

DESCRIPTION

The knowledge and skills contained in these Computer Maintenance & Repair standards cover the necessary competencies for an entry-level IT professional including installing, building, upgrading, repairing, configuring, troubleshooting, optimizing, diagnosing, and performing preventive maintenance of basic personal computer hardware and operating systems.

Total Test Questions: 63

Levels: 10-12

Units of Credit: 1.00

Prerequisites: Suggested Intro to IT

STANDARDS, OBJECTIVES, AND INDICATORS

STANDARD I

28% of Exam Blueprint

◆ STUDENTS WILL UNDERSTAND, IDENTIFY AND TROUBLESHOOT THE HARDWARE COMPONENTS OF A TYPICAL PC.

Objective 1: Show competency in your understanding of BIOS components and settings by knowing and doing the following:

1. Firmware
 - Install upgrades
2. Components
 - Monitor CPU
 - Monitor Hard drive
 - Monitor Optical drive
 - Monitor RAM
3. Configurations
 - Monitor Boot sequence
 - Enable and disable devices
 - Monitor Clock speeds
 - Monitor Virtualization support
 - Set Date/time
4. Security
 - Explain drive encryption
 - Set passwords
 - Explain TPM
 - Explain lo-jack
5. BIOS Monitoring
 - Explain built-in diagnostics
 - Monitor Fan speeds
 - Monitor Intrusions
 - Monitor BIOS Clock
 - Monitor bus speed



- Monitor temperature
- Monitor Voltage

Objective 2: Show competency in your understanding of essential hardware components, cards and devices by knowing and doing the following:

1. Motherboard
 - Locate and explain RAM slots
 - Locate and explain CMOS battery
 - Locate and identify power connections and types
 - Locate and explain Fan connectors
 - Locate and explain Audio port
 - Locate and explain USB port
 - Locate and explain Power button
 - Locate and explain Power light
 - Locate and explain Reset button
 - Locate and explain Drive activity lights
 - Explain bus speeds
2. Expansion Cards
 - Locate and explain sound cards
 - Locate and explain network cards
 - Locate and explain video cards
 - Locate and explain USB cards
 - Locate and explain serial and parallel cards
 - Locate and explain storage cards
 - Locate and explain Firewire cards
3. CPU
 - Explain pros and cons of Intel v. AMD
4. Power Supply
 - Explain SATA
 - Explain Molex
5. Other Devices
 - Input
 - Explain Mouse
 - Explain Keyboard
 - Explain Touch screen
 - Explain Scanner
 - Explain Barcode reader
 - Explain KVM
 - Explain Microphone
 - Explain Biometric devices
 - Output
 - Explain Display devices
 - Explain Speakers
 - Multimedia
 - Explain Camcorder
 - Explain Digital cameras
 - Explain Microphone



- Explain Webcam
- 6. Storage
 - Optical drives and burners
 - Identify and explain media capacity of CD-ROM
 - Identify and explain media capacity of DVD-ROM
 - Identify and explain media capacity of Blu-Ray
 - Identify and explain media capacity of CD-RW
 - Identify and explain media capacity of DVD-RW
 - Identify and explain media capacity of Dual Layer DVD-RW
 - Identify and explain media capacity of BD-R
 - Identify and explain media capacity of BD-RE
 - Connections
 - Identify eSATA
 - Identify Ethernet
 - Identify IDE configuration and setup (Master, Slave, Cable Select)
 - Identify Firewire
 - Identify internal SATA, IDE and SCSI
 - Identify USB
 - Drives
 - Recognize hot swappable
 - Recognize Solid state/flash
 - Compact flash
 - SD
 - Micro-SD
 - Mini-SD
 - Internet
 - Explain Cloud Storage
- 7. Cables
 - Types
 - Identify coaxial
 - Identify component
 - Identify composite
 - Identify DVI
 - Identify ethernet
 - Identify HDMI
 - Identify RGB
 - Identify s-video
 - Identify SATA
 - Identify eSATA
 - Identify IDE
 - Identify EIDE
 - Identify USB
 - Identify ethernet
 - Identify phone



