

<b>The TestOut PC Pro course and certification exam cover the following CompTIA A+ Certification 220-1001 objectives</b>	<b>TestOut PC Pro v6.0.x</b> <b>ISBN: 978-1-935080-42-8</b> <b>Only content that maps to the Exam 220-1001.</b>	<b>The Official CompTIA A+ Core 1 Study Guide (Exam 220-1001)</b>
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#	Domain	Resource	Topic
1.0	<b>Mobile Devices</b>		
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Mini-HDMI	3.12.2 Video Card Facts	2A
DisplayPort	3.12.2 Video Card Facts	2A
DVI	3.12.2 Video Card Facts	2A
DVI-DDVI-I	3.12.2 Video Card Facts	2A
Multipurpose cables		1B
Lightning	9.6.2 Mobile Device Connection Facts	1B
Thunderbolt	1.2.4 Port and Connector Facts	1B
USB	4.2.1 Universal Serial Bus (USB) 4.2.2 USB Facts	1B
USB-C	4.2.1 Universal Serial Bus (USB) 4.2.2 USB Facts	1B
USB 2.0	4.2.1 Universal Serial Bus (USB) 4.2.2 USB Facts	1B
USB 3.0	4.2.1 Universal Serial Bus (USB) 4.2.2 USB Facts	1B
Peripheral cables		1B
Serial	1.2.3 External Components 1.2.4 Port and Connector Facts	1B
Hard drive cables		3B
SATA	1.2.4 Port and Connector Facts 5.2.1 SATA 5.2.2 Install a SATA Device 5.2.3 SATA Installation Facts	3B
IDE	1.2.5 Adapter and Converter Facts 1.2.6 Internal Components	3B
SCSI	1.2.4 Port and Connector Facts 5.1.2 Storage Device Facts	3B
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DVI to HDMI	1.2.5 Adapter and Converter Facts	2A
USB to Ethernet	1.2.5 Adapter and Converter Facts	5A, 8A
DVI to VGA	1.2.5 Adapter and Converter Facts	2A
3.2 Identify common connector types.		

RJ-11	1.2.4 Port and Connector Facts 6.3.1 Cable Media 6.3.3 Twisted Pair Facts	1B
RJ-45	1.2.3 External Components 1.2.4 Port and Connector Facts 6.3.1 Cable Media 6.3.3 Twisted Pair Facts	1B
RS-232	1.2.4 Port and Connector Facts 6.3.1 Cable Media 6.3.3 Twisted Pair Facts	1B
BNC	3.12.2 Video Card Facts	1B
RG-59	6.3.1 Cable Media 6.3.2 Coaxial Cable Facts 6.3.3 Twisted Pair Facts	1B
RG-6	6.3.1 Cable Media 6.3.2 Coaxial Cable Facts 6.3.3 Twisted Pair Facts	1B
USB	4.2.1 Universal Serial Bus (USB) 4.2.2 USB Facts	1B
Micro-USB	4.2.1 Universal Serial Bus (USB) 4.2.2 USB Facts	1B
Mini-USB	4.2.1 Universal Serial Bus (USB) 4.2.2 USB Facts	1B
USB-C	4.2.1 Universal Serial Bus (USB) 4.2.2 USB Facts	1B
DB-9	1.2.4 Port and Connector Facts	1B
Lightning	9.6.2 Mobile Device Connection Facts	1B
SCSI	1.2.4 Port and Connector Facts 5.1.2 Storage Device Facts	1B
eSATA	5.2.1 SATA	1B
	5.2.2 Install a SATA Device 5.2.3 SATA Installation Facts	1B
Molex	3.2.1 Power Supplies 3.2.2 Power Supply Facts 3.2.3 Identify Power Supply Components	1B
3.3	Given a scenario, install RAM types.	
	RAM types	3A
	SODIMM	3A
	3.7.1 Random Access Memory 3.7.2 DRAM Types 3.7.3 RAM Facts 3.7.4 Memory Speed 3.7.5 Memory Speed Facts	

DDR2	3.7.1 Random Access Memory 3.7.2 DRAM Types 3.7.3 RAM Facts 3.7.4 Memory Speed 3.7.5 Memory Speed Facts	3A
DDR3	3.7.1 Random Access Memory 3.7.2 DRAM Types 3.7.3 RAM Facts 3.7.4 Memory Speed 3.7.5 Memory Speed Facts	3A
DDR4	3.7.1 Random Access Memory 3.7.2 DRAM Types 3.7.3 RAM Facts 3.7.4 Memory Speed 3.7.5 Memory Speed Facts	3A
Single channel	3.8.1 Memory Characteristics 3.8.2 Memory Facts 3.8.4 Select the Correct Memory Module 3.8.5 Install Memory 3.8.6 Memory Installation Facts 3.8.7 Install Triple Channel Memory	3A
Dual channel	3.8.1 Memory Characteristics 3.8.2 Memory Facts 3.8.4 Select the Correct Memory Module 3.8.5 Install Memory 3.8.6 Memory Installation Facts 3.8.7 Install Triple Channel Memory	3A
Triple channel	3.8.1 Memory Characteristics 3.8.2 Memory Facts 3.8.4 Select the Correct Memory Module 3.8.5 Install Memory 3.8.6 Memory Installation Facts 3.8.7 Install Triple Channel Memory	3A
Error correcting	3.7.1 Random Access Memory 3.7.2 DRAM Types 3.7.3 RAM Facts 3.7.4 Memory Speed 3.7.5 Memory Speed Facts	3A
Parity vs. non-parity	3.7.1 Random Access Memory 3.7.2 DRAM Types 3.7.3 RAM Facts 3.7.4 Memory Speed 3.7.5 Memory Speed Facts	3A
3.4	Given a scenario, select, install and configure storage devices.	
	Optical drives	3C



