1.0 Hardware

1.1 Given a scenario, configure settings and use BIOS/UEFI tools on a PC.
- Firmware upgrades/flash BIOS
- BIOS component information
  - RAM
  - Hard drive
  - Optical drive
  - CPU
- BIOS configurations
  - Boot sequence
- Enabling and disabling devices
- Date/time
- Clock speeds
- Virtualization support
- BIOS security (passwords, drive encryption: TPM, LoJack, secure boot)
- Built-in diagnostics
- Monitoring
  - Temperature monitoring
  - Fan speeds
  - Intrusion detection/notification
  - Voltage
  - Clock
  - Bus speed

1.2 Explain the importance of motherboard components, their purpose and properties.
- Sizes
  - ATX
  - Micro-ATX
  - Mini-ITX
  - ITX
- Expansion slots
  - PCI
  - PCI-X
  - PCIe
  - miniPCI
- RAM slots
- CPU sockets
- Chipsets
  - Northbridge
  - Southbridge
- CMOS battery
- Power connections and types
  - Fan connectors
- Front/top panel connectors
  - USB
  - Audio
  - Power button
  - Power light
  - Drive activity lights
- Bus speeds
- Reset button

1.3 Compare and contrast various RAM types and their features.
- Types
  - DDR
  - DDR2
  - DDR3
  - SODIMM
  - DIMM
  - Parity vs. non-parity
- ECC vs. non-ECC
- RAM configurations
  - Single channel vs. dual channel vs. triple channel
  - Single sided vs. double sided
  - Buffered vs. unbuffered
- RAM compatibility

CompTIA A+ Certification Exam Objectives Version 2.0 (Exam Number: 220-901)
Install and configure PC expansion cards.

- Sound cards
- Video cards
- Network cards
- USB cards
- Firewire cards
- Thunderbolt cards
- Storage cards
- Modem cards
- Wireless/cellular cards
- TV tuner cards
- Video capture cards
- Riser cards

Install and configure storage devices and use appropriate media.

- Optical drives
  - CD-ROM/CD-RW
  - DVD-ROM/DVD-RW/DVD-RW DL
  - Blu-ray
  - BD-R
  - BD-RE
- Magnetic hard disk drives
  - 5400 rpm
  - 7200 rpm
  - 10,000 rpm
- Hot swappable drives
- Solid state/flash drives
  - Compact flash
  - SD
  - MicroSD
  - MiniSD
  - xD
  - SSD
  - Hybrid
  - eMMC
- RAID types
  - 0
  - 1
  - 5
  - 10
- Tape drive
- Media capacity
  - CD
  - CD-RW
  - DVD-RW
  - DVD
  - Blu-ray
  - Tape
  - DVD DL

Install various types of CPUs and apply the appropriate cooling methods.

- Socket types
  - Intel: 775, 1155, 1156, 1366, 1150, 2011
  - AMD: AM3, AM3+, FM1, FM2, FM2+
- Characteristics
  - Speeds
  - Cores
  - Cache size/type
  - Hyperthreading
  - Virtualization support
- Architecture (32-bit vs. 64-bit)
- Integrated GPU
- Disable execute bit
- Cooling
  - Heat sink
  - Fans
  - Thermal paste
  - Liquid-based
  - Fanless/passive
- Heat sink
- Fans
- Thermal paste
- Liquid-based
- Fanless/passive
1.7 Compare and contrast various PC connection interfaces, their characteristics and purpose.

- **Physical connections**
  - USB 1.1 vs. 2.0 vs. 3.0
  - Connector types: A, B, mini, micro
  - Firewire 400 vs. Firewire 800
  - SATA1 vs. SATA2 vs. SATA3, eSATA
  - Other connector types
    - VGA
    - HDMI
    - DVI

- **Audio**
  - Analog
  - Digital (Optical connector)

- **IR**
  - NFC

- **Characteristics**
  - Analog
  - Digital
  - Distance limitations
  - Data transfer speeds
  - Quality
  - Frequencies

- **Wireless connections**
  - Bluetooth
  - RF

- **Connector types and their voltages**
  - SATA
  - Molex
  - 4/8-pin 12v
  - PCIe 6/8-pin
  - 20-pin
  - 24-pin

- **Specifications**
  - Wattage
  - Dual rail
  - Size
  - Number of connectors
  - ATX
  - MicroATX
  - Dual voltage options

1.8 Install a power supply based on given specifications.

- **Connector types and their voltages**
  - SATA
  - Molex
  - 4/8-pin 12v
  - PCIe 6/8-pin
  - 20-pin
  - 24-pin

- **Specifications**
  - Wattage
  - Dual rail
  - Size
  - Number of connectors
  - ATX
  - MicroATX
  - Dual voltage options

1.9 Given a scenario, select the appropriate components for a custom PC configuration to meet customer specifications or needs.