- Identify VGA
- Connectors
 - Identify Audio
 - Identify DisplayPort
 - Identify DVI
 - Identify HDMI
 - Identify miniHDMI
 - Identify parallel
 - Identify RJ-45
 - Identify serial
 - Identify USB—A, B, mini, micro
 - Compare VGA (analog) v. HDMI (Digital)

Objective 3: Show competency in your understanding of troubleshooting symptoms and tools by knowing and doing the following:

- I. Troubleshooting (Motherboards, RAM, CPU and Power Supplies)
 - Recognize unexpected shutdowns
 - Recognize system lockups
 - Recognize POST code beeps
 - Recognize blank screen on bootup
 - Recognize BIOS time and settings resets
 - Recognize attempts to boot to incorrect device
 - Recognize continuous reboots
 - Recognize noises
 - Recognize loss of power
 - Recognize overheating
 - Recognize intermittent device failure
 - Recognize fans spin – no power to other devices
 - Recognize indicator lights
 - Recognize smoke and burning smell
 - Recognize BSOD
2. Troubleshooting (Hard Drives and RAID Arrays)
 - Recognize read/write failure
 - Recognize slow performance
 - Recognize failure to boot
 - Recognize loud clicking noise
 - Recognize drive not recognized
 - Recognize OS not found
 - Recognize RAID stops working
 - Recognize RAID not found
 - Recognize BSOD
3. Troubleshooting Tools
 - Use Screwdriver
 - Use External enclosures
 - Use CHKDSK
 - Use FORMAT
 - Use File recovery software



STANDARD 2

15% of Exam Blueprint

◆ STUDENTS WILL UNDERSTAND, IDENTIFY AND TROUBLESHOOT THE WINDOWS OPERATING SYSTEM COMPONENTS OF A TYPICAL PC.

Objective 1: Show competency in your understanding of installing and configuring operating systems by knowing and doing the following:

1. Versions
 - Compare and contrast Windows XP Home/Professional
 - Compare and contrast Windows Vista Home/Professional
 - Compare and contrast Windows 7 Home/Professional
2. Features and Requirements
 - Explain 32 bit v. 64 bit
 - Identify purpose of the following: Aero, gadgets, user account control, bit-locker, shadow copy, system restore, ready boost, sidebar, compatibility mode, XP mode, easy transfer, administrative tools, defender, Windows firewall, security center, event viewer, file structure and paths, category view vs. classic view
3. Upgrade Paths
 - Explain differences between in place upgrades, compatibility tools, and Windows upgrade OS advisor
4. Booting, Installing and Configuring
 - Boot system
 - Boot with USB
 - Boot with CD-ROM
 - Boot with DVD
 - Boot with PXE
 - Installation methods
 - Perform image installation
 - Perform unattended installation
 - Perform Upgrade
 - Perform Clean install
 - Perform Repair installation
 - Utilize partitioning
 - Dynamic
 - Basic
 - Primary
 - Extended
 - Logical



- Factory recovery partition
- Configuration
 - Load alternate third party drivers when necessary
 - Set Time/date/region/language
 - Install drivers, software and windows updates
- 5. Command Line Tools
 - Network
 - Use PING
 - Use IPCONFIG
 - Use TRACERT
 - Operating System
 - Use SHUTDOWN
 - Use CD
 - Use CHKDSK
 - Use [command name]/?
 - Utilities
 - Use CMD
 - Use REGEDIT (Caution)
 - Use SERVICES.MSC
 - Use MMC
 - Use EXPLORER
 - Use NOTEPAD
 - Use MSINFO32
- 6. Administrative Tools
 - Explain Computer management
 - Explain Users and groups
 - Explain Local security policy
 - Explain Device manager
 - Explain Task scheduler
 - Explain Services
 - Explain System configuration
 - Explain Windows Firewall
 - Explain Task Manager
 - Applications
 - Processes
 - Explain MSCONFIG
 - General
 - Boot
 - Services
 - Startup
 - Tools