CD-ROM/CD-RW	5.3.1 CD Drives 5.3.4 Optical Media Facts	3C
DVD-ROM/DVD-RW/DVD-RW DL	5.3.2 DVD Drives 5.3.4 Optical Media Facts	3C
Blu-ray	5.3.3 Blu-ray 5.3.4 Optical Media Facts	3C
BD-R	5.3.3 Blu-ray 5.3.4 Optical Media Facts	3C
BD-RE	5.3.3 Blu-ray 5.3.4 Optical Media Facts	3C
Solid-state drives		3B
M2 drives	5.1.1 Storage Devices 5.1.2 Storage Device Facts	3B
NVME	5.1.1 Storage Devices 5.1.2 Storage Device Facts	3B
SATA 2.5	5.2.1 SATA 5.2.2 Install a SATA Device	3B
Magnetic hard drives		3B
5,400rpm	5.9.1 Storage Optimization 5.9.5 Disk Optimization Facts	3B
7,200rpm	5.9.1 Storage Optimization 5.9.5 Disk Optimization Facts	3B
10,000rpm	5.9.1 Storage Optimization Facts 5.9.5 Disk Optimization	3B
15,000rpm	5.9.1 Storage Optimization 5.9.5 Disk Optimization Facts	3B
Sizes - 2.5	9.1.3 Laptop Facts 9.1.4 Laptop Special Keys Facts 9.2.6 Laptop Upgrade and Repair Facts	3B
Sizes - 3.5	3.3.2 Motherboard Facts 9.1.3 Laptop Facts 9.1.4 Laptop Special Keys Facts 9.2.6 Laptop Upgrade and Repair Facts	3B
Hybrid drives	5.1.1 Storage Devices 5.1.2 Storage Device Facts	3B
Flash		3C
SD card	5.1.1 Storage Devices 5.1.2 Storage Device Facts	3C
CompactFlash	5.1.1 Storage Devices 5.1.2 Storage Device Facts	3C
Micro-SD card	5.1.1 Storage Devices 5.1.2 Storage Device Facts	3C
Mini-SD card	5.1.1 Storage Devices 5.1.2 Storage Device Facts	3C

	xD	5.1.1 Storage Devices 5.1.2 Storage Device Facts	3C
	Configurations		3D
	RAID 0, 1, 5, 10	5.4.1 RAID 5.4.2 RAID Facts 5.4.3 Configure a RAID Array 5.4.4 RAID Configuration Facts	3D
	Hot swappable	4.5.6 Hardware Device Facts	3D
3.5	Given a scenario, install and configure motherboards, CPUs, and add-on cards.		
	Motherboard form factor		1A
	ATX	3.1.1 Cases and Form Factors 3.1.2 System Case Facts	1A
	mATX	3.1.1 Cases and Form Factors 3.1.2 System Case Facts	1A
			1A
	ITX	3.1.1 Cases and Form Factors 3.1.2 System Case Facts	1A
	mITX	3.1.1 Cases and Form Factors 3.1.2 System Case Facts	1A
	Motherboard connectors types	5.1.1 Storage Devices 5.1.2 Storage Device Facts	1A
	PCI	3.11.1 Expansion Buses and Slots 3.11.2 Expansion Bus Types	1A
	PCIe	3.11.1 Expansion Buses and Slots 3.11.2 Expansion Bus Types	1A
	Riser card	3.11.2 Expansion Bus Types	1A
	Socket types	3.5.4 CPU Socket Facts	1A
	SATA	5.2.1 SATA 5.2.2 Install a SATA Device 5.2.3 SATA Installation Facts	1A
	IDE		1A
	Front panel connector	3.3.3 Install a Motherboard	1A
	Internal USB connector	3.3.3 Install a Motherboard	1A
	BIOS/UEFI settings		4B
	Boot options	3.10.4 Edit BIOS/UEFI Settings	4B
	Firmware updates	13.5.1 BIOS/UEFI Security 13.5.2 Configure BIOS/UEFI Security Settings 13.5.3 BIOS/UEFI Security Facts	4B
	Security settings	13.5.1 BIOS/UEFI Security 13.5.2 Configure BIOS/UEFI Security Settings 13.5.3 BIOS/UEFI Security Facts	4B
	Interface configurations	13.5.1 BIOS/UEFI Security 13.5.2 Configure BIOS/UEFI Security Settings 13.5.3 BIOS/UEFI Security Facts	4B

Security - Passwords	13.5.1 BIOS/UEFI Security Settings 13.5.2 Configure BIO.UEFI Security Settings 13.5.3 BIOS/UEFI Security Facts	4B
Security - Drive encryption - TPM	3.10.4 Edit BIOS/UEFI Settings	4B
Security - Drive encryption - LoJack	3.10.4 Edit BIOS/UEFI Settings	4B
Security - Drive encryption - Secure boot	3.10.4 Edit BIOS/UEFI Settings	4B
CMOS battery	3.3.1 Motherboard Components 3.3.2 Motherboard Facts	1A
CPU features		4A
Single-core	3.5.1 Processor Concepts 3.5.2 CPU Facts	4A
Multicore	3.5.1 Processor Concepts 3.5.2 CPU Facts	4A
Virtual technology	3.5.1 Processor Concepts 3.5.2 CPU Facts	4A
Hyperthreading	3.5.1 Processor Concepts 3.5.2 CPU Facts	4A
Speeds	3.5.1 Processor Concepts 3.5.2 CPU Facts	4A
Overclocking	3.5.1 Processor Concepts 3.5.2 CPU Facts	4A
Integrated GPU	3.5.1 Processor Concepts 3.5.2 CPU Facts	4A
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AMD	3.5.4 CPU Socket Facts	4A
Intel	3.5.4 CPU Socket Facts	4A
Cooling mechanism		4A
Fans	3.14.1 System Cooling 3.14.2 System Cooling Facts	4A
Heat sink	3.14.1 System Cooling 3.14.2 System Cooling Facts	4A
Liquid	3.14.1 System Cooling 3.14.2 System Cooling Facts	4A
Thermal paste	3.14.1 System Cooling 3.14.2 System Cooling Facts	4A
Expansion cards	6.2.4 Network Infrastructure and Device Facts	2A
Video cards - Onboard	3.3.2 Motherboard Facts 3.12.3 Install a Video Card 3.12.4 Video Card Installation Facts	2A
Video cards - Add-on card	3.12.3 Install a Video Card 3.12.4 Video Card Installation Facts 9.2.6 Laptop Upgrade and Repair Facts	2A
Sound cards	3.13.7 Select and Install a Sound Card	2C
Network interface card	6.2.4 Network Infrastructure and Device Facts 6.2.6 Select and Install a Network Adapter	1C

