
		      o Line-of-sight wireless Internet service

6.9	Network Utilities	

6.10	Network Troubleshooting	1.5 Given a scenario, connect and configure accessories and ports of other mobile devices.
		
		    Connection types
		      o Wired - Micro-USB/Mini-USB/USB-C
		      o Wired - Lightning
		      o Wired - Proprietary vendor-specific ports (communication/power)
		
		2.8 Given a scenario, use appropriate networking tools.
		
		    Crimper
		    Cable stripper
		    Multimeter
		    Tone generator and probe
		    Cable tester
		    Loopback plug
		    Punchdown tool

			5.7 Given a scenario, troubleshoot common wired and wireless network problems.

			Common symptoms
			   o Limited connectivity
			   o Unavailable resources - Internet
			   o Unavailable resources - Local resources - Shares
			   o Unavailable resources - Local resources - Printers
			   o Unavailable resources - Local resources - Email
			   o No connectivity
			   o APIPA/link local address
			   o Intermittent connectivity
			   o IP conflict
			   o Slow transfer speeds
			   o Low RF signal
			   o SSID not found

7.0	**Wireless Networking**		

7.1	802.11 Wireless		1.2 Given a scenario, install components within the display of a laptop.
			
			    WiFi antenna connector/placement
			
			2.3 Given a scenario, install and configure a basic wired/wireless SOHO network.
			
			    Wireless settings
			      o Encryption
			
			2.4 Compare and contrast wireless networking protocols.
			
			    802.11a
			    802.11b
			    802.11g
			    802.11n
			    802.11ac
			    Frequencies
			      o 2.4Ghz
			      o 5Ghz
			
			2.5 Summarize the properties and purposes of services provided by networked hosts.
			
			    Server roles

		o Authentication server **3.9 Given a scenario, install and configure common devices.** Laptop/common mobile devices o Wireless settings

7.2	Infrared, Bluetooth, and NFC	**1.5 Given a scenario, connect and configure accessories and ports of other mobile devices.**
		
		Connection types
		    o Wired - Proprietary vendor-specific ports (communication/power)
		    o Wireless - NFC
		    o Wireless - Bluetooth
		    o Wireless - IR
		    o Wireless - Hotspot
		
		1.6 Given a scenario, configure basic mobile device network connectivity and application support.
		
		Bluetooth
		    o Enable Bluetooth
		    o Enable pairing
		    o Find a device for pairing
		    o Enter the appropriate pin code
		    o Test connectivity
		
		2.4 Compare and contrast wireless networking protocols.
		
		Bluetooth
		NFC

7.3	SOHO Configuration	**1.5 Given a scenario, connect and configure accessories and ports of other mobile devices.**
		
		Connection types
		    o Wired - Micro-USB/Mini-USB/USB-C
		    o Wired - Lightning
		    o Wired - Tethering
		    o Wired - Proprietary vendor-specific ports (communication/power)

		2.3 Given a scenario, install and configure a basic wired/wireless SOHO network.
		
		    Router/switch functionality
		    Access point settings
		    IP addressing
		    NIC configuration
		        o Wired
		        o Wireless
		    End-user device configuration
		    Firewall settings
		        o DMZ
		        o Port forwarding
		        o NAT
		        o UPnP
		        o Whitelist/blacklist
		        o MAC filtering
		    QoS
		    Wireless settings
		        o Channels
		        o QoS
		
		2.4 Compare and contrast wireless networking protocols.
		
		    Channels
		        o 1–11
		
		2.6 Explain common network configuration concepts.
		
		    NAT

7.4	Internet of Things	2.3 Given a scenario, install and configure a basic wired/wireless SOHO network.
		
		    IoT device configuration
		        o Thermostat
		        o Light switches
		        o Security cameras
		        o Door locks
		        o Voice-enabled, smart speaker/digital assistant
		
		2.4 Compare and contrast wireless networking protocols.

		Zigbee Z-Wave

7.5	Wireless Network Troubleshooting	2.8 Given a scenario, use appropriate networking tools.
		
		    WiFi analyzer
		
		5.7 Given a scenario, troubleshoot common wired and wireless network problems.
		
		    Common symptoms
		       o Limited connectivity
		       o No connectivity
		       o Intermittent connectivity
		       o Slow transfer speeds
		       o Low RF signal
		       o SSID not found
		       o No connectivity
		       o Intermittent connectivity
		       o Slow transfer speeds
		       o Low RF signal
		       o SSID not found

8.0	**Printing**	

8.1	Printers	3.11 Given a scenario, install and maintain various print technologies.
		
		    Laser
		       o Imaging drum, fuser assembly, transfer belt, transfer roller, pickup rollers, separate pads, duplexing assembly
		       o Imaging process: processing, charging, exposing, developing, transferring, fusing, and cleaning
		    Inkjet
		       o Ink cartridge, print head, roller, feeder, duplexing assembly, carriage, and belt
		       o Calibrate
		    Thermal
		       o Feed assembly, heating element
		       o Special thermal paper
		    Impact
		       o Print head, ribbon, tractor feed
		       o Impact paper

		3D printers o Plastic filament

8.2	Printer Configuration	3.6 Explain the purposes and uses of various peripheral types.
		
		   Printer
		
		3.10 Given a scenario, configure SOHO multifunction devices/printers and settings.
		
		   Use appropriate drivers for a given operating system
		      o Configuration settings - Duplex
		      o Configuration settings - Collate
		      o Configuration settings - Orientation
		      o Configuration settings - Quality
		
		3.11 Given a scenario, install and maintain various print technologies.
		
		   Virtual
		      o Print to file
		      o Print to PDF
		      o Print to XPS
		      o Print to image

8.3	Network Printing	3.10 Given a scenario, configure SOHO multifunction devices/printers and settings.
		
		   Device sharing
		      o Wired - USB
		      o Wired - Serial
		      o Wired - Ethernet
		      o Wireless - Bluetooth
		      o Wireless - 802.11(a, b, g, n, ac)
		      o Wireless - Infrastructure vs. ad hoc
		      o Integrated print server (hardware)
		      o Cloud printing/remote printing
		  Public/shared devices
		      o Sharing local/networked device via operating system settings - TCP/Bonjour/AirPrint
		      o Data privacy - User authentication on the device
		      o Data privacy - Hard drive caching

8.4	Printing Management	3.10 Given a scenario, configure SOHO multifunction devices/printers and settings.
		Use appropriate drivers for a given operating system
		o Configuration settings - Duplex
		o Configuration settings - Collate
		o Configuration settings - Orientation
		o Configuration settings - Quality
8.5	Printer Maintenance	3.11 Given a scenario, install and maintain various print technologies.
		Laser
		o Maintenance: Replace toner, apply maintenance kit, calibrate, clean
		Inkjet
		o Maintenance: Clean heads, replace cartridges, calibrate, clear jams
		Thermal
		o Maintenance: Replace paper, clean heating element, remove debris
		Impact
		o Maintenance: Replace ribbon, replace print head, replace paper
8.6	Printer Troubleshooting	5.6 Given a scenario, troubleshoot printers.
		Common symptoms
		o Streaks
		o Faded prints
		o Ghost images
		o Toner not fused to the paper
		o Creased paper
		o Paper not feeding
		o Paper jam
		o No connectivity
		o Garbled characters on paper
		o Vertical lines on page
		o Backed-up print queue
		o Low memory errors
		o Access denied
		o Printer will not print
		o Color prints in wrong print color
		o Unable to install printer
		o Error codes
		o Printing blank pages

		o No image on printer display
9.0	**Mobile Devices**	
9.1	Laptops	1.3 Given a scenario, use appropriate laptop features. Special function keys 　o Dual displays 　o Wireless (on/off) 　o Cellular (on/off) 　o Volume settings 　o Screen brightness 　o Bluetooth (on/off) 　o Keyboard backlight 　o Touchpad (on/off) 　o Screen orientation 　o Media options (fast forward/rewind) 　o GPS (on/off) 　o Airplane mode Docking station Port replicator Physical laptop lock and cable lock Rotating/removable screens 3.4 Given a scenario, select, install and configure storage devices. Magnetic hard drives 　o Sizes - 2.5 　o Sizes - 3.5
9.2	Laptop Components	1.1 Given a scenario, install and configure laptop hardware and components. Hardware/device replacement 　o Keyboard 　o Hard drive - SSD vs. hybrid vs. magnetic disk 　o Hard drive - 1.8in vs. 2.5in 　o Memory 　o Smart card reader 　o Optical drive 　o Wireless card/Bluetooth module 　o Cellular card

- o Video card
- o Mini PCIe
- o Screen
- o DC jack
- o Battery
- o Touchpad
- o Plastics/frames
- o Speaker
- o System board
- o CPU

1.2 Given a scenario, install components within the display of a laptop.

Types
- o LCD
- o OLED

WiFi antenna connector/placement
Webcam
Microphone
Inverter
Digitizer/touchscreen

3.4 Given a scenario, select, install and configure storage devices.

Magnetic hard drives
- o Sizes - 2.5
- o Sizes - 3.5

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

Expansion cards
- o Video cards - Add-on card

3.9 Given a scenario, install and configure common devices.

Laptop/common mobile devices
- o Touchpad configuration

5.5 Given a scenario, troubleshoot common mobile device issues while adhering to the appropriate procedures.

		Disassembling processes for proper reassembly
		  o Document and label cable and screw locations
		  o Organize parts
		  o Refer to manufacturer resources
		  o Use appropriate hand tools

9.3	Laptop Power Management	

9.4	Laptop Troubleshooting	1.2 Given a scenario, install components within the display of a laptop.
		
		Types
		Digitizer/touchscreen
		
		5.5 Given a scenario, troubleshoot common mobile device issues while adhering to the appropriate procedures.
		
		Common symptoms
		  o No display
		  o Dim display
		  o Flickering display
		  o Sticking keys
		  o Intermittent wireless
		  o Battery not charging
		  o Ghost cursor/pointer drift
		  o No power
		  o Num lock indicator lights
		  o No wireless connectivity
		  o No Bluetooth connectivity
		  o Cannot display to external monitor
		  o Touchscreen non-responsive
		  o Apps not loading
		  o Slow performance
		  o Unable to decrypt email
		  o Extremely short battery life
		  o Overheating
		  o Frozen system
		  o No sound from speakers
		  o GPS not functioning
		  o Swollen battery

9.5	Mobile Devices	1.2 Given a scenario, install components within the display of a laptop.

1.2 Given a scenario, install components within the display of a laptop.

    Types
    Webcam

1.4 Compare and contrast characteristics of various types of other mobile devices.

    Tablets
    Smartphones
    Wearable technology devices
- Smart watches
- Fitness monitors
- VR/AR headsets

    E-readers
    GPS

1.5 Given a scenario, connect and configure accessories and ports of other mobile devices.

    Accessories
- Headsets
- Speakers
- Game pads
- Extra battery packs/battery chargers
- Protective covers/waterproofing
- Credit card readers
- Memory/MicroSD

1.6 Given a scenario, configure basic mobile device network connectivity and application support.

    PRI updates/PRL updates/baseband updates
    Radio firmware
    IMEI vs. IMSI

3.6 Explain the purposes and uses of various peripheral types.

    Headset
    NFC/tap pay device

3.9 Given a scenario, install and configure common devices.

			Laptop/common mobile devices o Touchscreen configuration o Application installations/configurations
9.6	Mobile Device Networking		1.5 Given a scenario, connect and configure accessories and ports of other mobile devices. Connection types o Wired - Lightning o Wired - Tethering o Wired - Proprietary vendor-specific ports (communication/power) o Wireless - NFC o Wireless - Bluetooth o Wireless - IR o Wireless - Hotspot 1.6 Given a scenario, configure basic mobile device network connectivity and application support. Corporate and ISP email configuration o POP3 o IMAP o Port and SSL settings o S/MIME Integrated commercial provider email configuration o iCloud o Google/Inbox o Exchange Online o Yahoo VPN 1.7 Given a scenario, use methods to perform mobile device synchronization. Synchronization methods o Synchronize to the cloud o Synchronize to the desktop o Synchronize to the automobile Types of data to synchronize o Contacts o Applications o Email o Pictures

o Music
o Videos
o Calendar
o Bookmarks
o Documents
o Location data
o Social media data
o E-books
o Passwords

Mutual authentication for multiple services (SSO)
Software requirements to install the application on the PC
Connection types to enable synchronization

2.4 Compare and contrast wireless networking protocols.

3G
4G
5G
LTE

2.6 Explain common network configuration concepts.

VPN

3.1 Explain basic cable types, features, and their purposes.

Multipurpose cables
o Lightning

3.2 Identify common connector types.

Lightning

3.9 Given a scenario, install and configure common devices.

Laptop/common mobile devices
o Synchronization settings
o Account setup/settings
o Wireless settings

9.7	Mobile Device Security	

9.8	Mobile Device Troubleshooting	5.5 Given a scenario, troubleshoot common mobile device issues while adhering to the appropriate procedures.
		