7. Control Panel Features

- Set Internet options
 - Connections
 - Security
 - General
 - Privacy
 - Programs
 - Advanced
- Set Display settings
 - Resolution
- Explain user accounts
- Explain folder options
 - View hidden files
 - Hide extensions
 - General options
 - View options
- Explain System settings
 - Performance (virtual memory)
 - Remote settings
 - System protection
- Configure Windows Firewall
- Explain Power options
 - Hibernate
 - Power plans
 - Sleep/suspend
 - Standby
- Recognize features unique to Windows XP
 - Add/remove programs
 - Network connections
 - Printers and faxes
 - Automatic updates
 - Network setup wizard
- Recognize features unique to Vista
 - Tablet PC settings
 - Pen and input devices
 - Problem reports and solutions
 - Printers
- Recognize features unique to Windows 7
 - Action Center
 - Remote Applications and Desktop Connections
 - Troubleshooting



8. Preventive Maintenance
 - Schedule backups
 - Schedule check disks
 - Schedule defragmentation
 - Update Windows
 - Incorporate patch management
 - Incorporate fault tolerance
 - Update Driver/firmware
 - Update anti-virus
 - Utilize Tools
 - Backup
 - System restore
 - Check disk
 - Recovery image
 - Defrag

Objective 2: Show competency in your understanding of troubleshooting symptoms and tools by knowing and doing the following:

1. Troubleshoot OS
 - Explain failure to boot
 - Explain improper shutdown
 - Explain spontaneous shutdown/restart
 - Explain device fails to start
 - Explain missing dll message
 - Explain services fail to start
 - Explain compatibility error
 - Explain RAID not detected during installation
 - Explain slow system performance
 - Explain boots to safe mode
 - Explain file fails to open
 - Explain missing Boot.ini
 - Explain missing NTLDR
 - Explain missing operating system
 - Explain missing Graphical Interface
 - Explain Graphical Interface fails to load
 - Explain invalid boot disk
 - Explain BSOD
2. Troubleshooting Tools
 - Use recovery console
 - Use repair disks
 - Use pre-installation environments
 - Use MSCONFIG
 - Use DEFRAG



- Use REGSRV32
- Use REGEDIT
- Use event viewer
- Use safe mode
- Use command prompt
- Use emergency repair disk
- Use automated system recovery

STANDARD 3

14% of Exam Blueprint

- ◆ **STUDENTS WILL UNDERSTAND AND IDENTIFY ESSENTIAL COMPONENTS, FEATURES AND FUNCTIONS OF LAPTOPS, MOBILE DEVICES AND PRINTERS.**

LAPTOPS

Objective 1: Show competency in your understanding of laptop expansion and hardware components by knowing and doing the following:

1. Expansion
 - Identify Express card /34
 - Identify Express card /54
 - Identify PCMCIA
 - Identify SODIMM
 - Identify Flash
2. Internal components
 - Identify hard drive (2.5 vs. 3.5)
 - Identify memory
 - Identify CPU
 - Identify optical drive
 - Identify wireless card
 - Identify mini-PCle
 - Identify battery
 - Identify DC jack
 - Identify plastics
 - Identify speaker
 - Identify system board
3. External components
 - Identify keyboard
 - Identify touchpad
 - Identify screen
4. Display components
 - Identify LCD
 - Identify LED
 - Identify OLED



- Identify Plasma
- Locate Wi-Fi antenna connector/placement
- Locate Inverter and its function
- Locate Backlight

Objective 2: Show competency in your understanding of key laptop features by knowing and doing the following:

1. Function Keys

- Control Dual displays
- Control Wireless (on/off)
- Control Volume settings
- Control Screen brightness
- Control Bluetooth (on/off)
- Control Keyboard backlight