	USB expansion card	4.2.3 Install USB Devices	1C
	eSATA card		1C
3.6	Explain the purposes and uses of various peripheral types.		
	Printer	8.2.2 Install a Local Printer	10A
	ADF/flatbed scanner	1.2.2 Computing Facts 1.2.7 Set Up a Computer 4.1.1 Peripheral Devices 4.1.2 Peripheral Device Facts	10F
	Barcode scanner/QR scanner	1.2.2 Computing Facts 1.2.7 Set Up a Computer 4.1.1 Peripheral Devices 4.1.2 Peripheral Device Facts	10F
	Monitors	3.12.2 Video Card Facts	2A
	VR headset	4.1.1 Peripheral Devices 4.1.2 Peripheral Device Facts	2A
	Optical	5.3.2 DVD Drives	3C
	DVD drive	5.3.2 DVD Drives	3C
	Mouse	1.2.2 Computing Facts 1.2.7 Set Up a Computer 4.1.1 Peripheral Devices 4.1.2 Peripheral Device Facts	1D
	Keyboard	1.2.2 Computing Facts 1.2.7 Set Up a Computer 4.1.1 Peripheral Devices 4.1.2 Peripheral Device Facts	1D
	Touchpad	1.2.2 Computing Facts 1.2.7 Set Up a Computer 4.1.1 Peripheral Devices 4.1.2 Peripheral Device	1D
		Facts	1D
	Signature pad	4.1.1 Peripheral Devices 4.1.2 Peripheral Device Facts	1D
	Game controllers	1.2.2 Computing Facts 1.2.7 Set Up a Computer 4.1.1 Peripheral Devices 4.1.2 Peripheral Device Facts	1D
	Camera/webcam	1.2.2 Computing Facts 1.2.7 Set Up a Computer 4.1.1 Peripheral Devices 4.1.2 Peripheral Device Facts	2C
	Microphone	1.2.2 Computing Facts 1.2.7 Set Up a Computer 4.1.1 Peripheral Devices 4.1.2 Peripheral Device Facts	2C

	Speakers	3.13.5 Sound Card Installation Facts 3.13.6 Sound Card Connectors	2C
	Headset	9.5.4 Mobile Device Accessory Facts	2C
	Projector		2A
	Lumens/brightness	4.1.1 Peripheral Devices 4.1.2 Peripheral Device Facts 4.4.1 Video Troubleshooting	2A
	External storage drives	4.2.1 Universal Serial Bus (USB) 10.2.3 Pre-Installation Planning	3C
	KVM	4.1.3 Connect a KVM Switch	1D
	Magnetic reader/chip reader	4.1.1 Peripheral Devices 4.1.2 Peripheral Device Facts	1D
	NFC/tap pay device	4.1.1 Peripheral Devices 4.1.2 Peripheral Device Facts	1D
	Smart card reader	13.7.9 Use a Smart Card Reader	1D
3.7	Summarize power supply types and features.		
	Input 115V vs. 220V	3.2.1 Power Supplies 3.2.2 Power Supply Facts 3.2.3 Identify Power Supply Components	4C
	Output 5.5V vs. 12V	3.2.1 Power Supplies 3.2.2 Power Supply Facts 3.2.3 Identify Power Supply Components	4C
	24-pin motherboard adapter	3.2.3 Identify Power Supply Components	4C
	Wattage rating	3.2.3 Identify Power Supply Components	4C
	Number of devices/types of devices to be powered	3.2.3 Identify Power Supply Components	4C
3.8	Given a scenario, select and configure appropriate components for a custom PC configuration to meet customer specifications or needs.		4E
	Graphic/CAD/CAM design workstation	10.1.1 Component Selection 10.1.2 Component Selection Facts	4E
	Multicore processor	10.1.1 Component Selection 10.1.2 Component Selection Facts	4E
	High-end video	10.1.1 Component Selection 10.1.2 Component Selection Facts	4E
	Maximum RAM	10.1.1 Component Selection 10.1.2 Component Selection Facts	4E
	Audio/video editing workstation	10.1.1 Component Selection 10.1.2 Component Selection Facts	4E
	Specialized audio and video card	10.1.1 Component Selection 10.1.2 Component Selection Facts	4E
	Large, fast hard drive	10.1.1 Component Selection 10.1.2 Component Selection Facts	4E
	Dual monitors	10.1.1 Component Selection 10.1.2 Component Selection Facts	4E
	Virtualization workstation	10.1.1 Component Selection 10.1.2 Component Selection Facts	4E

	Maximum RAM and CPU cores	10.1.1 Component Selection 10.1.2 Component Selection Facts	4E
	Gaming PC	10.1.1 Component Selection 10.1.2 Component Selection Facts	4E
	Multicore processor	10.1.1 Component Selection 10.1.2 Component Selection Facts	4E
	High-end video/specialized GPU	10.1.1 Component Selection 10.1.2 Component Selection Facts	4E
	High-definition sound card	10.1.1 Component Selection 10.1.2 Component Selection Facts	4E
	High-end cooling	10.1.1 Component Selection 10.1.2 Component Selection Facts	4E
	Standard thick client	10.1.1 Component Selection 10.1.2 Component Selection Facts	4E
	Desktop applications	10.1.1 Component Selection 10.1.2 Component Selection Facts	4E
	Meets recommended requirements for selected OS	10.1.1 Component Selection 10.1.2 Component Selection Facts	4E
	Thin client	10.1.1 Component Selection 10.1.2 Component Selection Facts	4E
	Basic applications	10.1.1 Component Selection 10.1.2 Component Selection Facts	4E
	Meets minimum requirements for selected OS	10.1.1 Component Selection	4E
		10.1.2 Component Selection Facts	4E
	Network connectivity	10.1.1 Component Selection 10.1.2 Component Selection Facts	4E
	Network attached storage device	10.1.1 Component Selection 10.1.2 Component Selection Facts	4E
	Media streaming	10.1.1 Component Selection 10.1.2 Component Selection Facts	4E
	File sharing	10.1.1 Component Selection 10.1.2 Component Selection Facts	4E
	Gigabit NIC	10.1.1 Component Selection 10.1.2 Component Selection Facts	4E
	RAID array	10.1.1 Component Selection 10.1.2 Component Selection Facts	4E
3.9	Given a scenario, install and configure common devices.		
	Desktop	10.1.1 Component Selection 10.1.2 Component Selection Facts 10.2.1 Windows Versions	4E
	Thin client	10.1.1 Component Selection 10.1.2 Component Selection Facts	4E
	Thick client	10.1.1 Component Selection 10.1.2 Component Selection Facts	4E