		Common symptoms
		   o No display
		   o Dim display
		   o Flickering display
		   o Sticking keys
		   o Intermittent wireless
		   o Battery not charging
		   o Ghost cursor/pointer drift
		   o No power
		   o Num lock indicator lights
		   o No wireless connectivity
		   o No Bluetooth connectivity
		   o Cannot display to external monitor
		   o Touchscreen non-responsive
		   o Apps not loading
		   o Slow performance
		   o Unable to decrypt email
		   o Extremely short battery life
		   o Overheating
		   o Frozen system
		   o No sound from speakers
		   o GPS not functioning
		   o Swollen battery

10.0	**System Implementation**	

10.1	Component Selection	3.8 Given a scenario, select and configure appropriate components for a custom PC configuration to meet customer specifications or needs.
		
		Graphic/CAD/CAM design workstation
		   o Multicore processor
		   o High-end video
		   o Maximum RAM
		Audio/video editing workstation
		   o Specialized audio and video card
		   o Large, fast hard drive
		   o Dual monitors

			Virtualization workstation
			    o Maximum RAM and CPU cores
			Gaming PC
			    o Multicore processor
			    o High-end video/specialized GPU
			    o High-definition sound card
			    o High-end cooling
			Standard thick client
			    o Desktop applications
			    o Meets recommended requirements for selected OS
			Thin client
			    o Basic applications
			    o Meets minimum requirements for selected OS
			    o Network connectivity
			Network attached storage device
			    o Media streaming
			    o File sharing
			    o Gigabit NIC
			    o RAID array
			
			3.9 Given a scenario, install and configure common devices.
			
			Desktop
			    o Thin client
			    o Thick client

10.2	Windows Pre-Installation		3.6 Explain the purposes and uses of various peripheral types. External storage drives 3.9 Given a scenario, install and configure common devices. Desktop o Account setup/settings
10.3	Windows Installation		
10.4	Post-Installation		
10.5	Virtualization		2.2 Compare and contrast common networking hardware devices.

Cloud-based network controller

2.6 Explain common network configuration concepts.

VLAN

4.1 Compare and contrast cloud computing concepts.

Common cloud models
- o IaaS
- o SaaS
- o PaaS
- o Public vs. private vs. hybrid vs. community

Shared resources
- o Internal vs. external

Rapid elasticity

On-demand

Resource pooling

Measured service

Metered

Off-site email applications

Cloud file storage services
- o Synchronization apps

Virtual application streaming/cloud-based applications
- o Applications for cell phones/tablets
- o Applications for laptops/desktops

Virtual desktop
- o Virtual NIC

4.2 Given a scenario, set up and configure client-side virtualization.

Purpose of virtual machines

Resource requirements

Emulator requirements

Security requirements

Network requirements

Hypervisor

11.0	**File Management**	
11.1	Windows File Locations	

11.2	Manage Files on Windows	
11.3	NTFS Permissions	3.9 Given a scenario, install and configure common devices. Laptop/common mobile devices o Touchscreen configuration
11.4	Shared Folders	
11.5	Linux File Management	
12.0	**System Management**	
12.1	Windows System Tools	
12.2	Preferences and Settings	
12.3	Performance Monitoring	
12.4	Active Directory	
12.5	Users and Groups	
12.6	Remote Services	
12.7	Windows Application Management	
12.8	Linux Application Management	
12.9	Digital Content Management	
12.10	Updates	
12.11	System Backup	
12.12	System Recovery	
12.13	Virtual Memory	
12.14	Operating System Troubleshooting	
12.15	Windows Boot Errors	
13.0	**Security**	
13.1	Security Best Practices	
13.2	Incident Response	

13.3	Physical Security	
13.4	Social Engineering	

13.5	BIOS/UEFI Security	3.5 Given a scenario, install and configure motherboards, CPUs, and add-on cards.
		
		BIOS/UEFI settings
		   o Firmware updates
		   o Security settings
		   o Interface configurations
		   o Security - Passwords

13.6	Malware Protection	2.5 Summarize the properties and purposes of services provided by networked hosts. Server roles o Mail server
13.7	Authentication	2.4 Compare and contrast wireless networking protocols. RFID 3.6 Explain the purposes and uses of various peripheral types. Smart card reader Smart card reader
13.8	File Encryption	
13.9	Network Security	2.3 Given a scenario, install and configure a basic wired/wireless SOHO network. Firewall settings o MAC filtering

13.10	Firewalls	2.5 Summarize the properties and purposes of services provided by networked hosts.
		
		Server roles
		   o syslog
		Internet appliance
		   o UTM

		o IDS
		o IPS
		o End-point management server
13.11	Proxy Servers	2.5 Summarize the properties and purposes of services provided by networked hosts. Server roles o Proxy server
13.12	VPN	2.6 Explain common network configuration concepts. VPN
13.13	Security Troubleshooting	
14.0	**Capstone Exercises**	
A.0	**PC Pro Certification Practice Exams**	
A.1	Preparing for Certification	
A.2	PC Pro Domain Practice	
B.0	**CompTIA A+ 220-1001 Core 1 Practice Exams**	
B.1	Preparing for Certification	
B.2	A+ 220-1001 Core 1 Domain Practice (20 Random Questions)	
B.3	A+ 220-1001 Core 1 Domain Practice (All Questions)	
C.0	**CompTIA A+ 220-1002 Core 2 Practice Exams**	
C.1	Preparing for Certification	
C.2	A+ 220-1002 Core 2 Domain Practice (20 Random Questions)	

C.3	A+ 220-1002 Core 2 Domain Practice (All Questions)	

Objective Mapping: CompTIA 220-1001 Objectives to LabSim Section

The TestOut PC Pro course and certification exam cover the following CompTIA A+ Certification 220-1001 objectives:

#	Domain	Section
1.0	**Mobile Devices**	
1.1	Given a scenario, install and configure laptop hardware and components. Hardware/device replacement - Keyboard - Hard drive - SSD vs. hybrid vs. magnetic disk - Hard drive - 1.8in vs. 2.5in - Memory - Smart card reader - Optical drive - Wireless card/Bluetooth module - Cellular card - Video card - Mini PCIe - Screen - DC jack - Battery - Touchpad - Plastics/frames - Speaker - System board - CPU	5.1 9.2
1.2	Given a scenario, install components within the display of a laptop. Types - LCD - OLED WiFi antenna connector/placement Webcam Microphone Inverter	1.2 4.1 7.1 9.2, 9.4, 9.5

		Digitizer/touchscreen	
1.3	Given a scenario, use appropriate laptop features.		9.1
	Special function keys		
		o Dual displays	
		o Wireless (on/off)	
		o Cellular (on/off)	
		o Volume settings	
		o Screen brightness	
		o Bluetooth (on/off)	
		o Keyboard backlight	
		o Touchpad (on/off)	
		o Screen orientation	
		o Media options (fast forward/rewind)	
		o GPS (on/off)	
		o Airplane mode	
	Docking station		
	Port replicator		
	Physical laptop lock and cable lock		
	Rotating/removable screens		
1.4	Compare and contrast characteristics of various types of other mobile devices.		9.5
	Tablets		
	Smartphones		
	Wearable technology devices		
		o Smart watches	
		o Fitness monitors	
		o VR/AR headsets	
	E-readers		
	GPS		
1.5	Given a scenario, connect and configure accessories and ports of other mobile devices.		6.10 7.2, 7.3 9.5, 9.6
	Connection types		
		o Wired - Micro-USB/Mini-USB/USB-C	
		o Wired - Lightning	
		o Wired - Tethering	
		o Wired - Proprietary vendor-specific ports (communication/power)	

		o Wireless - NFC
		o Wireless - Bluetooth
		o Wireless - IR
		o Wireless - Hotspot
		Accessories
		    o Headsets
		    o Speakers
		    o Game pads
		    o Extra battery packs/battery chargers
		    o Protective covers/waterproofing
		    o Credit card readers
		    o Memory/MicroSD	

1.6	Given a scenario, configure basic mobile device network connectivity and application support.
	
	Wireless/cellular data network (enable/disable)
	    o Hotspot
	    o Tethering
	    o Airplane mode
	Bluetooth
	    o Enable Bluetooth
	    o Enable pairing
	    o Find a device for pairing
	    o Enter the appropriate pin code
	    o Test connectivity
	Corporate and ISP email configuration
	    o POP3
	    o IMAP
	    o Port and SSL settings
	    o S/MIME
	Integrated commercial provider email configuration
	    o iCloud
	    o Google/Inbox
	    o Exchange Online
	    o Yahoo
	PRI updates/PRL updates/baseband updates
	Radio firmware
	IMEI vs. IMSI
	VPN
			7.2
			9.5, 9.6

1.7	Given a scenario, use methods to perform mobile device synchronization.		9.6

Synchronization methods
- o Synchronize to the cloud
- o Synchronize to the desktop
- o Synchronize to the automobile

Types of data to synchronize
- o Contacts
- o Applications
- o Email
- o Pictures
- o Music
- o Videos
- o Calendar
- o Bookmarks
- o Documents
- o Location data
- o Social media data
- o E-books
- o Passwords

Mutual authentication for multiple services (SSO)
Software requirements to install the application on the PC
Connection types to enable synchronization

2.0	Networking	
2.1	Compare and contrast TCP and UDP ports, protocols, and their purposes.	6.5

Ports and protocols
- o 21 – FTP
- o 22 – SSH
- o 23 – Telnet
- o 25 – SMTP
- o 53 – DNS
- o 80 – HTTP
- o 110 – POP3
- o 143 – IMAP
- o 443 – HTTPS
- o 3389 – RDP
- o 137-139 – NetBIOS/NetBT
- o 445 – SMB/CIFS
- o 427 – SLP
- o 548 – AFP

		o 67/68 – DHCP o 389 – LDAP o 161/162 – SNMP TCP vs. UDP	

2.2	Compare and contrast common networking hardware devices.
	
	Routers
	Switches
	    o Managed
	    o Unmanaged
	Access points
	Cloud-based network controller
	Firewall
	Network interface card
	Repeater
	Hub
	Cable/DSL modem
	Bridge
	Patch panel
	Power over Ethernet (PoE)
	    o Injectors
	    o Switch
	Ethernet over Power
			6.2, 6.4, 6.8
			10.5

2.3	Given a scenario, install and configure a basic wired/wireless SOHO network.
	
	Router/switch functionality
	Access point settings
	IP addressing
	NIC configuration
	    o Wired
	    o Wireless
	End-user device configuration
	IoT device configuration
	    o Thermostat
	    o Light switches
	    o Security cameras
	    o Door locks
	    o Voice-enabled, smart speaker/digital assistant
	Cable/DSL modem configuration
			6.8
			7.1, 7.3, 7.4
			13.9

		Firewall settings	

		o DMZ
		    o Port forwarding
		    o NAT
		    o UPnP
		    o Whitelist/blacklist
		    o MAC filtering
		QoS
		Wireless settings
		    o Encryption
		    o Channels
		    o QoS	