2. Safety

- Differentiate Docking station vs. port replicator
- Differentiate physical laptop lock and cable lock

Objective 3: Show competency in your understanding of troubleshooting symptoms by knowing and doing the following:

1. Troubleshooting Common Symptoms

- Recognize no display
- Recognize dim display
- Recognize flickering display
- Recognize sticking keys
- Recognize intermittent wireless
- Recognize no power
- Recognize battery not charging
- Recognize ghost cursor
- Recognize num lock indicator lights
- Recognize No Bluetooth connectivity
- Recognize No wireless connectivity
- Recognize Cannot display to external monitor

2. Disassembling Tips

- Document and label cable and screw locations
- Organize parts
- Refer to manufacturer documentation
- Use appropriate hand tools

3. Troubleshooting Video and Display

- Recognize VGA mode
- Recognize no image on screen
- Recognize overheat shutdown
- Recognize dead pixels



- Recognize artifacts
- Recognize color patterns incorrect
- Recognize dim image
- Recognize flickering image
- Recognize distorted image
- Recognize discoloration (degaussing)
- Recognize BSOD

MOBILE DEVICES

Objective 4: Show competency in your understanding of mobile operating systems, hardware, connectivity and email configuration by knowing and doing the following:

1. Android v. iOS Operating Systems
 - Differentiate open source vs. closed source/vendor specific
 - Explain app source (app store and market)
 - Explain screen orientation (accelerometer/gyroscope)
 - Explain screen calibration
 - Explain GPS and geotracking
2. Hardware Considerations
 - Explain concept of “no field serviceable parts”
 - Explain concept of “typically no upgradeable”
 - Explain touch interface
 - Explain touch flow
 - Explain multi-touch
 - Explain solid state drives
3. Network connectivity
 - Wireless/cellular data network (enable/disable)
 - Bluetooth
 - Enable Bluetooth
 - Enable pairing
 - Find device for pairing
 - Enter appropriate pin code
 - Test connectivity
4. Email Configuration
 - Enable/disable Wireless/cellular data network
 - Set Server address
 - POP3
 - IMAP
 - Port and SSL setting
 - Utilize Exchange
 - Utilize Gmail



Objective 5: Show competency in your understanding of mobile device security and synchronization by knowing and doing the following:

1. Security Methods
 - Passcode locks
 - Remote wipes
 - Locator applications
 - Remote backup applications
 - Failed login attempts restrictions
 - Anti-virus
 - Patching/OS updates
2. Device Synchronization
 - Synchronize pictures
 - Synchronize videos
 - Synchronize contacts
 - Synchronize programs
 - Synchronize email
 - Synchronize music
 - Identify software requirements to install the application on the PC
 - Recognize connection types to enable synchronization

PRINTERS

Objective 6: Show competency in your understanding of installing and maintaining printers by knowing and doing the following:

1. Installation
 - Configure wired printers
 - Configure wireless printers
 - Use appropriate printer drivers
2. Maintenance
 - Laser
 - Replace toner, applying maintenance kit, calibration, cleaning
 - Thermal
 - Replace paper, clean heating element, remove debris
 - Impact
 - Replace ribbon, replace print head, replace paper

Objective 7: Show competency in your understanding of troubleshooting symptoms and tools by knowing and doing the following:

1. Troubleshooting Printers
 - Recognize streaks
 - Recognize faded prints
 - Recognize creased paper



- Recognize ghost images
 - Recognize toner not fused to the paper
 - Recognize paper not feeding
 - Recognize Paper jam
 - Recognize no connectivity
 - Recognize vertical lines on page
 - Recognize garbled characters on paper
 - Recognize backed up print queue
 - Recognize low memory errors
 - Recognize access denied
 - Recognize printer will not print
 - Recognize color prints in wrong print color
 - Recognize unable to install printer
 - Recognize error codes
2. Troubleshooting Tools
- Use Maintenance kit
 - Use Compressed air
 - Use Toner vacuum
 - Use Printer spooler

STANDARD 4

8% of Exam Blueprint

◆ STUDENTS WILL UNDERSTAND AND IDENTIFY ESSENTIAL COMPONENT AND PRACTICES OF PC SECURITY.