	Account setup/settings	10.2.1 Windows Versions 10.2.2 Windows Versions Facts	4E
	Laptop/common mobile devices		8A
	Touchpad configuration	9.2.6 Laptop Upgrade and Repair Facts	8A
	Touchscreen configuration	9.5.2 Mobile Device Facts 11.3.1 NTFS Permissions	8A
	Application installations/configurations	9.5.2 Mobile Device Facts 9.5.3 Mobile Communication Facts	9D
	Synchronization settings	9.6.3 Synchronize Mobile Devices 9.6.4 Data Synchronization Facts	9D
	Account setup/settings	9.6.5 Configure Email on Mobile Devices 9.6.6 Mobile Email Configuration Facts 9.6.7 Manage Mobile Devices	9D
	Wireless settings	7.1.10 Configure a Wireless Profile 9.6.1 Networking Mobile Devices	9C
3.10	Given a scenario, configure SOHO multifunction devices/printers and settings.		
	Use appropriate drivers for a given operating system		10D
	Configuration settings - Duplex	8.2.4 Printer Configuration Facts 8.4.3 Printing Management Facts	10D
	Configuration settings - Collate	8.2.4 Printer Configuration Facts 8.4.3 Printing Management Facts	10D
	Configuration settings - Orientation	8.2.4 Printer Configuration Facts 8.4.3 Printing Management Facts	10D
	Configuration settings - Quality	8.2.4 Printer Configuration Facts 8.4.3 Printing Management Facts	10D
	Device sharing		10D
	Wired - USB	8.3.1 Network Printing 8.3.2 Share a Printer	10D
	Wired - Serial	8.3.1 Network Printing 8.3.2 Share a Printer	10D
	Wired - Ethernet	8.3.1 Network Printing 8.3.2 Share a Printer	10D
	Wireless - Bluetooth	8.3.3 Configure a Wireless Network Printer	10D
	Wireless - 802.11(a, b, g, n, ac)	8.3.3 Configure a Wireless Network Printer	10D
	Wireless - Infrastructure vs. ad hoc	8.3.3 Configure a Wireless Network Printer	10D
	Integrated print server (hardware)	8.3.1 Network Printing 8.3.4 Network Printing Facts	10D
	Cloud printing/remote printing	8.3.1 Network Printing	10D
	Public/shared devices		10D
	Sharing local/networked device via operating system settings - TCP/Bonjour/AirPrint	8.3.1 Network Printing 8.3.2 Share a Printer	10D
	Data privacy - User authentication on the device	8.3.1 Network Printing	10D
	Data privacy - Hard drive caching	8.3.1 Network Printing	10D
3.11	Given a scenario, install and maintain various print technologies.		

Laser	8.1.2 Printer Type Facts 8.1.6 Printer Characteristics Facts	10A
Imaging drum, fuser assembly, transfer belt, transfer roller, pickup rollers, separate pads, duplexing assembly	8.1.1 Printer Types 8.1.2 Printer Type Facts 8.1.3 Laser Printing Process 8.1.4 Laser Printing Facts 8.1.6 Printer Characteristics Facts	10A
Imaging process: processing, charging, exposing, developing, transferring, fusing, and cleaning	8.1.1 Printer Types 8.1.2 Printer Type Facts 8.1.3 Laser Printing Process 8.1.4 Laser Printing Facts 8.1.6 Printer Characteristics Facts	10A
Maintenance: Replace toner, apply maintenance kit, calibrate, clean	8.5.1 Maintain Laser Printers 8.5.2 Printer Preventative Maintenance	10A
Inkjet	8.1.2 Printer Type Facts 8.1.6 Printer Characteristics Facts	10B
Ink cartridge, print head, roller, feeder, duplexing assembly, carriage, and belt	8.1.1 Printer Types 8.1.2 Printer Type Facts 8.1.6 Printer Characteristics Facts	10B
Calibrate	8.1.1 Printer Types 8.1.2 Printer Type Facts 8.1.6 Printer Characteristics Facts	10B
Maintenance: Clean heads, replace cartridges, calibrate, clear jams	8.5.2 Printer Preventative Maintenance	10B
Thermal	8.1.2 Printer Type Facts 8.1.6 Printer Characteristics Facts	10C
Feed assembly, heating element	8.1.1 Printer Types 8.1.2 Printer Type Facts 8.1.6 Printer Characteristics Facts	10C
Special thermal paper	8.1.1 Printer Types 8.1.2 Printer Type Facts 8.1.6 Printer Characteristics Facts	10C
Maintenance: Replace paper, clean heating element, remove debris	8.5.2 Printer Preventative Maintenance	10C
Impact	8.1.2 Printer Type Facts 8.1.6 Printer Characteristics Facts	10C
Print head, ribbon, tractor feed	8.1.1 Printer Types 8.1.2 Printer Type Facts 8.1.6 Printer Characteristics Facts	10C
Impact paper	8.1.1 Printer Types 8.1.2 Printer Type Facts 8.1.6 Printer Characteristics Facts	10C
Maintenance: Replace ribbon, replace print head, replace paper	8.5.2 Printer Preventative Maintenance	10C
Virtual		10D
Print to file	8.2.3 Configure Virtual Printing 8.2.4 Printer Configuration Facts	10D