2.4	Compare and contrast wireless networking protocols.
	
	802.11a
	802.11b
	802.11g
	802.11n
	802.11ac
	Frequencies
	    o 2.4Ghz
	    o 5Ghz
	Channels
	    o 1–11
	Bluetooth
	NFC
	RFID
	Zigbee
	Z-Wave
	3G
	4G
	5G
	LTE
			7.1, 7.2, 7.3, 7.4
			9.6
			13.7

2.5	Summarize the properties and purposes of services provided by networked hosts.
	
	Server roles
	    o Web server
	    o File server
	    o Print server
			4.5
			6.2
			7.1
			13.6, 13.10, 13.11

		o DHCP server
		o DNS server
		o Proxy server
		o Mail server
		o Authentication server
		o syslog
		Internet appliance
		    o UTM
		    o IDS
		    o IPS
		    o End-point management server
		Legacy/embedded systems	

2.6	Explain common network configuration concepts.
	
	IP addressing
	    o Static
	    o Dynamic
	    o APIPA
	    o Link local
	DNS
	DHCP
	    o Reservations
	IPv4 vs. IPv6
	Subnet mask
	Gateway
	VPN
	VLAN
	NAT
			6.6, 6.7
			7.3
			9.6
			10.5
			13.12

2.7	Compare and contrast Internet connection types, network types, and their features.
	
	Internet connection types
	    o Cable
	    o DSL
	    o Dial-up
	    o Fiber
	    o Satellite
	    o ISDN
	    o Cellular - Tethering
	    o Cellular - Mobile hotspot
			6.1, 6.8

		o Line-of-sight wireless Internet service
		Network types
		   o LAN
		   o WAN
		   o PAN
		   o MAN
		   o WMN	

2.8	Given a scenario, use appropriate networking tools. Crimper Cable stripper Multimeter Tone generator and probe Cable tester Loopback plug Punchdown tool WiFi analyzer		6.10 7.5
3.0	**Hardware**		

3.1	Explain basic cable types, features, and their purposes.
	
	Network cables
	   o Ethernet - Cat 5
	   o Ethernet - Cat 5e
	   o Ethernet - Cat 6
	   o Ethernet - Plenum
	   o Ethernet - Shielded twisted pair
	   o Ethernet - Unshielded twisted pair
	   o Ethernet - 568A/B
	   o Fiber
	   o Coaxial
	   o Speed and transmission limitations
	Video cables
	   o VGA
	   o HDMI
	   o Mini-HDMI
	   o DisplayPort
	   o DVI
	   o DVI-DDVI-I
			1.2
			3.12
			4.2
			5.1, 5.2
			6.3, 6.4
			9.6

		Multipurpose cables	
		o Lightning	
		o Thunderbolt	
		o USB	
		o USB-C	
		o USB 2.0	
		o USB 3.0	
		Peripheral cables	
		o Serial	
		Hard drive cables	
		o SATA	
		o IDE	
		o SCSI	
		Adapters	
		o DVI to HDMI	
		o USB to Ethernet	
		o DVI to VGA	

3.2	Identify common connector types.
	
	    RJ-11
	    RJ-45
	    RS-232
	    BNC
	    RG-59
	    RG-6
	    USB
	    Micro-USB
	    Mini-USB
	    USB-C
	    DB-9
	    Lightning
	    SCSI
	    eSATA
	    Molex
			1.2
			3.2, 3.12
			4.2
			5.1, 5.2
			6.3
			9.6

3.3	Given a scenario, install RAM types.
	
	    RAM types
	        o SODIMM
	        o DDR2
			3.7, 3.8

	○ DDR3 ○ DDR4 Single channel Dual channel Triple channel Error correcting Parity vs. non-parity	

3.4	Given a scenario, select, install and configure storage devices.
	
	Optical drives
	    ○ CD-ROM/CD-RW
	    ○ DVD-ROM/DVD-RW/DVD-RW DL
	    ○ Blu-ray
	    ○ BD-R
	    ○ BD-RE
	Solid-state drives
	    ○ M2 drives
	    ○ NVME
	    ○ SATA 2.5
	Magnetic hard drives
	    ○ 5,400rpm
	    ○ 7,200rpm
	    ○ 10,000rpm
	    ○ 15,000rpm
	    ○ Sizes - 2.5
	    ○ Sizes - 3.5
	Hybrid drives
	Hybrid drives
	Flash
	    ○ SD card
	    ○ CompactFlash
	    ○ Micro-SD card
	    ○ Mini-SD card
	    ○ xD
	Configurations
	    ○ RAID 0, 1, 5, 10
	    ○ Hot swappable
		3.3
		4.5
		5.1, 5.2, 5.3, 5.4, 5.9
		9.1, 9.2

3.5	Given a scenario, install and configure motherboards, CPUs, and add-on cards.	3.1, 3.3, 3.5, 3.10, 3.11, 3.12, 3.13, 3.14

			4.2

- Motherboard form factor
  - ATX
  - mATX
  - ITX
  - mITX
- Motherboard connectors types
  - PCI
  - PCIe
  - Riser card
  - Socket types
  - SATA
  - IDE
  - Front panel connector
  - Internal USB connector
- BIOS/UEFI settings
  - Boot options
  - Firmware updates
  - Security settings
  - Interface configurations
  - Security - Passwords
  - Security - Drive encryption - TPM
  - Security - Drive encryption - LoJack
  - Security - Drive encryption - Secure boot
- CMOS battery
- CPU features
  - Single-core
  - Multicore
  - Virtual technology
  - Hyperthreading
  - Speeds
  - Overclocking
  - Integrated GPU
- Compatibility
  - AMD
  - Intel
- Cooling mechanism
  - Fans
  - Heat sink
  - Liquid
  - Thermal paste
- Expansion cards
  - Video cards - Onboard

4.2
5.1, 5.2
6.2
9.2
13.5

		o Video cards - Add-on card o Sound cards o Network interface card o USB expansion card o eSATA card	

3.6	Explain the purposes and uses of various peripheral types.
	
	    Printer
	    ADF/flatbed scanner
	    Barcode scanner/QR scanner
	    Monitors
	    VR headset
	    Optical
	    DVD drive
	    Mouse
	    Keyboard
	    Touchpad
	    Signature pad
	    Game controllers
	    Camera/webcam
	    Microphone
	    Speakers
	    Headset
	    Projector
	        o Lumens/brightness
	    External storage drives
	    KVM
	    Magnetic reader/chip reader
	    NFC/tap pay device
	    Smart card reader
	    External storage drives
	    KVM
	    Magnetic reader/chip reader
	    NFC/tap pay device
	    Smart card reader
		1.2
		3.12, 3.13
		4.1, 4.2, 4.4
		5.3
		8.2
		9.5
		10.2
		13.7

3.7	Summarize power supply types and features.
	
	    Input 115V vs. 220V
	    Output 5.5V vs. 12V
		3.2

	24-pin motherboard adapter Wattage rating Number of devices/types of devices to be powered	

3.8	Given a scenario, select and configure appropriate components for a custom PC configuration to meet customer specifications or needs.
	
	Graphic/CAD/CAM design workstation
	   o Multicore processor
	   o High-end video
	   o Maximum RAM
	Audio/video editing workstation
	   o Specialized audio and video card
	   o Large, fast hard drive
	   o Dual monitors
	Virtualization workstation
	   o Maximum RAM and CPU cores
	Gaming PC
	   o Multicore processor
	   o High-end video/specialized GPU
	   o High-definition sound card
	   o High-end cooling
	Standard thick client
	   o Desktop applications
	   o Meets recommended requirements for selected OS
	Thin client
	   o Basic applications
	   o Meets minimum requirements for selected OS
	   o Network connectivity
	Network attached storage device
	   o Media streaming
	   o File sharing
	   o Gigabit NIC
	   o RAID array
		10.1

3.9	Given a scenario, install and configure common devices.
	
	Desktop
	   o Thin client
	   o Thick client
	   o Account setup/settings
		7.1
		9.2, 9.5, 9.6
		10.1, 10.2
		11.3

	Laptop/common mobile devices
	   o Touchpad configuration
	   o Touchscreen configuration
	   o Application installations/configurations
	   o Synchronization settings
	   o Account setup/settings
	   o Wireless settings	

3.10	Given a scenario, configure SOHO multifunction devices/printers and settings.
	
	Use appropriate drivers for a given operating system
	   o Configuration settings - Duplex
	   o Configuration settings - Collate
	   o Configuration settings - Orientation
	   o Configuration settings - Quality
	Device sharing
	   o Wired - USB
	   o Wired - Serial
	   o Wired - Ethernet
	   o Wireless - Bluetooth
	   o Wireless - 802.11(a, b, g, n, ac)
	   o Wireless - Infrastructure vs. ad hoc
	   o Integrated print server (hardware)
	   o Cloud printing/remote printing
	Public/shared devices
	   o Sharing local/networked device via operating system settings - TCP/Bonjour/AirPrint
	   o Data privacy - User authentication on the device
	   o Data privacy - Hard drive caching
		8.2, 8.3, 8.4

3.11	Given a scenario, install and maintain various print technologies.
	
	Laser
	   o Imaging drum, fuser assembly, transfer belt, transfer roller, pickup rollers, separate pads, duplexing assembly
	   o Imaging process: processing, charging, exposing, developing, transferring, fusing, and cleaning
	   o Maintenance: Replace toner, apply maintenance kit, calibrate, clean
	Inkjet
	   o Ink cartridge, print head, roller, feeder, duplexing assembly, carriage, and belt
	   o Calibrate
	   o Maintenance: Clean heads, replace cartridges, calibrate, clear jams
		8.1, 8.2, 8.5

Thermal
- o   Feed assembly, heating element
- o   Special thermal paper
- o   Maintenance: Replace paper, clean heating element, remove debris

Impact
- o   Print head, ribbon, tractor feed
- o   Impact paper
- o   Maintenance: Replace ribbon, replace print head, replace paper

Virtual
- o   Print to file
- o   Print to PDF
- o   Print to XPS
- o   Print to image

3D printers
- o   Plastic filament

4.0	Virtualization and Cloud Computing	
4.1	Compare and contrast cloud computing concepts.	10.5

Common cloud models
- o   IaaS
- o   SaaS
- o   PaaS
- o   Public vs. private vs. hybrid vs. community

Shared resources
- o   Internal vs. external

Rapid elasticity

On-demand

Resource pooling

Measured service

Metered

Off-site email applications

Cloud file storage services
- o   Synchronization apps

Virtual application streaming/cloud-based applications
- o   Applications for cell phones/tablets
- o   Applications for laptops/desktops

Virtual desktop
- o   Virtual NIC

4.2	Given a scenario, set up and configure client-side virtualization.	10.5
	Purpose of virtual machines Resource requirements Emulator requirements Security requirements Network requirements Hypervisor	
5.0	**Hardware and Network Troubleshooting**	

5.1	Given a scenario, use the best practice methodology to resolve problems.
	
	Always consider corporate policies, procedures, and impacts before implementing changes
	
	1. Identify the problem
	   o Question the user and identify user changes to computer and perform backups before making changes
	   o Inquire regarding environmental or infrastructure changes
	   o Review system and application logs
	2. Establish a theory of probable cause (question the obvious)
	   o If necessary, conduct external or internal research based on symptoms
	3. Test the theory to determine cause
	   o Once the theory is confirmed, determine the next steps to resolve problem
	   o If theory is not confirmed re-establish new theory or escalate
	4. Establish a plan of action to resolve the problem and implement the solution
	5. Verify full system functionality and, if applicable, implement preventive measures
	6. Document findings, actions, and outcomes
		2.6

5.2	Given a scenario, troubleshoot problems related to motherboards, RAM, CPUs, and power.
	
	Common symptoms
	   o Unexpected shutdowns
	   o System lockups
	   o POST code beeps
	   o Blank screen on bootup
	   o BIOS time and setting resets
	   o Attempts to boot to incorrect device
	   o Continuous reboots
	   o No power
	   o Overheating
		3.4, 3.9

	o Loud noise o Intermittent device failure o Fans spin – no power to other devices o Indicator lights o Smoke o Burning smell o Proprietary crash screens (BSOD/pin wheel) o Distended capacitors o Log entries and error messages		