Objective 1: Show competency in recognizing and preventing security threats by knowing and doing the following:

1. Threats

- Recognize social engineering
- Recognize malware
- Recognize rootkits
- Recognize phishing
- Recognize shoulder surfing
- Recognize spyware
- Recognize viruses
 - Worms
 - Trojans

2. Prevention

- Explain physical security
 - Barriers
 - Lighting
 - Surveillance
 - Guards



- Secure physical documents/passwords/shredding
 - Explain digital security
 - Antivirus
 - Firewalls
 - Antispyware
 - Use authentication/strong passwords
 - Emphasize user education
3. Best Practices
- Set strong passwords
 - Require passwords
 - Restrict user permissions
 - Change default user names
 - Disable guest account
 - Set screensaver required password
 - Disable autorun
4. Data Destruction/Disposal Methods
- Perform low level format vs. standard format
 - Perform hard drive sanitation and sanitation methods
 - Perform Overwrite
 - Perform Drive wipe
 - Perform physical destruction
 - Shredder
 - Drill
 - Electromagnetic
 - Degaussing tool

Objective 2: Show competency in your understanding of troubleshooting symptoms and tools by knowing and doing the following:

- I. Troubleshooting Common Symptoms
- Recognize pop-ups
 - Recognize browser redirection
 - Recognize security alerts
 - Recognize slow performance
 - Recognize Internet connectivity issues
 - Recognize PC locks up
 - Recognize Windows update failures
 - Recognize rogue antivirus
 - Recognize spam
 - Recognize renamed system files
 - Recognize files disappearing
 - Recognize file permission changes
 - Recognize hijacked email



- Recognize access denied
- 2. Troubleshooting Tools
 - Recognize anti-virus software
 - Recognize anti-malware software
 - Recognize anti-spyware software
 - Recognize recovery console
 - Recognize pre-installation environments
 - Recognize event viewer
 - Recognize system restore
- 3. Best Practices
 - Identify malware symptoms
 - Quarantine infected system
 - Disable system restore
 - Remediate infected systems
 - Update anti-virus software
 - Scan and removal techniques (safe mode, pre-installation environment)
 - Schedule scans and updates
 - Enable system restore and create restore point
 - Teach end user

STANDARD 5

12% of Exam Blueprint

◆ STUDENTS WILL UNDERSTAND AND IDENTIFY ESSENTIAL COMPONENTS AND PRACTICES OF PC NETWORKING.

Objective 1: Show competency in establishing a Small Office/Home office (SOHO) network by knowing and doing the following:

1. Network Devices
 - Identify hub
 - Identify switch
 - Identify PoE
 - Identify router
 - Identify access point
 - Identify modem
 - Identify bridge
 - Identify NAS
 - Identify firewall
 - Identify Internet appliance
 - Identify VoIP phones
2. Networking Practices
 - Establish wireless connection
 - Establish wired connection
 - Establish WWAN (Cellular) connection



