



3.0 Hardware

3.1 Compare and contrast display components and attributes.

- **Types**
 - Liquid crystal display (LCD)
 - In-plane switching (IPS)
 - Twisted nematic (TN)
 - Vertical alignment (VA)
 - Organic light-emitting diode (OLED)
 - Mini light-emitting diode (Mini-LED)
- Touch screen/digitizer
- **Inverter**
- **Attributes**
 - Pixel density
 - Refresh rates
 - Screen resolution
 - Color gamut

3.2 Summarize basic cable types and their connectors, features, and purposes.

- **Network cables**
 - Copper
 - Categories
 - T568A/T568B standards
 - Coaxial
 - Shielded twisted pair
 - Direct burial
 - Unshielded twisted pair
 - Plenum-rated
 - Optical
 - Single-mode
 - Multimode
- **Peripheral cables**
 - USB 2.0
 - USB 3.0
 - Serial
- Thunderbolt
- **Video cables**
 - High-definition Multimedia Interface (HDMI)
 - DisplayPort
 - Digital Visual Interface (DVI)
 - Video Graphics Array (VGA)
 - USB-C
- **Hard drive cables**
 - Serial Advanced Technology Attachment (SATA)
 - External SATA (eSATA)
- **Adapters**
- **Connector types**
 - RJ11
 - RJ45
 - F-type
 - Straight tip (ST)
 - Subscriber connector (SC)
 - Lucent connector (LC)
 - Punchdown block
 - MicroUSB
 - MiniUSB
 - USB-C
 - Molex
 - Lightning
 - DB9

3.3 Compare and contrast RAM characteristics.

- **Form factors**
 - Small Outline Dual In-line Memory Module (SODIMM)
 - Dual In-line Memory Module (DIMM)
- Double Data Rate (DDR) iterations
- Error-correcting code (ECC) vs. non-ECC RAM
- Channel configurations



3.4 Compare and contrast storage devices.

- Hard drives
 - Spindle speeds
 - Form factors
 - 2.5-inch
 - 3.5-inch
- Solid-state drives
 - Communications interfaces
 - Non-volatile Memory Express (NVMe)
 - SATA
- Peripheral Component Interconnect Express (PCIe)
- Serial Attached SCSI [Small Computer System Interface] (SAS)
- Form factors
 - M.2
 - Mini-serial Advanced Technology Attachment (mSATA)
- Drive configurations
 - Redundant Array of Independent Disks (RAID) 0, 1, 5, 6, 10
- Removable storage
 - Flash drives
 - Memory cards
- Optical drives

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

- Motherboard form factors
 - Advanced Technology Extended (ATX)
 - microATX
 - Information Technology eXtended (ITX)
- Motherboard connector types
 - Peripheral Component Interconnect (PCI)
 - PCIe
 - Power connectors
 - SATA
 - eSATA
 - Headers
 - M.2
- Motherboard compatibility
 - CPU socket types
 - Advanced Micro Devices, Inc. (AMD)
 - Intel
 - Multisocket
- BIOS/Unified Extensible Firmware Interface (UEFI) settings
 - Boot options
 - USB permissions
 - Trusted Platform Module (TPM) security features
 - Fan considerations
 - Secure Boot
 - Boot password
 - BIOS password
 - Temperature monitoring
- Virtualization support
- Encryption
 - TPM
 - Hardware security module (HSM)
- CPU architecture
 - x86/x64
 - Advanced RISC [Reduced Instruction Set Computer] Machine (ARM)
 - Core configurations
- Expansion cards
 - Sound card
 - Video card
 - Capture card
 - Network interface card
- Cooling
 - Fans
 - Heat sink
 - Thermal paste/pads
 - Liquid

3.6 Given a scenario, install the appropriate power supply.

- Input 110–120 VAC vs. 220–240 VAC
- Output 3.3V vs. 5V vs. 12V
- 20+4 pin motherboard connector
- Redundant power supply
- Modular power supply
- Wattage rating
- Energy efficiency



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

- Properly unbox device and consider set-up location
- Use appropriate drivers for a given operating system
 - Printer Control Language (PCL) vs. postscript
- Firmware
- Device connectivity
 - USB
 - Ethernet
 - Wireless
- Public/shared devices
 - Printer share
 - Print server
- Configuration settings
 - Duplex
 - Orientation
 - Tray settings
 - Quality
- Security
 - User authentication
 - Badging
- Audit logs
- Secured prints
- Network scan services
 - Email
 - SMB
 - Cloud services
- Automatic document feeder (ADF)/flatbed scanner

3.8 Given a scenario, perform appropriate printer maintenance.

- Laser
 - Maintenance: Replace toner, apply maintenance kit, calibrate, and clean
- Inkjet
 - Ink cartridge, printhead, roller, and feeder
 - Maintenance: Clean printheads, replace cartridges, calibrate, and clear jams
- Thermal
 - Feed assembly
 - Special thermal paper
 - Maintenance: Replace paper, clean heating element, and remove debris
- Impact
 - Multipart paper
 - Maintenance: Replace ribbon, printhead, and paper