5.3	Given a scenario, troubleshoot hard drives and RAID arrays.
	
	Common symptoms
	    o Read/write failure
	    o Slow performance
	    o Loud clicking noise
	    o Failure to boot
	    o Drive not recognized
	    o OS not found
	    o RAID not found
	    o RAID stops working
	    o Proprietary crash screens (BSOD/pin wheel)
	    o S.M.A.R.T. errors
		5.10	

5.4	Given a scenario, troubleshoot video, projector, and display issues.
	
	Common symptoms
	    o VGA mode
	    o No image on screen
	    o Overheat shutdown
	    o Dead pixels
	    o Artifacts
	    o Incorrect color patterns
	    o Dim image
	    o Flickering image
	    o Distorted image
	    o Distorted geometry
	    o Burn-in
	    o Oversized images and icons
	    o Multiple failed jobs in logs
		4.4	

5.5	Given a scenario, troubleshoot common mobile device issues while adhering to the appropriate procedures.	9.2, 9.4, 9.8
	Common symptoms o No display o Dim display o Flickering display o Sticking keys o Intermittent wireless o Battery not charging o Ghost cursor/pointer drift o No power o Num lock indicator lights o No wireless connectivity o No Bluetooth connectivity o Cannot display to external monitor o Touchscreen non-responsive o Apps not loading o Slow performance o Unable to decrypt email o Extremely short battery life o Overheating o Frozen system o No sound from speakers o GPS not functioning o Swollen battery Disassembling processes for proper reassembly o Document and label cable and screw locations o Organize parts o Refer to manufacturer resources o Use appropriate hand tools	
5.6	Given a scenario, troubleshoot printers.	8.6
	Common symptoms o Streaks o Faded prints o Ghost images o Toner not fused to the paper o Creased paper o Paper not feeding o Paper jam o No connectivity	

		- Garbled characters on paper - Vertical lines on page - Backed-up print queue - Low memory errors - Access denied - Printer will not print - Color prints in wrong print color - Unable to install printer - Error codes - Printing blank pages - No image on printer display	
5.7	Given a scenario, troubleshoot common wired and wireless network problems. Common symptoms - Limited connectivity - Unavailable resources - Internet - Unavailable resources - Local resources - Shares - Unavailable resources - Local resources - Printers - Unavailable resources - Local resources - Email - No connectivity - APIPA/link local address - Intermittent connectivity - IP conflict - Slow transfer speeds - Low RF signal - SSID not found - Unavailable resources - Internet - Unavailable resources - Local resources - Shares - Unavailable resources - Local resources - Printers - Unavailable resources - Local resources - Email - No connectivity - APIPA/link local address - Intermittent connectivity - IP conflict - Slow transfer speeds - Low RF signal - SSID not found	6.9, 6.10 7.5

Objective Mapping: LabSim Section to CompTIA 220-1002 Objectives

The TestOut PC Pro course covers the following CompTIA A+ Certification 220-1002 exam objectives:

Section	Title	Objectives
1.0	**Computing Overview**	
1.1	Course Introduction	
1.2	Hardware Basics	
1.3	Windows Basics	1.1 Compare and contrast common operating system types and their purposes. Workstation operating systems o Microsoft Windows
1.4	Linux Basics	1.1 Compare and contrast common operating system types and their purposes. Workstation operating systems o Linux 1.9 Given a scenario, use features and tools of the Mac OS and Linux client/desktop operating systems. Tools o Shell/Terminal Basic Linux commands o ls o cd o shutdown o pwd vs. passwd o mv o cp o rm o iwconfig/ifconfig o su/sudo

		o dd 4.8 Identify the basics of scripting. Environment variables

1.5	macOS Basics	1.1 Compare and contrast common operating system types and their purposes.
		
		Workstation operating systems
		    o Apple Macintosh OS
		
		1.3 Summarize general OS installation considerations and upgrade methods.
		
		File system types/formatting
		    o HFS
		
		1.9 Given a scenario, use features and tools of the Mac OS and Linux client/desktop operating systems.
		
		Features
		    o Multiple desktops/Mission Control
		    o Key Chain
		    o Spot Light
		    o iCloud
		    o Gestures
		    o Finder
		    o Remote Disc
		    o Dock
		    o Boot Camp

2.0	**PC Technician Responsibilities**	

2.1	Protection and Safety	4.4 Explain common safety procedures.
		
		Equipment grounding
		Proper component handling and storage
		    o Antistatic bags
		    o ESD straps
		    o ESD mats
		    o Self-grounding

		Toxic waste handling
		- Batteries - Toner - CRT - Cell phones - Tablets Personal safety - Disconnect power before repairing PC - Remove jewelry - Lifting techniques - Weight limitations - Electrical fire safety - Cable management - Safety goggles - Air filter mask Compliance with government regulations 4.5 Explain environmental impacts and appropriate controls. MSDS documentation for handling and disposal Temperature, humidity level awareness, and proper ventilation Protection from airborne particles - Enclosures - Air filters/mask Dust and debris - Compressed air - Vacuums Compliance to government regulations
2.2	Professionalism	4.7 Given a scenario, use proper communication techniques and professionalism. Use proper language and avoid jargon, acronyms, and slang, when applicable Maintain a positive attitude/project confidence Actively listen (taking 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 calls - Texting/social media sites - Talking to coworkers while interacting with customers - Personal interruptions

			Dealing with difficult customers or situations
			o Do not argue with customers and/or be defensive
			o Avoid dismissing customer problems
			o Avoid being judgmental
			o Clarify customer statements (ask open-ended questions to narrow the scope of the problem, restate the issue, or question to verify understanding)
			o Do not disclose experiences via social media outlets
			Set and meet expectations/timeline and communicate status with the customer
			o Offer different repair/replacement options, if applicable
			o Provide proper documentation on the services provided
			o Follow up with customer/user at a later date to verify satisfaction
			Deal appropriately with customers' confidential and private materials
			o Located on a computer, desktop, printer, etc.
2.3	Change Management		4.2 Given a scenario, implement basic change management best practices.
			Documented business processes
			Purpose of the change
			Scope the change
			Risk analysis
			Plan for change
			End-user acceptance
			Change board
			o Approvals
			Backout plan
			Document changes
2.4	PC Tools		
2.5	PC Maintenance		4.3 Given a scenario, implement basic disaster prevention and recovery methods.
			UPS
			Surge protector
			4.5 Explain environmental impacts and appropriate controls.
			Power surges, brownouts, and blackouts
			o Battery backup
			o Surge suppressor

2.6	Troubleshooting Process Overview	4.1 Compare and contrast best practices associated with types of documentation.
		Network topology diagrams Knowledge base/articles
3.0	**System Components**	
3.1	Cases and Form Factors	
3.2	Power Supplies	
3.3	Motherboards and Buses	
3.4	Motherboard Troubleshooting	

3.5	Processors	1.1 Compare and contrast common operating system types and their purposes.
		
		32-bit vs. 64-bit
		   o RAM limitations
		   o Software compatibility

3.6	Processor Troubleshooting	
3.7	Memory	1.7 Summarize application installation and configuration concepts. System requirements o RAM
3.8	Memory Installation	
3.9	Memory Troubleshooting	1.5 Given a scenario, use Microsoft operating system features and tools. Administrative o Windows Memory Diagnostics
3.10	BIOS/UEFI	
3.11	Expansion Cards	
3.12	Video	

3.13	Audio	1.6 Given a scenario, use Microsoft Windows Control Panel utilities. Sound
3.14	Cooling	
4.0	**Peripheral Devices**	
4.1	Peripheral Devices	4.1 Compare and contrast best practices associated with types of documentation. Inventory management o Barcodes
4.2	USB	

4.3	Display Devices	1.6 Given a scenario, use Microsoft Windows Control Panel utilities.
		
		Display/Display Settings
		   o Resolution
		   o Color depth
		   o Refresh rate

4.4	Video Troubleshooting	

4.5	Device Driver Management	1.5 Given a scenario, use Microsoft operating system features and tools.
		
		Administrative
		   o Computer Management
		   o Device Manager
		   o Local Users and Groups
		   o Local Security Policy
		   o Performance Monitor
		   o Services
		   o System Configuration
		   o Task Scheduler
		   o Component Services
		   o Data Sources
		   o Print Management
		   o Windows Memory Diagnostics
		   o Windows Firewall

		o Advanced Security
		
		1.6 Given a scenario, use Microsoft Windows Control Panel utilities.
		
		    Device Manager
		
		1.9 Given a scenario, use features and tools of the Mac OS and Linux client/desktop operating systems.
		
		    Best practices
		       o Driver/firmware updates

4.6	Device Driver Troubleshooting	1.5 Given a scenario, use Microsoft operating system features and tools.
		
		    Administrative
		       o Computer Management
		       o Device Manager
		       o Local Users and Groups
		       o Local Security Policy
		       o Performance Monitor
		       o Services
		       o System Configuration
		       o Task Scheduler
		       o Component Services
		       o Data Sources
		       o Print Management
		       o Windows Memory Diagnostics
		       o Windows Firewall
		       o Advanced Security
		
		3.1 Given a scenario, troubleshoot Microsoft Windows OS problems.
		
		    Common solutions
		       o Roll back updates
		       o Roll back devices drivers

5.0	**Storage**	
5.1	Storage Devices	

5.2	SATA	
5.3	Optical Media	
5.4	RAID	

5.5	File Systems	1.3 Summarize general OS installation considerations and upgrade methods.
		
		Partitioning
		   o Dynamic
		   o Basic
		   o Primary
		   o Extended
		   o Logical
		   o GPT
		File system types/formatting
		   o ExFAT
		   o FAT32
		   o NTFS
		   o CDFS
		   o NFS
		   o ext3, ext4
		   o Quick format vs. full format

5.6	File System Creation	1.3 Summarize general OS installation considerations and upgrade methods.
		
		Partitioning
		   o Dynamic
		   o Basic
		   o Primary
		   o Extended
		   o Logical
		
		1.4 Given a scenario, use appropriate Microsoft command line tools.
		
		diskpart
		gpupdate
		format
		
		1.5 Given a scenario, use Microsoft operating system features and tools.
		
		Disk Management

		o Drive status o Mounting o Initializing o Extending partitions o Splitting partitions o Shrink partitions o Assigning/changing drive letters o Adding drives o Adding arrays o Storage spaces 1.7 Summarize application installation and configuration concepts. System requirements o RAM

5.7	Storage Management	1.5 Given a scenario, use Microsoft operating system features and tools.
		
		Disk Management
		   o Drive status
		   o Mounting
		   o Initializing
		   o Extending partitions
		   o Splitting partitions
		   o Shrink partitions
		   o Assigning/changing drive letters
		   o Adding drives
		   o Adding arrays
		   o Storage spaces

5.8	Storage Spaces	1.5 Given a scenario, use Microsoft operating system features and tools.
		
		Disk Management
		   o Drive status
		   o Mounting
		   o Initializing
		   o Extending partitions
		   o Splitting partitions
		   o Shrink partitions
		   o Assigning/changing drive letters
		   o Adding drives

		o Adding arrays o Storage spaces

5.9	Disk Optimization	1.4 Given a scenario, use appropriate Microsoft command line tools.
		
		      chkdsk
		
		1.5 Given a scenario, use Microsoft operating system features and tools.
		
		      System utilities
		            o Regedit
		            o Msinfo32
		            o DxDiag
		            o Disk Defragmenter

5.10	Storage Troubleshooting	
6.0	**Networking**	
6.1	Networking Overview	

6.2	Network Hardware	1.8 Given a scenario, configure Microsoft Windows networking on a client/desktop.
		
		      Network card properties
		            o Half duplex/full duplex/auto
		            o Speed
		            o Wake-on-LAN
		            o QoS
		            o BIOS (on-board NIC)