- **Graphic/CAD/CAM design workstation**
  - Multicore processor
  - High-end video
  - Maximum RAM

- **Audio/video editing workstation**
  - Specialized audio and video card
  - Large fast hard drive
  - Dual monitors

- **Virtualization workstation**
  - Maximum RAM and CPU cores

- **Gaming PC**
  - Multicore processor

- **Home theater PC**
  - High-end video/specialized GPU
  - High-definition sound card
  - High-end cooling

- **Standard thick client**
  - Desktop applications
  - Meets recommended requirements for selected OS

- **Thin client**
  - Basic applications
  - Meets minimum requirements for selected OS

- **Home server PC**
  - Media streaming
  - File sharing
  - Print sharing
  - Gigabit NIC
  - RAID array

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  - Media streaming
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1.0 Hardware

1.10 Compare and contrast types of display devices and their features.

- **Types**
  - LCD
  - TN vs. IPS
  - Fluorescent vs. LED backlighting
  - Plasma
  - Projector
  - OLED

- **Refresh/frame rates**

- **Resolution**

- **Native resolution**

- **Brightness/lumens**

- **Analog vs. digital**

- **Privacy/antiglare filters**

- **Multiple displays**

- **Aspect ratios**
  - 16:9
  - 16:10
  - 4:3

1.11 Identify common PC connector types and associated cables.

- **Display connector types**
  - DVI-D
  - DVI-I
  - DVI-A
  - DisplayPort
  - RCA
  - HD15 (i.e., DE15 or DB15)
  - BNC
  - miniHDMI
  - miniDin-6

- **Display cable types**
  - HDMI
  - DVI
  - VGA
  - Component
  - Composite
  - Coaxial

- **Device cables and connectors**
  - SATA
  - eSATA
  - USB
  - Firewire (IEEE1394)
  - PS/2
  - Audio

- **Adapters and convertors**
  - DVI to HDMI
  - USB A to USB B
  - USB to Ethernet
  - DVI to VGA
  - Thunderbolt to DVI
  - PS/2 to USB
  - HDMI to VGA

1.12 Install and configure common peripheral devices.

- **Input devices**
  - Mouse
  - Keyboard
  - Scanner
  - Barcode reader
  - Biometric devices
  - Game pads
  - Joysticks
  - Digitizer
  - Motion sensor

- **Output devices**
  - Printers
  - Speakers
  - Display devices

- **Input & output devices**
  - Touch screen
  - KVM
  - Smart TV
  - Set-top Box
  - MIDI-enabled devices
1.3 Install SOHO multifunction device/printers and configure appropriate settings.

- Use appropriate drivers for a given operating system
  - Configuration settings
  - Duplex
  - Collate
  - Orientation
  - Quality
- Device sharing
  - Wired
  - USB
  - Serial
  - Ethernet
  - Wireless
  - Bluetooth
  - 802.11 (a/b/g/n/ac)
  - Infrastructure vs. ad hoc
  - Integrated print server (hardware)
  - Cloud printing/remote printing
- Public/shared devices
  - Sharing local/networked device via operating system settings
  - Wired
  - USB
  - Serial
  - Ethernet
  - Wireless
  - Bluetooth
  - 802.11 (a/b/g/n/ac)
  - Infrastructure vs. ad hoc
  - Integrated print server (hardware)
  - Cloud printing/remote printing

1.4 Compare and contrast differences between the various print technologies and the associated imaging process.

- Laser
  - Imaging drum, fuser assembly, transfer belt, transfer roller, pickup rollers, separate pads, duplexing assembly
  - Imaging process: processing, charging, exposing, developing, transferring, fusing and cleaning
- Inkjet
  - Ink cartridge, print head, roller, feeder, duplexing assembly, carriage and belt
  - Calibration
- Thermal
  - Feed assembly, heating element
  - Special thermal paper
- Impact
  - Print head, ribbon, tractor feed
  - Impact paper
- Virtual
  - Print to file
  - Print to PDF
  - Print to XPS
  - Print to image

1.5 Given a scenario, perform appropriate printer maintenance.

- Laser
  - Replacing toner, applying maintenance kit, calibration, cleaning
- Thermal
  - Replace paper, clean heating element, remove debris
- Impact
  - Replace ribbon, replace print head, replace paper
- Inkjet
  - Clean heads, replace cartridges, calibration, clear jams