- Differentiate Home vs. Work vs. Public network settings
- Set firewall settings
 - Exceptions
 - Configuration
 - Enabling/disabling
- 3. Wireless/Wired Routers
 - Configure MAC filtering
 - Configure channels (1-11)
 - Configure port forwarding, port triggering
 - Configure SSID broadcast (on/off)
 - Configure wireless encryption
 - Configure firewall
 - Configure DMZ
 - Configure DHCP (on/off)
 - Configure WPS
 - Configure NAT
 - Configure basic QoS
- 4. Internet Connections
 - Explain cable
 - Explain DSL
 - Explain dial-up
 - Explain fiber
 - Explain satellite
 - Explain ISDN
 - Explain cellular (mobile hotspot)
 - Explain line of sight wireless internet service
- 5. Wired network
 - Change default usernames and passwords
 - Enable MAC filtering
 - Assign static IP addresses
 - Disable ports
 - Identify physical security
- 6. Wireless network
 - Change default user-names and passwords
 - Change SSID
 - Set encryption
 - Disable SSID broadcast
 - Enable MAC filtering
 - Explain antenna and access point placement
 - Explain radio power levels
 - Assign static IP addresses
- 7. Troubleshooting
 - Address symptoms
 - No connectivity
 - Limited connectivity
 - Intermittent connectivity
 - Local connectivity
 - APIPA address



- IP conflict
- Low RF signal
- Slow transfer speeds
- Utilize proper tools
 - Wire strippers
 - Toner probes
 - Crimper
 - Cable tester
 - PING
 - IPCONFIG

STANDARD 6

15% of Exam Blueprint

◆ STUDENTS WILL UNDERSTAND AND IDENTIFY ESSENTIAL COMPONENTS OF PC PROFESSIONALISM, SAFETY PRECAUTIONS AND ENVIRONMENTAL IMPACT AND CONTROLS.

Objective 1: Show competency in professionally and respectfully communicating by knowing and doing the following:

1. Communication
 - Use appropriate language by avoiding
 - Jargon
 - Acronyms
 - Slang
 - Be positive
 - Listen respectfully to customer
 - Be culturally sensitive
 - Be punctual
 - Avoid distractions
 - Personal calls
 - Talking to co-workers while interacting with customers
 - Personal interruptions
2. Personal Behavior
 - Dealing with a difficult customer or situation
 - Avoid arguing with customers and/or being defensive
 - Do not minimize customer's problems
 - Avoid being judgmental
 - Clarify customer statements (ask open ended questions to narrow the scope of the problem, restate the issue or question to verify understanding)
3. Relationship of Trust
 - Set and meet expectations and communicate status with the customer
 - Offer different repair/replacement options if applicable
 - Provide proper documentation on the services provided



- Follow up with customer/user at a later date to verify satisfaction
- Deal appropriately with customers confidential materials
 - Located on a computer, desktop, printer, etc.
- First response behaviors
 - Identify
 - Report through proper channels
 - Data/device preservation
- Use of documentation changes
- Chain of custody
- Tracking of evidence/documenting process

Objective 2: Show competency in following proper safety and environmental guidelines by knowing and doing the following:

1. Personal and Customer Safety
 - Disconnect power before repairing PC
 - Remove jewelry
 - Use proper lifting techniques
 - Consider weight limitations
 - Promote electrical fire safety
 - Understand CRT safety – proper disposal
 - Utilize cable management
 - Comply with local government regulations
2. Environmental Protection
 - Explain MSDS documentation for handling and disposal
 - Monitor Temperature, humidity level awareness and proper ventilation
 - Anticipate Power surges, brownouts, blackouts
 - Explain Battery backup
 - Explain Surge suppressor
 - Remove Dust and debris
 - Compressed air
 - Vacuums
 - Comply with local government regulations

STANDARD 7

8% of Exam Blueprint

STUDENTS WILL UNDERSTAND AND IDENTIFY GENERAL TROUBLESHOOTING TECHNIQUES.

Objective 1: Show competency in identifying the problem by knowing and doing the following:

1. Ask good questions
 - Before making changes, question the user and identify user changes to computer and perform backups
2. Establish a theory of probable cause
 - Look to the obvious first
3. Test the theory to determine cause
4. Determine next steps to resolve problem, if theory works



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5. If theory is denied, re-establish new theory or escalate
6. Establish a plan of action to resolve the problem
7. Implement the solution
8. Verify full system functionality and if applicable implement preventive measures
9. Document findings, actions and outcomes