6.3	Networking Media	

6.4	Ethernet	1.8 Given a scenario, configure Microsoft Windows networking on a client/desktop.
		
		      Establish networking connections
		            o WWAN (Cellular)

6.5	IP Networking	4.9 Given a scenario, use remote access technologies.

		RDP Telnet SSH Third-party tools o File share

6.6	IP Configuration	1.6 Given a scenario, use Microsoft Windows Control Panel utilities.
		
		    Network and Sharing Center
		
		1.8 Given a scenario, configure Microsoft Windows networking on a client/desktop.
		
		    Configuring an alternative IP address in Windows
		        o IP addressing
		        o Subnet mask
		        o DNS
		        o Gateway

6.7	IP Version 6	

6.8	Internet Connectivity	1.8 Given a scenario, configure Microsoft Windows networking on a client/desktop.
		
		    Establish networking connections
		        o Dial-ups
		        o Wired

6.9	Network Utilities	1.4 Given a scenario, use appropriate Microsoft command line tools.
		
		    ipconfig
		    ping
		    tracert
		    netstat
		    nslookup
		
		1.9 Given a scenario, use features and tools of the Mac OS and Linux client/desktop operating systems.
		
		    Basic Linux commands

		o iwconfig/ifconfig 2.5 Compare and contrast social engineering, threats, and vulnerabilities. DoS
6.10	Network Troubleshooting	3.1 Given a scenario, troubleshoot Microsoft Windows OS problems. Common solutions o Update network settings
7.0	**Wireless Networking**	
7.1	802.11 Wireless	1.8 Given a scenario, configure Microsoft Windows networking on a client/desktop. Establish networking connections o Wireless 2.2 Explain logical security concepts. Certificates 2.3 Compare and contrast wireless security protocols and authentication methods. Protocols and encryption o WEP o WPA o WPA2 o TKIP o AES Authentication o RADIUS o TACACS
7.2	Infrared, Bluetooth, and NFC	
7.3	SOHO Configuration	
7.4	Internet of Things	

7.5	Wireless Network Troubleshooting	3.1 Given a scenario, troubleshoot Microsoft Windows OS problems.
		
		Common symptoms
		   o Limited connectivity
		Common solutions
		   o Update network settings

8.0	**Printing**	
8.1	Printers	
8.2	Printer Configuration	1.6 Given a scenario, use Microsoft Windows Control Panel utilities. Devices and Printers
8.3	Network Printing	1.8 Given a scenario, configure Microsoft Windows networking on a client/desktop. Printer sharing vs. network printer mapping

8.4	Printing Management	1.5 Given a scenario, use Microsoft operating system features and tools.
		
		Administrative
		   o Computer Management
		   o Device Manager
		   o Local Users and Groups
		   o Local Security Policy
		   o Performance Monitor
		   o Services
		   o System Configuration
		   o Task Scheduler
		   o Component Services
		   o Data Sources
		   o Print Management
		   o Windows Memory Diagnostics
		   o Windows Firewall
		   o Advanced Security

8.5	Printer Maintenance	

8.6	Printer Troubleshooting	3.1 Given a scenario, troubleshoot Microsoft Windows OS problems. Common symptoms o Printing issues
9.0	**Mobile Devices**	
9.1	Laptops	
9.2	Laptop Components	

9.3	Laptop Power Management	1.6 Given a scenario, use Microsoft Windows Control Panel utilities.
		
		Power Options
		   o Hibernate
		   o Power plans
		   o Sleep/suspend
		   o Standby

9.4	Laptop Troubleshooting	

9.5	Mobile Devices	1.1 Compare and contrast common operating system types and their purposes.
		
		Cell phone/tablet operating systems
		   o Microsoft Windows
		   o Android
		   o iOS
		   o Chrome OS

9.6	Mobile Device Networking	

9.7	Mobile Device Security	2.2 Explain logical security concepts.
		
		MDM policies
		
		2.8 Given a scenario, implement methods for securing mobile devices.
		
		Screen locks
		   o Fingerprint lock
		   o Face lock
		   o Swipe lock

		o Passcode lock
		Remote wipes
		Locator applications
		Remote backup applications
		Failed login attempts restrictions
		Antivirus/Anti-malware
		Patching/OS updates
		Biometric authentication
		Full device encryption
		Multifactor authentication
		Authenticator applications
		Trusted sources vs. untrusted sources
		Firewalls
		Policies and procedures
		       o BYOD vs. corporate-owned
		       o Profile security requirements
		
		3.5 Given a scenario, troubleshoot mobile OS and application security issues.
		
		Common symptoms
		       o Signal drop/weak signal
		       o Power drain
		       o Slow data speeds
		       o Unintended WiFi connection
		       o Unintended Bluetooth pairing
		       o Leaked personal files/data
		       o Data transmission over limit
		       o Unauthorized account access
		       o Unauthorized location tracking
		       o Unauthorized camera/microphone activation
		       o High resource utilization
		
		4.3 Given a scenario, implement basic disaster prevention and recovery methods.
		
		Cloud storage vs. local storage backups

9.8	Mobile Device Troubleshooting	3.4 Given a scenario, troubleshoot mobile OS and application issues.
		
		Common symptoms
		       o Dim display
		       o Intermittent wireless

		o No wireless connectivity o No Bluetooth connectivity o Cannot broadcast to external monitor o Touchscreen non-responsive o Apps not loading o Slow performance o Unable to decrypt email o Extremely short battery life o Overheating o Frozen system o No sound from speakers o Inaccurate touch screen response o System lockout o App log errors 3.5 Given a scenario, troubleshoot mobile OS and application security issues. Common symptoms o Slow data speeds o Data transmission over limit o High resource utilization
10.0	**System Implementation**	
10.1	Component Selection	
10.2	Windows Pre-Installation	1.1 Compare and contrast common operating system types and their purposes. Workstation operating systems o Microsoft Windows o Apple Macintosh OS o Linux Compatibility concerns between operating systems 1.2 Compare and contrast features of Microsoft Windows versions. Windows 7 Windows 8 Windows 8.1 Windows 10 Corporate vs. personal needs o Domain access

- o Media center
- o Branchcache

Desktop styles/user interface

1.3 Summarize general OS installation considerations and upgrade methods.

Type of installations
- o Unattended installation
- o In-place upgrade
- o Clean install
- o Repair installation
- o Multiboot
- o Remote network installation
- o Image deployment
- o Recovery partition
- o Refresh/restore

Properly formatted boot drive with the correct partitions/format
Prerequisites/hardware compatibility
OS compatibility/upgrade path

1.6 Given a scenario, use Microsoft Windows Control Panel utilities.

HomeGroup

1.7 Summarize application installation and configuration concepts.

OS requirements
- o Compatibility

Methods of installation and deployment
- o Local (CD/USB)
- o Network-based

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

HomeGroup vs. Workgroup
Domain setup

3.1 Given a scenario, troubleshoot Microsoft Windows OS problems.

Common solutions

			o Rebuild Windows profiles 4.3 Given a scenario, implement basic disaster prevention and recovery methods. Account recovery options

10.3	Windows Installation		1.3 Summarize general OS installation considerations and upgrade methods.
			
			    Boot methods
			        o USB
			        o CD-ROM
			        o DVD
			        o PXE
			        o Solid state/flash drives
			        o Netboot
			        o External/hot-swappable drive
			        o Internal hard drive (partition)
			    Load alternate third-party drivers when necessary
			    Time/date/region/language settings
			    Driver installation, software, and Windows updates
			    Factory recovery partition
			    Properly formatted boot drive with the correct partitions/format
			
			1.4 Given a scenario, use appropriate Microsoft command line tools.
			
			    dism
			
			1.7 Summarize application installation and configuration concepts.
			
			    Methods of installation and deployment
			        o Local (CD/USB)
			        o Network-based

10.4	Post-Installation		
10.5	Virtualization		
11.0	**File Management**		

11.1	Windows File Locations	2.6 Compare and contrast the differences of basic Microsoft Windows OS security settings. System files and folders 4.8 Identify the basics of scripting. Environment variables
11.2	Manage Files on Windows	1.4 Given a scenario, use appropriate Microsoft command line tools. Navigation ipconfig nslookup copy xcopy robocopy 1.6 Given a scenario, use Microsoft Windows Control Panel utilities. Folder Options o View hidden files o Hide extensions o General options o View options 2.6 Compare and contrast the differences of basic Microsoft Windows OS security settings. NTFS vs. share permissions o Allow vs. deny o Moving vs. copying folders and files o File attributes 4.8 Identify the basics of scripting. Script file types o .bat o .ps1 o .vbs o .sh o .py

		o .js
		Comment syntax
		Basic script constructs
		    o Basic loops
		    o Variables
		Basic data types
		    o Integers
		    o Strings

11.3	NTFS Permissions	1.7 Summarize application installation and configuration concepts.
		
		    Local user permissions
		        o Folder/file access for installation
		
		2.6 Compare and contrast the differences of basic Microsoft Windows OS security settings.
		
		    NTFS vs. share permissions
		        o Allow vs. deny
		        o Moving vs. copying folders and files
		        o File attributes

11.4	Shared Folders	1.3 Summarize general OS installation considerations and upgrade methods.
		
		    Workgroup vs. Domain setup
		
		1.4 Given a scenario, use appropriate Microsoft command line tools.
		
		    net use
		
		1.5 Given a scenario, use Microsoft operating system features and tools.
		
		    System utilities
		        o Regedit
		        o Msinfo32
		        o DxDiag
		        o Disk Defragmenter
		
		1.8 Given a scenario, configure Microsoft Windows networking on a client/desktop.

		Network shares/administrative shares/mapping drives
		
		2.6 Compare and contrast the differences of basic Microsoft Windows OS security settings.
		
		Shared files and folders
		    o Administrative shares vs. local shares
		    o Permission propagation
		    o Inheritance
		
		4.9 Given a scenario, use remote access technologies.
		
		Third-party tools
		    o File share

11.5	Linux File Management	1.9 Given a scenario, use features and tools of the Mac OS and Linux client/desktop operating systems.
		
		Basic Linux commands
		    o ls
		    o grep
		    o cd
		    o shutdown
		    o pwd vs. passwd
		    o mv
		    o cp
		    o rm
		    o chmod
		    o chown
		    o vi
		    o dd

12.0	**System Management**	
12.1	Windows System Tools	1.4 Given a scenario, use appropriate Microsoft command line tools. shutdown taskkill gpupdate gpresult [command name] /?

Commands available with standard privileges vs. administrative privileges

1.5 Given a scenario, use Microsoft operating system features and tools.

Administrative
- o Computer Management
- o Device Manager
- o Local Users and Groups
- o Local Security Policy
- o Performance Monitor
- o Services
- o System Configuration
- o Task Scheduler
- o Component Services
- o Data Sources
- o Print Management
- o Windows Memory Diagnostics
- o Windows Firewall
- o Advanced Security
- o Event Viewer
- o User Account Management

MSConfig
- o General
- o Boot
- o Services
- o Startup
- o Tools

Task Manager
- o Applications
- o Processes
- o Performance
- o Networking
- o Users

System utilities
- o Regedit
- o Command
- o Services.msc
- o MMC
- o MSTSC
- o Notepad
- o Explorer
- o Msinfo32
- o DxDiag

		o Disk Defragmenter
		o System Restore
		o Windows Update
		
		1.6 Given a scenario, use Microsoft Windows Control Panel utilities.
		
		    Troubleshooting
		    Sync Center
		
		1.9 Given a scenario, use features and tools of the Mac OS and Linux client/desktop operating systems.
		
		    Basic Linux commands
		        o kill
		
		2.6 Compare and contrast the differences of basic Microsoft Windows OS security settings.
		
		    Run as administrator vs. standard user
		
		2.7 Given a scenario, implement security best practices to secure a workstation.
		
		    Account management
		        o Timeout/screen lock
		
		3.1 Given a scenario, troubleshoot Microsoft Windows OS problems.
		
		    Common symptoms
		        o Services fail to start
		    Common solutions
		        o Kill tasks
		        o Disable application startup
		
		4.8 Identify the basics of scripting.
		
		    Environment variables

12.2	Preferences and Settings	
12.3	Performance Monitoring	1.5 Given a scenario, use Microsoft operating system features and tools.