	Print to PDF	8.2.3 Configure Virtual Printing 8.2.4 Printer Configuration Facts	10D
	Print to XPS	8.2.3 Configure Virtual Printing 8.2.4 Printer Configuration Facts	10D
	Print to image	8.2.3 Configure Virtual Printing 8.2.4 Printer Configuration Facts	10D
	3D printers	8.1.2 Printer Type Facts 8.1.6 Printer Characteristics Facts	10C
	Plastic filament	8.1.2 Printer Type Facts 8.1.6 Printer Characteristics Facts	10C
<b>4.0</b>	<b>Virtualization and Cloud Computing</b>		
4.1	Compare and contrast cloud computing concepts.		
	Common cloud models	10.5.8 Cloud Computing Overview 10.5.9 Cloud Computing Facts	7B
	IaaS	10.5.8 Cloud Computing Overview 10.5.9 Cloud Computing Facts	7B
	SaaS	10.5.8 Cloud Computing Overview 10.5.9 Cloud Computing Facts	7B
	PaaS	10.5.8 Cloud Computing Overview 10.5.9 Cloud Computing Facts	7B
	Public vs. private vs. hybrid vs. community	10.5.8 Cloud Computing Overview 10.5.9 Cloud Computing Facts	7B
	Shared resources	10.5.8 Cloud Computing Overview	7B
	Internal vs. external	10.5.8 Cloud Computing Overview	7B
	Rapid elasticity	10.5.8 Cloud Computing Overview 10.5.9 Cloud Computing Facts	7B
	On-demand	10.5.8 Cloud Computing Overview 10.5.9 Cloud Computing Facts	7B
	Resource pooling	10.5.8 Cloud Computing Overview 10.5.9 Cloud Computing Facts	7B
	Measured service	10.5.8 Cloud Computing Overview 10.5.9 Cloud Computing Facts	7B
	Metered	10.5.8 Cloud Computing Overview	7B
	Off-site email applications	10.5.8 Cloud Computing Overview	7B
	Cloud file storage services	10.5.8 Cloud Computing Overview	7B
	Synchronization apps	10.5.8 Cloud Computing Overview	7B
	Virtual application streaming/cloud-based applications	10.5.8 Cloud Computing Overview	7B
	Applications for cell phones/tablets	10.5.8 Cloud Computing Overview	7B
	Applications for laptops/desktops	10.5.8 Cloud Computing Overview	7B
	Virtual desktop		7B
	Virtual NIC	10.5.3 Create a Virtual Machine	7B
4.2	Given a scenario, set up and configure client-side virtualization.		
	Purpose of virtual machines	10.5.1 Virtualization Overview 10.5.2 Virtualization Facts 10.5.3 Create a Virtual Machine	7A

	Resource requirements	10.5.1 Virtualization Overview 10.5.2 Virtualization Facts 10.5.3 Create a Virtual Machine	7A
	Emulator requirements	10.5.1 Virtualization Overview 10.5.2 Virtualization Facts 10.5.3 Create a Virtual Machine	7A
	Security requirements	10.5.1 Virtualization Overview 10.5.2 Virtualization Facts 10.5.3 Create a Virtual Machine	7A
	Network requirements	10.5.1 Virtualization Overview 10.5.2 Virtualization Facts 10.5.3 Create a Virtual Machine	7A
	Hypervisor	10.5.1 Virtualization Overview 10.5.2 Virtualization Facts 10.5.3 Create a Virtual Machine	7A
<b>5.0</b>	<b>Hardware and Network Troubleshooting</b>		
5.1	Given a scenario, use the best practice methodology to resolve problems.		1D
	Always consider corporate policies, procedures, and impacts before implementing changes	2.6.1 Troubleshooting Process 2.6.2 Troubleshooting Process Facts	1D
	1. Identify the problem		1D
	Question the user and identify user changes to computer and perform backups before making changes	2.6.1 Troubleshooting Process 2.6.2 Troubleshooting Process Facts	1D
	Inquire regarding environmental or infrastructure changes	2.6.1 Troubleshooting Process 2.6.2 Troubleshooting Process Facts	1D
	Review system and application logs	2.6.1 Troubleshooting Process 2.6.2 Troubleshooting Process Facts	1D
	2. Establish a theory of probable cause (question the obvious)		1D
	If necessary, conduct external or internal research based on symptoms	2.6.1 Troubleshooting Process 2.6.2 Troubleshooting Process Facts	1D
	3. Test the theory to determine cause		1D
	Once the theory is confirmed, determine the next steps to resolve problem	2.6.1 Troubleshooting Process 2.6.2 Troubleshooting Process Facts	1D
	If theory is not confirmed re-establish new theory or escalate	2.6.1 Troubleshooting Process 2.6.2 Troubleshooting Process Facts	1D
	4. Establish a plan of action to resolve the problem and implement the solution	2.6.1 Troubleshooting Process 2.6.2 Troubleshooting Process Facts	1D
	5. Verify full system functionality and, if applicable, implement preventive measures	2.6.1 Troubleshooting Process 2.6.2 Troubleshooting Process Facts	1D
	6. Document findings, actions, and outcomes	2.6.1 Troubleshooting Process 2.6.2 Troubleshooting Process Facts	1D
5.2	Given a scenario, troubleshoot problems related to motherboards, RAM, CPUs, and power.		
	Common symptoms		4D