			Administrative
			o Computer Management
			o Device Manager
			o Local Users and Groups
			o Local Security Policy
			o Performance Monitor
			o Services
			o System Configuration
			o Task Scheduler
			o Component Services
			o Data Sources
			o Print Management
			o Windows Memory Diagnostics
			o Windows Firewall
			o Advanced Security
12.4	Active Directory		2.2 Explain logical security concepts.
			Active Directory
			o Login script
			o Domain
			o Group Policy/Updates
			o Organizational Units
			o Home Folder
			o Folder redirection
			2.7 Given a scenario, implement security best practices to secure a workstation.
			Account management
			o Basic Active Directory functions - Account creation
			o Basic Active Directory functions - Account deletion
			o Basic Active Directory functions - Password reset/unlock account
			o Basic Active Directory functions - Disable account
12.5	Users and Groups		1.4 Given a scenario, use appropriate Microsoft command line tools.
			net user
			1.5 Given a scenario, use Microsoft operating system features and tools.

Administrative
- o Computer Management
- o Device Manager
- o Local Users and Groups
- o Local Security Policy
- o Performance Monitor
- o Services
- o System Configuration
- o Task Scheduler
- o Component Services
- o Data Sources
- o Print Management
- o Windows Memory Diagnostics
- o Windows Firewall
- o Advanced Security
- o User Account Management

1.6 Given a scenario, use Microsoft Windows Control Panel utilities.

User Accounts

2.2 Explain logical security concepts.

Active Directory
- o Domain
- o Group Policy/Updates

2.6 Compare and contrast the differences of basic Microsoft Windows OS security settings.

User and groups
- o Administrator
- o Power user
- o Guest
- o Standard user

2.7 Given a scenario, implement security best practices to secure a workstation.

Account management
- o Restricting user permissions
- o Logon time restrictions
- o Disabling guest account
- o Basic Active Directory functions - Account creation

		o Basic Active Directory functions - Account deletion o Basic Active Directory functions - Disable account

12.6	Remote Services	1.6 Given a scenario, use Microsoft Windows Control Panel utilities.
		
		System
		    o Performance (virtual memory)
		    o Remote settings
		    o System protection
		
		1.8 Given a scenario, configure Microsoft Windows networking on a client/desktop.
		
		Remote Desktop Connection
		Remote Assistance
		
		1.9 Given a scenario, use features and tools of the Mac OS and Linux client/desktop operating systems.
		
		Tools
		    o Screen sharing
		
		4.9 Given a scenario, use remote access technologies.
		
		Third-party tools
		    o Screen share feature
		Security considerations of each access method

12.7	Windows Application Management	1.5 Given a scenario, use Microsoft operating system features and tools.
		
		Administrative
		    o Computer Management
		    o Device Manager
		    o Local Users and Groups
		    o Local Security Policy
		    o Performance Monitor
		    o Services
		    o System Configuration
		    o Task Scheduler
		    o Component Services
		    o Data Sources

		- Print Management - Windows Memory Diagnostics - Windows Firewall - Advanced Security 1.6 Given a scenario, use Microsoft Windows Control Panel utilities. Programs and features
12.8	Linux Application Management	1.9 Given a scenario, use features and tools of the Mac OS and Linux client/desktop operating systems. Tools - Force Quit Basic Linux commands - ps - su/sudo - apt-get - kill
12.9	Digital Content Management	4.6 Explain the processes for addressing prohibited content/activity, and privacy, licensing, and policy concepts. Licensing/DRM/EULA - Open-source vs. commercial license - Personal license vs. enterprise licenses
12.10	Updates	1.1 Compare and contrast common operating system types and their purposes. Vendor-specific limitations - End-of-life - Update limitations 1.3 Summarize general OS installation considerations and upgrade methods. OS compatibility/upgrade path 1.5 Given a scenario, use Microsoft operating system features and tools.

		System utilities
		o Regedit
		o Command
		o Services.msc
		o MMC
		o MSTSC
		o Notepad
		o Explorer
		o Msinfo32
		o DxDiag
		o Disk Defragmenter
		o System Restore
		o Windows Update
		1.7 Summarize application installation and configuration concepts.
		OS requirements
		o Compatibility
		1.9 Given a scenario, use features and tools of the Mac OS and Linux client/desktop operating systems.
		Best practices
		o System updates/App Store
		o Patch management
		2.7 Given a scenario, implement security best practices to secure a workstation.
		Patch/update management
12.11	System Backup	1.3 Summarize general OS installation considerations and upgrade methods.
		File system types/formatting
		o HFS
		1.9 Given a scenario, use features and tools of the Mac OS and Linux client/desktop operating systems.
		Best practices
		o Scheduled backups

		Tools
		   o Backup/Time Machine
		   o Restore/Snapshot
		
		3.1 Given a scenario, troubleshoot Microsoft Windows OS problems.
		
		Common solutions
		   o Rebuild Windows profiles
		
		4.3 Given a scenario, implement basic disaster prevention and recovery methods.
		
		Backup and recovery
		   o Image level
		   o File level
		   o Critical applications
		Backup testing

12.12	System Recovery	1.5 Given a scenario, use Microsoft operating system features and tools.
		
		System utilities
		   o Regedit
		   o Command
		   o Services.msc
		   o MMC
		   o MSTSC
		   o Notepad
		   o Explorer
		   o Msinfo32
		   o DxDiag
		   o Disk Defragmenter
		   o System Restore
		   o Windows Update
		
		1.6 Given a scenario, use Microsoft Windows Control Panel utilities.
		
		System
		   o Performance (virtual memory)
		   o Remote settings
		   o System protection

		1.9 Given a scenario, use features and tools of the Mac OS and Linux client/desktop operating systems.
		
		    Tools
		        o Restore/Snapshot
		        o Image recovery
		
		3.1 Given a scenario, troubleshoot Microsoft Windows OS problems.
		
		    Common solutions
		        o Disable Windows services/applications
		        o Rebuild Windows profiles

12.13	Virtual Memory	1.6 Given a scenario, use Microsoft Windows Control Panel utilities.
		
		    System
		        o Performance (virtual memory)
		        o Remote settings
		        o System protection

12.14	Operating System Troubleshooting	1.3 Summarize general OS installation considerations and upgrade methods.
		
		    Application compatibility
		
		3.1 Given a scenario, troubleshoot Microsoft Windows OS problems.
		
		    Common symptoms
		        o Black screens
		        o Slow profile load
		    Common solutions
		        o Apply updates
		        o Repair application
		
		3.2 Given a scenario, troubleshoot and resolve PC security issues.
		
		    Common symptoms
		        o System/application log errors

		4.8 Identify the basics of scripting. Environment variables

12.15	Windows Boot Errors	1.4 Given a scenario, use appropriate Microsoft command line tools.
		
		    sfc
		
		3.1 Given a scenario, troubleshoot Microsoft Windows OS problems.
		
		    Common solutions
		        o Reboot
		        o Update boot order

13.0	**Security**	

13.1	Security Best Practices	2.2 Explain logical security concepts.
		
		    Trusted/untrusted software sources
		    Principle of least privilege
		
		2.7 Given a scenario, implement security best practices to secure a workstation.
		
		    Password best practices
		        o Setting strong passwords
		        o Password expiration
		        o Screensaver required password
		        o BIOS/UEFI passwords
		        o Requiring passwords
		    Account management
		        o Change default admin user account/password
		    Disable autorun
		
		4.1 Compare and contrast best practices associated with types of documentation.
		
		    Acceptable use policy
		    Password policy

		4.6 Explain the processes for addressing prohibited content/activity, and privacy, licensing, and policy concepts. Follow all policies and security best practices
13.2	Incident Response	1.3 Summarize general OS installation considerations and upgrade methods. File system types/formatting o Swap partition 4.1 Compare and contrast best practices associated with types of documentation. Incident documentation Regulatory and compliance policy 4.6 Explain the processes for addressing prohibited content/activity, and privacy, licensing, and policy concepts. Incident response o First response - Identify o First response - Report through proper channels o First response - Data/device preservation o Use of documentation/documentation changes o Chain of custody - Tracking of evidence/documenting process
13.3	Physical Security	2.1 Summarize the importance of physical security measures. Mantrap Badge reader Smart card Security guard Door lock Biometric locks Hardware tokens Cable locks Server locks USB locks Privacy screen Key fobs

Entry control roster

2.2 Explain logical security concepts.

    DLP
    Access control lists

2.7 Given a scenario, implement security best practices to secure a workstation.

    Password best practices
        o   Screensaver required password

2.9 Given a scenario, implement appropriate data destruction and disposal methods.

    Physical destruction
        o   Shredder
        o   Drill/hammer
        o   Electromagnetic (Degaussing)
        o   Incineration
        o   Certificate of destruction
    Recycling or repurposing best practices
        o   Low-level format vs. standard format
        o   Overwrite
        o   Drive wipe

4.1 Compare and contrast best practices associated with types of documentation.

    Regulatory and compliance policy
    Inventory management
        o   Asset tags

13.4	Social Engineering	4.6 Explain the processes for addressing prohibited content/activity, and privacy, licensing, and policy concepts.
		
		    Regulated data
		        o PII
		        o PCI
		        o GDPR
		        o PHI

13.5	BIOS/UEFI Security	2.7 Given a scenario, implement security best practices to secure a workstation.
		Password best practices
		o Setting strong passwords
		o Password expiration
		o Screensaver required password
		o BIOS/UEFI passwords
		o Requiring passwords
13.6	Malware Protection	1.9 Given a scenario, use features and tools of the Mac OS and Linux client/desktop operating systems.
		Best practices
		o Antivirus/Anti-malware updates
		2.2 Explain logical security concepts.
		Antivirus/Anti-malware
		2.4 Given a scenario, detect, remove, and prevent malware using appropriate tools and methods.
		Malware
		o Ransomware
		o Trojan
		o Keylogger
		o Rootkit
		o Virus
		o Botnet
		o Worm
		o Spyware
		2.5 Compare and contrast social engineering, threats, and vulnerabilities.
		Social engineering
		o Phishing
		o Spear phishing
		o Impersonation
		o Shoulder surfing
		o Tailgating
		o Dumpster diving
		DDoS

		DoS
		Zero-day
		Man-in-the-middle
		Brute force
		Dictionary
		Rainbow table
		Spoofing
		Non-compliant systems
		Zombie
		
		3.1 Given a scenario, troubleshoot Microsoft Windows OS problems.
		
		Common solutions
		    o Reimage/reload OS
		
		3.3 Given a scenario, use best practice procedures for malware removal.
		
		1. Identify and research malware symptoms.
		2. Quarantine the infected systems.
		3. Disable System Restore (in Windows).
		4. Remediate the infected systems.
		    a. Update the anti-malware software.
		    b. Scan and use removal techniques (safe mode, pre-installation environment).
		5. Schedule scans and run updates.
		6. Enable System Restore and create a restore point (in Windows).
		7. Educate the end user.

13.7	Authentication	1.5 Given a scenario, use Microsoft operating system features and tools.
		
		Administrative
		    o Computer Management
		    o Device Manager
		    o Local Users and Groups
		    o Local Security Policy
		    o Performance Monitor
		    o Services
		    o System Configuration
		    o Task Scheduler
		    o Component Services
		    o Data Sources
		    o Print Management

- o Windows Memory Diagnostics
- o Windows Firewall
- o Advanced Security

1.6 Given a scenario, use Microsoft Windows Control Panel utilities.

Credential Manager

2.2 Explain logical security concepts.

Software tokens
User authentication/strong passwords
Multifactor authentication
Directory permissions
Smart card

2.3 Compare and contrast wireless security protocols and authentication methods.

Authentication
- o Single-factor
- o Multifactor

2.6 Compare and contrast the differences of basic Microsoft Windows OS security settings.

User authentication
- o Single sign-on

2.7 Given a scenario, implement security best practices to secure a workstation.

Password best practices
- o Setting strong passwords
- o Password expiration
- o Screensaver required password
- o BIOS/UEFI passwords
- o Requiring passwords
Account management
- o Failed attempts lockout
- o Basic Active Directory functions - Password reset/unlock account

4.8 Identify the basics of scripting.

		Environment variables

13.8	File Encryption	1.2 Compare and contrast features of Microsoft Windows versions.
		
		Corporate vs. personal needs
		    o Bitlocker
		    o EFS
		
		1.6 Given a scenario, use Microsoft Windows Control Panel utilities.
		
		Bitlocker
		
		2.6 Compare and contrast the differences of basic Microsoft Windows OS security settings.
		
		BitLocker
		BitLocker To Go
		EFS
		
		2.7 Given a scenario, implement security best practices to secure a workstation.
		
		Data encryption

13.9	Network Security	2.2 Explain logical security concepts.
		
		Port security
		MAC address filtering
		
		2.7 Given a scenario, implement security best practices to secure a workstation.
		
		Account management
		    o Disabling guest account
		    o Basic Active Directory functions - Disable account
		
		2.10 Given a scenario, configure security on SOHO wireless and wired networks.
		
		Wireless-specific
		    o Changing default SSID
		    o Setting encryption
		    o Disabling SSID broadcast

			o Antenna and access point placement o Radio power levels o WPS Change default usernames and passwords Enable MAC filtering Assign static IP addresses Firewall settings Port forwarding/mapping Disabling ports Content filtering/parental controls Update firmware Physical security

13.10	Firewalls		1.5 Given a scenario, use Microsoft operating system features and tools.
			
			Administrative
			    o Computer Management
			    o Device Manager
			    o Local Users and Groups
			    o Local Security Policy
			    o Performance Monitor
			    o Services
			    o System Configuration
			    o Task Scheduler
			    o Component Services
			    o Data Sources
			    o Print Management
			    o Windows Memory Diagnostics
			    o Windows Firewall
			    o Advanced Security
			
			1.6 Given a scenario, use Microsoft Windows Control Panel utilities.
			
			Windows Firewall
			
			1.8 Given a scenario, configure Microsoft Windows networking on a client/desktop.
			
			Firewall settings
			    o Exceptions
			    o Configuration

		o Enabling/disabling Windows Firewall
		
		2.2 Explain logical security concepts.
		
		    Firewalls
		    Email filtering
		
		2.4 Given a scenario, detect, remove, and prevent malware using appropriate tools and methods.
		
		    Tools and methods
		        o Software firewalls

13.11	Proxy Servers	1.8 Given a scenario, configure Microsoft Windows networking on a client/desktop. Proxy settings

13.12	VPN	1.8 Given a scenario, configure Microsoft Windows networking on a client/desktop.
		
		    Establish networking connections
		        o VPN
		
		2.2 Explain logical security concepts.
		
		    VPN
		
		4.9 Given a scenario, use remote access technologies.
		
		    Security considerations of each access method

13.13	Security Troubleshooting	1.7 Summarize application installation and configuration concepts.
		
		    Security considerations
		        o Impact to device
		        o Impact to network
		
		2.4 Given a scenario, detect, remove, and prevent malware using appropriate tools and methods.
		
		    Tools and methods

- o Antivirus
- o Anti-malware
- o Recovery console
- o Backup/restore
- o End user education
- o SecureDNS

3.1 Given a scenario, troubleshoot Microsoft Windows OS problems.

Common symptoms
- o Slow performance
- o Slow bootup
Common solutions
- o Safe boot

3.2 Given a scenario, troubleshoot and resolve PC security issues.

Common symptoms
- o Pop-ups
- o Browser redirection
- o Security alerts
- o Slow performance
- o Internet connectivity issues
- o PC/OS lockup
- o Application crash
- o OS updates failures
- o Rogue antivirus
- o Spam
- o Renamed system files
- o Disappearing files
- o File permission changes
- o Hijacked email - Responses from users regarding email
- o Hijacked email - Automated replies from unknown sent email
- o Access denied
- o Invalid certificate (trusted root CA)
- o System/application log errors

| 14.0 | Capstone Exercises | |
| A.0 | PC Pro Certification Practice Exams | |

A.1	Preparing for Certification	
A.2	PC Pro Domain Practice	
B.0	**CompTIA A+ 220-1001 Core 1 Practice Exams**	
B.1	Preparing for Certification	
B.2	A+ 220-1001 Core 1 Domain Practice (20 Random Questions)	
B.3	A+ 220-1001 Core 1 Domain Practice (All Questions)	
C.0	**CompTIA A+ 220-1002 Core 2 Practice Exams**	
C.1	Preparing for Certification	
C.2	A+ 220-1002 Core 2 Domain Practice (20 Random Questions)	
C.3	A+ 220-1002 Core 2 Domain Practice (All Questions)	

Objective Mapping: CompTIA 220-1002 Objectives to LabSim Section

The TestOut PC Pro course and certification exam cover the following CompTIA A+ Certification 220-1002 objectives:

#	Domain	Section
1.0	**Operating Systems**	
1.1	Compare and contrast common operating system types and their purposes. 32-bit vs. 64-bit o RAM limitations o Software compatibility Workstation operating systems o Microsoft Windows o Apple Macintosh OS o Linux Cell phone/tablet operating systems o Microsoft Windows o Android o iOS o Chrome OS Vendor-specific limitations o End-of-life o Update limitations Compatibility concerns between operating systems	1.3, 1.4, 1.5 3.5 9.5 10.2 12.10
1.2	Compare and contrast features of Microsoft Windows versions. Windows 7 Windows 8 Windows 8.1 Windows 10 Corporate vs. personal needs o Domain access o Bitlocker o Media center o Branchcache o EFS	10.2 13.8

		Desktop styles/user interface	
1.3		Summarize general OS installation considerations and upgrade methods.	1.5 5.5, 5.6 10.2, 10.3 11.4 12.10, 12.11, 12.14 13.2

Boot methods
- o USB
- o CD-ROM
- o DVD
- o PXE
- o Solid state/flash drives
- o Netboot
- o External/hot-swappable drive
- o Internal hard drive (partition)

Type of installations
- o Unattended installation
- o In-place upgrade
- o Clean install
- o Repair installation
- o Multiboot
- o Remote network installation
- o Image deployment
- o Recovery partition
- o Refresh/restore

Partitioning
- o Dynamic
- o Basic
- o Primary
- o Extended
- o Logical
- o GPT

File system types/formatting
- o ExFAT
- o FAT32
- o NTFS
- o CDFS
- o NFS
- o ext3, ext4
- o HFS
- o Swap partition
- o Quick format vs. full format

Load alternate third-party drivers when necessary

Workgroup vs. Domain setup

		Time/date/region/language settings Driver installation, software, and Windows updates Factory recovery partition Properly formatted boot drive with the correct partitions/format Prerequisites/hardware compatibility Application compatibility OS compatibility/upgrade path	

1.4		Given a scenario, use appropriate Microsoft command line tools.
		
		Navigation
		    o dir
		    o cd..
		ipconfig
		ping
		tracert
		netstat
		nslookup
		shutdown
		dism
		sfc
		chkdsk
		diskpart
		taskkill
		gpupdate
		gpresult
		format
		copy
		xcopy
		robocopy
		net use
		net user
		[command name] /?
		Commands available with standard privileges vs. administrative privileges
			5.6, 5.9
			6.9
			10.3
			11.2, 11.4
			12.1, 12.5, 12.15

1.5		Given a scenario, use Microsoft operating system features and tools.
		
		Administrative
		    o Computer Management
		    o Device Manager
		    o Local Users and Groups
			3.9
			4.5, 4.6
			5.6, 5.7, 5.8, 5.9
			8.4
			11.4

- Local Security Policy
- Performance Monitor
- Services
- System Configuration
- Task Scheduler
- Component Services
- Data Sources
- Print Management
- Windows Memory Diagnostics
- Windows Firewall
- Advanced Security
- Event Viewer
- User Account Management

MSConfig
- General
- Boot
- Services
- Startup
- Tools

Task Manager
- Applications
- Processes
- Performance
- Networking
- Users

Disk Management
- Drive status
- Mounting
- Initializing
- Extending partitions
- Splitting partitions
- Shrink partitions
- Assigning/changing drive letters
- Adding drives
- Adding arrays
- Storage spaces

System utilities
- Regedit
- Command
- Services.msc
- MMC
- MSTSC
- Notepad

12.1, 12.3, 12.5, 12.7,
12.10, 12.12
13.7, 13.10

		o Explorer o Msinfo32 o DxDiag o Disk Defragmenter o System Restore o Windows Update	

1.6	Given a scenario, use Microsoft Windows Control Panel utilities.
	
	Internet Options
	    o Connections
	    o Security
	    o General
	    o Privacy
	    o Programs
	    o Advanced
	Display/Display Settings
	    o Resolution
	    o Color depth
	    o Refresh rate
	User Accounts
	Folder Options
	    o View hidden files
	    o Hide extensions
	    o General options
	    o View options
	System
	    o Performance (virtual memory)
	    o Remote settings
	    o System protection
	Windows Firewall
	Power Options
	    o Hibernate
	    o Power plans
	    o Sleep/suspend
	    o Standby
	Credential Manager
	Programs and features
	HomeGroup
	Devices and Printers
	Sound
	Troubleshooting
		3.13
		4.3, 4.5
		6.6
		8.2
		9.3
		10.2
		11.2
		12.1, 12.5, 12.6, 12.7,
		12.12, 12.13
		13.7, 13.8, 13.10	

		Network and Sharing Center Device Manager Network and Sharing Center Device Manager Bitlocker Sync Center	

1.7	Summarize application installation and configuration concepts.
	
	System requirements
	   o Drive space
	   o RAM
	OS requirements
	   o Compatibility
	Methods of installation and deployment
	   o Local (CD/USB)
	   o Network-based
	Local user permissions
	   o Folder/file access for installation
	Security considerations
	   o Impact to device
	   o Impact to network
		3.7
		5.6
		10.2, 10.3
		11.3
		12.10
		13.13

1.8	Given a scenario, configure Microsoft Windows networking on a client/desktop.
	
	HomeGroup vs. Workgroup
	Domain setup
	Network shares/administrative shares/mapping drives
	Printer sharing vs. network printer mapping
	Establish networking connections
	   o VPN
	   o Dial-ups
	   o Wireless
	   o Wired
	   o WWAN (Cellular)
	Proxy settings
	Remote Desktop Connection
	Remote Assistance
	Home vs. Work vs. Public network settings
	Firewall settings
	   o Exceptions
		6.2, 6.4, 6.6, 6.8
		7.1
		8.3
		10.2
		11.4
		12.6
		13.10, 13.11, 13.12

	o Configuration
	o Enabling/disabling Windows Firewall
	Configuring an alternative IP address in Windows
	    o IP addressing
	    o Subnet mask
	    o DNS
	    o Gateway
	Network card properties
	    o Half duplex/full duplex/auto
	    o Speed
	    o Wake-on-LAN
	    o QoS
	    o BIOS (on-board NIC)	