	Unexpected shutdowns	3.4.1 Motherboard Troubleshooting 3.4.2 Motherboard Troubleshooting Facts	4D
	System lockups	3.4.1 Motherboard Troubleshooting 3.4.2 Motherboard Troubleshooting Facts	4D
	POST code beeps	3.4.1 Motherboard Troubleshooting 3.4.2 Motherboard Troubleshooting Facts	4D
	Blank screen on bootup	3.4.1 Motherboard Troubleshooting 3.4.2 Motherboard Troubleshooting Facts	4D
	BIOS time and setting resets	3.4.1 Motherboard Troubleshooting 3.4.2 Motherboard Troubleshooting Facts	4D
	Attempts to boot to incorrect device	3.4.1 Motherboard	4D
		Troubleshooting 3.4.2 Motherboard Troubleshooting Facts	4D
	Continuous reboots	3.4.1 Motherboard Troubleshooting 3.4.2 Motherboard Troubleshooting Facts	4D
	No power	3.4.1 Motherboard Troubleshooting 3.4.2 Motherboard Troubleshooting Facts	4D
	Overheating	3.4.1 Motherboard Troubleshooting 3.4.2 Motherboard Troubleshooting Facts	4D
	Loud noise	3.4.1 Motherboard Troubleshooting 3.4.2 Motherboard Troubleshooting Facts	4D
	Intermittent device failure	3.4.1 Motherboard Troubleshooting 3.4.2 Motherboard Troubleshooting Facts	4D
	Fans spin – no power to other devices	3.4.1 Motherboard Troubleshooting 3.4.2 Motherboard Troubleshooting Facts	4D
	Indicator lights	3.4.1 Motherboard Troubleshooting 3.4.2 Motherboard Troubleshooting Facts	4D
	Smoke	3.4.1 Motherboard Troubleshooting 3.4.2 Motherboard Troubleshooting Facts	4D
	Burning smell	3.4.1 Motherboard Troubleshooting 3.4.2 Motherboard Troubleshooting Facts	4D
	Proprietary crash screens (BSOD/pin wheel)	3.4.1 Motherboard Troubleshooting 3.4.2 Motherboard Troubleshooting Facts	4D
	Distended capacitors	3.4.1 Motherboard Troubleshooting 3.4.2 Motherboard Troubleshooting Facts	4D
	Log entries and error messages	3.4.1 Motherboard Troubleshooting 3.4.2 Motherboard Troubleshooting Facts 3.9.3 Memory Troubleshooting Facts	4D
5.3	Given a scenario, troubleshoot hard drives and RAID arrays.		
	Common symptoms		3E
	Read/write failure		3E
	Slow performance	5.10.1 Storage Troubleshooting 5.10.2 Storage Troubleshooting Facts	3E
	Loud clicking noise	5.10.1 Storage Troubleshooting 5.10.2 Storage Troubleshooting Facts	3E

	Failure to boot	5.10.1 Storage Troubleshooting 5.10.2 Storage Troubleshooting Facts	3E
	Drive not recognized	5.10.1 Storage Troubleshooting 5.10.2 Storage Troubleshooting Facts	3E
	OS not found	5.10.1 Storage Troubleshooting 5.10.2 Storage Troubleshooting Facts	3E
	RAID not found	5.10.1 Storage Troubleshooting 5.10.2 Storage Troubleshooting Facts	3E
	RAID stops working	5.10.1 Storage Troubleshooting 5.10.2 Storage Troubleshooting Facts	3E
	Proprietary crash screens (BSOD/pin wheel)	5.10.1 Storage Troubleshooting 5.10.2 Storage Troubleshooting Facts	3E
	S.M.A.R.T. errors	5.10.1 Storage Troubleshooting 5.10.2 Storage Troubleshooting Facts	3E
5.4	Given a scenario, troubleshoot video, projector, and display issues.		
	Common symptoms		2B
	VGA mode	4.4.1 Video Troubleshooting 4.4.2 Video Troubleshooting Facts	2B
	No image on screen	4.4.1 Video Troubleshooting 4.4.2 Video Troubleshooting Facts	2B
	Overheat shutdown	4.4.1 Video Troubleshooting 4.4.2 Video Troubleshooting Facts	2B
	Dead pixels	4.4.1 Video Troubleshooting 4.4.2 Video Troubleshooting Facts	2B
	Artifacts	4.4.1 Video Troubleshooting 4.4.2 Video Troubleshooting Facts	2B
	Incorrect color patterns	4.4.1 Video Troubleshooting 4.4.2 Video Troubleshooting Facts	2B
	Dim image	4.4.1 Video Troubleshooting 4.4.2 Video Troubleshooting Facts	2B
	Flickering image	4.4.1 Video Troubleshooting 4.4.2 Video Troubleshooting Facts	2B
	Distorted image	4.4.1 Video Troubleshooting 4.4.2 Video Troubleshooting Facts	2B
	Distorted geometry	4.4.1 Video Troubleshooting 4.4.2 Video Troubleshooting Facts	2B
	Burn-in	4.4.1 Video Troubleshooting 4.4.2 Video Troubleshooting Facts	2B
	Oversized images and icons	4.4.1 Video Troubleshooting 4.4.2 Video Troubleshooting Facts	2B
	Multiple failed jobs in logs	4.4.1 Video Troubleshooting 4.4.2 Video Troubleshooting Facts	2B
5.5	Given a scenario, troubleshoot common mobile device issues while adhering to the appropriate procedures.		
	Common symptoms		8C