1.9	Given a scenario, use features and tools of the Mac OS and Linux client/desktop operating systems.
	
	Best practices
	    o Scheduled backups
	    o Scheduled disk maintenance
	    o System updates/App Store
	    o Patch management
	    o Driver/firmware updates
	    o Antivirus/Anti-malware updates
	Tools
	    o Backup/Time Machine
	    o Restore/Snapshot
	    o Image recovery
	    o Disk maintenance utilities
	    o Shell/Terminal
	    o Screen sharing
	    o Force Quit
	Features
	    o Multiple desktops/Mission Control
	    o Key Chain
	    o Spot Light
	    o iCloud
	    o Gestures
	    o Finder
	    o Remote Disc
	    o Dock
	    o Boot Camp
	Basic Linux commands
		1.4, 1.5
		4.5
		6.9
		11.5
		12.1, 12.6, 12.8, 12.10, 12.11, 12.12
		13.6

		o ls	
		o grep	
		o cd	
		o shutdown	
		o pwd vs. passwd	
		o mv	
		o cp	
		o rm	
		o chmod	
		o chown	
		o iwconfig/ifconfig	
		o ps	
		o su/sudo	
		o apt-get	
		o vi	
		o dd	
		o kill	
2.0	**Security**		
2.1	Summarize the importance of physical security measures. Mantrap Badge reader Smart card Security guard Door lock Biometric locks Hardware tokens Cable locks Server locks USB locks Privacy screen Key fobs Entry control roster	13.3
2.2	Explain logical security concepts. Active Directory o Login script o Domain	7.1 9.7 12.4, 12.5 13.1, 13.3, 13.6, 13.7, 13.9, 13.10, 13.12

		o Group Policy/Updates o Organizational Units o Home Folder o Folder redirection Software tokens MDM policies Port security MAC address filtering Certificates Antivirus/Anti-malware Firewalls User authentication/strong passwords Multifactor authentication Directory permissions VPN DLP Access control lists Smart card Email filtering Trusted/untrusted software sources Principle of least privilege	

2.3	Compare and contrast wireless security protocols and authentication methods.
	
	Protocols and encryption
	   o WEP
	   o WPA
	   o WPA2
	   o TKIP
	   o AES
	Authentication
	   o Single-factor
	   o Multifactor
	   o RADIUS
	   o TACACS
			7.1
			13.7

2.4	Given a scenario, detect, remove, and prevent malware using appropriate tools and methods.
	
	Malware
	   o Ransomware
	   o Trojan
			13.6, 13.10, 13.13

		o Keylogger o Rootkit o Virus o Botnet o Worm o Spyware Tools and methods o Antivirus o Anti-malware o Recovery console o Backup/restore o End user education o Software firewalls o SecureDNS	
2.5		Compare and contrast social engineering, threats, and vulnerabilities. Social engineering o Phishing o Spear phishing o Impersonation o Shoulder surfing o Tailgating o Dumpster diving DDoS DoS Zero-day Man-in-the-middle Brute force Dictionary Rainbow table Spoofing Non-compliant systems Zombie	6.9 13.6
2.6		Compare and contrast the differences of basic Microsoft Windows OS security settings. User and groups o Administrator o Power user o Guest	11.1, 11.2, 11.3, 11.4 12.1, 12.5 13.7, 13.8

		o Standard user NTFS vs. share permissions o Allow vs. deny o Moving vs. copying folders and files o File attributes Shared files and folders o Administrative shares vs. local shares o Permission propagation o Inheritance System files and folders User authentication o Single sign-on Run as administrator vs. standard user BitLocker BitLocker To Go EFS	
2.7	Given a scenario, implement security best practices to secure a workstation. Password best practices o Setting strong passwords o Password expiration o Screensaver required password o BIOS/UEFI passwords o Requiring passwords Account management o Restricting user permissions o Logon time restrictions o Disabling guest account o Failed attempts lockout o Timeout/screen lock o Change default admin user account/password o Basic Active Directory functions - Account creation o Basic Active Directory functions - Account deletion o Basic Active Directory functions - Password reset/unlock account o Basic Active Directory functions - Disable account Disable autorun Data encryption Patch/update management	12.1, 12.4, 12.5, 12.10 13.1, 13.3, 13.5, 13.7, 13.8, 13.9
2.8	Given a scenario, implement methods for securing mobile devices.	9.7

		Screen locks	
		o Fingerprint lock	
		o Face lock	
		o Swipe lock	
		o Passcode lock	
		Remote wipes	
		Locator applications	
		Remote backup applications	
		Failed login attempts restrictions	
		Antivirus/Anti-malware	
		Patching/OS updates	
		Biometric authentication	
		Full device encryption	
		Multifactor authentication	
		Authenticator applications	
		Trusted sources vs. untrusted sources	
		Firewalls	
		Policies and procedures	
		o BYOD vs. corporate-owned	
		o Profile security requirements	

2.9	Given a scenario, implement appropriate data destruction and disposal methods.
	
	Physical destruction
	    o Shredder
	    o Drill/hammer
	    o Electromagnetic (Degaussing)
	    o Incineration
	    o Certificate of destruction
	Recycling or repurposing best practices
	    o Low-level format vs. standard format
	    o Overwrite
	    o Drive wipe
			13.3

2.10	Given a scenario, configure security on SOHO wireless and wired networks.
	
	Wireless-specific
	    o Changing default SSID
	    o Setting encryption
	    o Disabling SSID broadcast
			13.9

		o Antenna and access point placement o Radio power levels o WPS Change default usernames and passwords Enable MAC filtering Assign static IP addresses Firewall settings Port forwarding/mapping Disabling ports Content filtering/parental controls Update firmware Physical security	
3.0	**Software Troubleshooting**		

3.1	Given a scenario, troubleshoot Microsoft Windows OS problems.
	
	Common symptoms
	    o Slow performance
	    o Limited connectivity
	    o Failure to boot
	    o No OS found
	    o Application crashes
	    o Blue screens
	    o Black screens
	    o Printing issues
	    o Services fail to start
	    o Slow bootup
	    o Slow profile load
	Common solutions
	    o Defragment the hard drive
	    o Reboot
	    o Kill tasks
	    o Restart services
	    o Update network settings
	    o Reimage/reload OS
	    o Roll back updates
	    o Roll back devices drivers
	    o Apply updates
	    o Repair application
	    o Update boot order
	    o Disable Windows services/applications
			4.6
			6.9, 6.10
			7.5
			8.6
			10.2
			12.1, 12.11, 12.12, 12.14, 12.15
			13.6, 13.13

		o Disable application startup o Safe boot o Rebuild Windows profiles	

3.2	Given a scenario, troubleshoot and resolve PC security issues.
	
	Common symptoms
	    o Pop-ups
	    o Browser redirection
	    o Security alerts
	    o Slow performance
	    o Internet connectivity issues
	    o PC/OS lockup
	    o Application crash
	    o OS updates failures
	    o Rogue antivirus
	    o Spam
	    o Renamed system files
	    o Disappearing files
	    o File permission changes
	    o Hijacked email - Responses from users regarding email
	    o Hijacked email - Automated replies from unknown sent email
	    o Access denied
	    o Invalid certificate (trusted root CA)
	    o System/application log errors
		12.14
		13.13

3.3	Given a scenario, use best practice procedures for malware removal.
	
	1. Identify and research malware symptoms.
	2. Quarantine the infected systems.
	3. Disable System Restore (in Windows).
	4. Remediate the infected systems.
	    a. Update the anti-malware software.
	    b. Scan and use removal techniques (safe mode, pre-installation environment).
	5. Schedule scans and run updates.
	6. Enable System Restore and create a restore point (in Windows).
	7. Educate the end user.
		13.6

3.4	Given a scenario, troubleshoot mobile OS and application issues.	9.8

Common symptoms
- o Dim display
- o Intermittent wireless
- o No wireless connectivity
- o No Bluetooth connectivity
- o Cannot broadcast to external monitor
- o Touchscreen non-responsive
- o Apps not loading
- o Slow performance
- o Unable to decrypt email
- o Extremely short battery life
- o Overheating
- o Frozen system
- o No sound from speakers
- o Inaccurate touch screen response
- o System lockout
- o App log errors

3.5	Given a scenario, troubleshoot mobile OS and application security issues. Common symptoms o Signal drop/weak signal o Power drain o Slow data speeds o Unintended WiFi connection o Unintended Bluetooth pairing o Leaked personal files/data o Data transmission over limit o Unauthorized account access o Unauthorized location tracking o Unauthorized camera/microphone activation o High resource utilization	9.7, 9.8

4.0	**Operational Procedures**	
4.1	Compare and contrast best practices associated with types of documentation. Network topology diagrams Knowledge base/articles Incident documentation	2.6 4.1 13.1, 13.2, 13.3

	Regulatory and compliance policy
	Acceptable use policy
	Password policy
	Inventory management
	    o Asset tags
	    o Barcodes		

4.2	Given a scenario, implement basic change management best practices. Documented business processes Purpose of the change Scope the change Risk analysis Plan for change End-user acceptance Change board o Approvals Backout plan Document changes	2.3	

4.3	Given a scenario, implement basic disaster prevention and recovery methods.
	
	Backup and recovery
	    o Image level
	    o File level
	    o Critical applications
	Backup testing
	UPS
	Surge protector
	Cloud storage vs. local storage backups
	Account recovery options
		2.5
		9.7
		10.2
		12.11	

4.4	Explain common safety procedures.
	
	Equipment grounding
	Proper component handling and storage
	    o Antistatic bags
	    o ESD straps
	    o ESD mats
	    o Self-grounding
		2.1	

		Toxic waste handling
		    o Batteries
		    o Toner
		    o CRT
		    o Cell phones
		    o Tablets
		Personal safety
		    o Disconnect power before repairing PC
		    o Remove jewelry
		    o Lifting techniques
		    o Weight limitations
		    o Electrical fire safety
		    o Cable management
		    o Safety goggles
		    o Air filter mask
		Compliance with government regulations	

4.5	Explain environmental impacts and appropriate controls.
	
	MSDS documentation for handling and disposal
	Temperature, humidity level awareness, and proper ventilation
	Power surges, brownouts, and blackouts
	    o Battery backup
	    o Surge suppressor
	Protection from airborne particles
	    o Enclosures
	    o Air filters/mask
	Dust and debris
	    o Compressed air
	    o Vacuums
	Compliance to government regulations
			2.1, 2.5

4.6	Explain the processes for addressing prohibited content/activity, and privacy, licensing, and policy concepts.
	
	Incident response
	    o First response - Identify
	    o First response - Report through proper channels
	    o First response - Data/device preservation
	    o Use of documentation/documentation changes
	    o Chain of custody - Tracking of evidence/documenting process
	Licensing/DRM/EULA
			12.9
			13.1, 13.2, 13.4

	o Open-source vs. commercial license
	o Personal license vs. enterprise licenses
	Regulated data
	    o PII
	    o PCI
	    o GDPR
	    o PHI
	Follow all policies and security best practices	

4.7	Given a scenario, use proper communication techniques and professionalism.
	
	Use proper language and avoid jargon, acronyms, and slang, when applicable
	Maintain a positive attitude/project confidence
	Actively listen (taking notes) and avoid interrupting the customer
	Be culturally sensitive
	    o Use appropriate professional titles, when applicable
	Be on time (if late, contact the customer)
	Avoid distractions
	    o Personal calls
	    o Texting/social media sites
	    o Talking to coworkers while interacting with customers
	    o Personal interruptions
	Dealing with difficult customers or situations
	    o Do not argue with customers and/or be defensive
	    o Avoid dismissing customer problems
	    o Avoid being judgmental
	    o Clarify customer statements (ask open-ended questions to narrow the scope of the problem, restate the issue, or question to verify understanding)
	    o Do not disclose experiences via social media outlets
	Set and meet expectations/timeline and communicate status with the customer
	    o Offer different repair/replacement options, if applicable
	    o Provide proper documentation on the services provided
	    o Follow up with customer/user at a later date to verify satisfaction
	Deal appropriately with customers' confidential and private materials
	    o Located on a computer, desktop, printer, etc.
		2.2

4.8	Identify the basics of scripting.
	
	Script file types
	    o .bat
	    o .ps1
		1.4
		11.1, 11.2
		12.1, 12.14
		13.7

| | | o .vbs o .sh o .py o .js Environment variables
Comment syntax
Basic script constructs o Basic loops o Variables Basic data types o Integers o Strings | |
| 4.9 | Given a scenario, use remote access technologies.

RDP
Telnet
SSH
Third-party tools o Screen share feature o File share Security considerations of each access method | 6.5
11.4
12.6
13.12 |