No display	9.4.1 Common Laptop Issues 9.4.4 Laptop Troubleshooting Facts 9.8.1 Mobile Device Troubleshooting 9.8.3 Mobile Device Troubleshooting Facts	8C
Dim display	9.4.1 Common Laptop Issues 9.4.4 Laptop Troubleshooting Facts 9.8.1 Mobile Device Troubleshooting 9.8.3 Mobile Device Troubleshooting Facts	8C
Flickering display	9.4.1 Common Laptop Issues 9.4.4 Laptop Troubleshooting Facts 9.8.1 Mobile Device Troubleshooting 9.8.3 Mobile Device Troubleshooting Facts	8C
Sticking keys	9.4.1 Common Laptop Issues 9.4.4 Laptop Troubleshooting Facts 9.8.1 Mobile Device Troubleshooting 9.8.3 Mobile Device Troubleshooting Facts	8C
Intermittent wireless	9.4.1 Common Laptop Issues 9.4.4 Laptop Troubleshooting Facts 9.8.1 Mobile Device Troubleshooting 9.8.3 Mobile Device Troubleshooting Facts	8C
Battery not charging	9.4.1 Common Laptop Issues 9.4.4 Laptop Troubleshooting Facts 9.8.1 Mobile Device Troubleshooting 9.8.3 Mobile Device Troubleshooting Facts	8C
Ghost cursor/pointer drift	9.4.1 Common Laptop Issues 9.4.4 Laptop Troubleshooting Facts 9.8.1 Mobile Device Troubleshooting 9.8.3 Mobile Device Troubleshooting Facts	8C
No power	9.4.1 Common Laptop Issues 9.4.4 Laptop Troubleshooting Facts 9.8.1 Mobile Device Troubleshooting 9.8.3 Mobile Device Troubleshooting Facts	8C
Num lock indicator lights	9.4.1 Common Laptop Issues 9.4.4 Laptop Troubleshooting Facts 9.8.1 Mobile Device Troubleshooting 9.8.3 Mobile Device Troubleshooting Facts	8C
No wireless connectivity	9.4.1 Common Laptop Issues 9.4.4 Laptop Troubleshooting Facts 9.8.1 Mobile Device Troubleshooting 9.8.3 Mobile Device Troubleshooting Facts	8C
No Bluetooth connectivity	9.4.1 Common Laptop Issues 9.4.4 Laptop Troubleshooting Facts 9.8.1 Mobile Device Troubleshooting 9.8.3 Mobile Device Troubleshooting Facts	8C

Cannot display to external monitor	9.4.1 Common Laptop Issues 9.4.4 Laptop Troubleshooting Facts 9.8.1 Mobile Device Troubleshooting 9.8.3 Mobile Device Troubleshooting Facts	8C
Touchscreen non-responsive	9.4.1 Common Laptop Issues 9.4.4 Laptop Troubleshooting Facts 9.8.1 Mobile Device Troubleshooting 9.8.3 Mobile Device Troubleshooting Facts	8C
Apps not loading	9.4.1 Common Laptop Issues 9.4.4 Laptop Troubleshooting Facts 9.8.1 Mobile Device Troubleshooting 9.8.3 Mobile Device Troubleshooting Facts	8C
Slow performance	9.4.1 Common Laptop Issues 9.4.4 Laptop Troubleshooting Facts 9.8.1 Mobile Device Troubleshooting 9.8.3 Mobile Device Troubleshooting Facts	8C
Unable to decrypt email	9.4.1 Common Laptop Issues 9.4.4 Laptop Troubleshooting Facts 9.8.1 Mobile Device Troubleshooting 9.8.3 Mobile Device Troubleshooting Facts	8C
Extremely short battery life	9.4.1 Common Laptop Issues 9.4.4 Laptop Troubleshooting Facts 9.8.1 Mobile Device Troubleshooting 9.8.3 Mobile Device Troubleshooting Facts	8C
Overheating	9.4.1 Common Laptop Issues 9.4.4 Laptop Troubleshooting Facts 9.8.1 Mobile Device Troubleshooting 9.8.3 Mobile Device Troubleshooting Facts	8C
Frozen system	9.4.1 Common Laptop Issues 9.4.4 Laptop Troubleshooting Facts 9.8.1 Mobile Device Troubleshooting 9.8.3 Mobile Device Troubleshooting Facts	8C
No sound from speakers	9.4.1 Common Laptop Issues 9.4.4 Laptop Troubleshooting Facts 9.8.1 Mobile Device Troubleshooting 9.8.3 Mobile Device Troubleshooting Facts	8C
GPS not functioning	9.4.1 Common Laptop Issues 9.4.4 Laptop Troubleshooting Facts 9.8.1 Mobile Device Troubleshooting 9.8.3 Mobile Device Troubleshooting Facts	8C
Swollen battery	9.4.1 Common Laptop Issues 9.4.4 Laptop Troubleshooting Facts 9.8.1 Mobile Device Troubleshooting 9.8.3 Mobile Device Troubleshooting Facts	8C
Disassembling processes for proper reassembly		8B

	Document and label cable and screw locations	9.2.6 Laptop Upgrade and Repair Facts	8B
	Organize parts	9.2.6 Laptop Upgrade and Repair Facts	8B
	Refer to manufacturer resources	9.2.6 Laptop Upgrade and Repair Facts	8B
	Use appropriate hand tools	9.2.6 Laptop Upgrade and Repair Facts	8B
5.6	Given a scenario, troubleshoot printers.		
	Common symptoms		10E
	Streaks	8.6.1 Printer Troubleshooting 8.6.2 Troubleshoot Printing 8.6.3 Printer Troubleshooting Facts	10E
	Faded prints	8.6.1 Printer Troubleshooting 8.6.2 Troubleshoot Printing 8.6.3 Printer Troubleshooting Facts	10E
	Ghost images	8.6.1 Printer Troubleshooting 8.6.2 Troubleshoot Printing 8.6.3 Printer Troubleshooting Facts	10E
	Toner not fused to the paper	8.6.1 Printer Troubleshooting 8.6.2 Troubleshoot Printing 8.6.3 Printer Troubleshooting Facts	10E
	Creased paper	8.6.1 Printer Troubleshooting 8.6.2 Troubleshoot Printing 8.6.3 Printer Troubleshooting Facts	10E
	Paper not feeding	8.6.1 Printer Troubleshooting 8.6.2 Troubleshoot Printing 8.6.3 Printer Troubleshooting Facts	10E
	Paper jam	8.6.1 Printer Troubleshooting 8.6.2 Troubleshoot Printing 8.6.3 Printer Troubleshooting Facts	10E
	No connectivity	8.6.1 Printer Troubleshooting 8.6.2 Troubleshoot Printing 8.6.3 Printer Troubleshooting Facts	10E
	Garbled characters on paper	8.6.1 Printer Troubleshooting 8.6.2 Troubleshoot Printing 8.6.3 Printer Troubleshooting Facts	10E
	Vertical lines on page	8.6.1 Printer	10E
		Troubleshooting 8.6.2 Troubleshoot Printing 8.6.3 Printer Troubleshooting Facts	10E
	Backed-up print queue	8.6.1 Printer Troubleshooting 8.6.2 Troubleshoot Printing 8.6.3 Printer Troubleshooting Facts	10E
	Low memory errors	8.6.1 Printer Troubleshooting 8.6.2 Troubleshoot Printing 8.6.3 Printer Troubleshooting Facts	10E

	Access denied	8.6.1 Printer Troubleshooting 8.6.2 Troubleshoot Printing 8.6.3 Printer Troubleshooting Facts	10E
	Printer will not print	8.6.1 Printer Troubleshooting 8.6.2 Troubleshoot Printing 8.6.3 Printer Troubleshooting Facts	10E
	Color prints in wrong print color	8.6.1 Printer Troubleshooting 8.6.2 Troubleshoot Printing 8.6.3 Printer Troubleshooting Facts	10E
	Unable to install printer	8.6.1 Printer Troubleshooting 8.6.2 Troubleshoot Printing 8.6.3 Printer Troubleshooting Facts	10E
	Error codes	8.6.1 Printer Troubleshooting 8.6.2 Troubleshoot Printing 8.6.3 Printer Troubleshooting Facts	10E
	Printing blank pages	8.6.1 Printer Troubleshooting 8.6.2 Troubleshoot Printing 8.6.3 Printer Troubleshooting Facts	10E
	No image on printer display	8.6.1 Printer Troubleshooting 8.6.2 Troubleshoot Printing 8.6.3 Printer Troubleshooting Facts	10E
5.7	Given a scenario, troubleshoot common wired and wireless network problems.		
	Common symptoms	6.9 Network Utilities 6.10.2 Troubleshoot Network Connectivity 6.10.3 Network Troubleshooting Facts 7.5.1 Wireless Network Troubleshooting 7.5.2 Wireless Network Troubleshooting Tool Facts 7.5.2 Wireless Network Troubleshooting Tool Facts	6E
	Limited connectivity	6.9 Network Utilities 6.10.2 Troubleshoot Network Connectivity 6.10.3 Network Troubleshooting Facts 6.10.4 Fix a Network Connection 1 7.5.1 Wireless Network Troubleshooting 7.5.2 Wireless Network Troubleshooting Tool Facts	6E
	Unavailable resources - Internet	6.9 Network Utilities 6.10.2 Troubleshoot Network Connectivity 6.10.3 Network Troubleshooting Facts 6.10.4 Fix a Network Connection 1	6E



Unavailable resources - Local resources - Shares	6.9 Network Utilities 6.10.2 Troubleshoot Network Connectivity 6.10.3 Network Troubleshooting Facts 6.10.4 Fix a Network Connection 1	6E
Unavailable resources - Local resources - Printers	6.9 Network Utilities 6.10.2 Troubleshoot Network Connectivity 6.10.3 Network Troubleshooting Facts 6.10.4 Fix a Network Connection 1	6E
Unavailable resources - Local resources - Email	6.9 Network Utilities 6.10.2 Troubleshoot Network Connectivity 6.10.3 Network Troubleshooting Facts 6.10.4 Fix a Network Connection 1	6E
No connectivity	6.9 Network Utilities 6.10.2 Troubleshoot Network Connectivity 6.10.3 Network Troubleshooting Facts 6.10.4 Fix a Network Connection 1 7.5.1 Wireless Network Troubleshooting 7.5.2 Wireless Network Troubleshooting Tool Facts	6E
APIPA/link local address	6.9 Network Utilities 6.10.2 Troubleshoot Network Connectivity 6.10.3 Network Troubleshooting Facts 6.10.4 Fix a Network Connection 1	6E
Intermittent connectivity	6.9 Network Utilities 6.10.2 Troubleshoot Network Connectivity 6.10.3 Network Troubleshooting Facts 6.10.4 Fix a Network Connection 1 7.5.1 Wireless Network Troubleshooting 7.5.2 Wireless Network Troubleshooting Tool Facts	6E
IP conflict	6.9 Network Utilities 6.10.2 Troubleshoot Network Connectivity 6.10.3 Network Troubleshooting Facts 6.10.4 Fix a Network Connection 1	6E
Slow transfer speeds	6.9 Network Utilities 6.10.2 Troubleshoot Network Connectivity 6.10.3 Network Troubleshooting Facts 6.10.4 Fix a Network Connection 1 7.5.1 Wireless Network Troubleshooting 7.5.2 Wireless Network Troubleshooting Tool Facts	6E

Low RF signal	6.9 Network Utilities 6.10.2 Troubleshoot Network Connectivity 6.10.3 Network Troubleshooting Facts 6.10.4 Fix a Network Connection 1 7.5.1 Wireless Network Troubleshooting 7.5.2 Wireless Network Troubleshooting Tool Facts	6E
SSID not found	6.9 Network Utilities 6.10.2 Troubleshoot Network Connectivity 6.10.3 Network Troubleshooting Facts 6.10.4 Fix a Network Connection 1 7.5.1 Wireless Network Troubleshooting 7.5.2 Wireless Network Troubleshooting Tool Facts	6E
Unavailable resources - Internet		6E
Unavailable resources - Local resources - Shares		6E
Unavailable resources - Local resources - Printers		6E
Unavailable resources - Local resources - Email		6E
No connectivity	7.5.1 Wireless Network Troubleshooting 7.5.2 Wireless Network Troubleshooting Tool Facts	6E
APIPA/link local address		6E
Intermittent connectivity	7.5.1 Wireless Network Troubleshooting 7.5.2 Wireless Network Troubleshooting Tool Facts	6E
IP conflict		6E
Slow transfer speeds	7.5.1 Wireless Network Troubleshooting 7.5.2 Wireless Network Troubleshooting Tool Facts	6E
Low RF signal	7.5.1 Wireless Network Troubleshooting 7.5.2 Wireless Network Troubleshooting Tool Facts	6E
SSID not found	7.5.1 Wireless Network Troubleshooting 7.5.2 Wireless Network Troubleshooting Tool Facts	6E