Hardware

THE COMPTIA A+ EXAM 220–901 TOPICS COVERED IN THIS CHAPTER INCLUDE THE FOLLOWING:

✓ 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

✓ 1.4 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
✓ 1.5 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

✓ 1.6 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

✓ 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)
  ■ RJ-45
  ■ RJ-11
  ■ Thunderbolt
■ Wireless connections
  ■ Bluetooth
  ■ RF
  ■ IR
  ■ NFC
■ Characteristics
  ■ Analog
  ■ Digital
  ■ Distance limitations
  ■ Data transfer speeds
  ■ Quality
  ■ Frequencies

✓ 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
  - High-end video/specialized GPU
  - High-definition sound card
  - High-end cooling
- Home theater PC
  - Surround sound audio
  - HDMI output
  - HTPC compact form factor
  - TV tuner
- Standard thick client
  - Desktop applications
  - Meets recommended requirements for selected OS
- Thin client
  - Basic applications
  - Meets minimum requirements for selected OS
  - Network connectivity
- Home server PC
  - Media streaming
  - File sharing
  - Print sharing
  - Gigabit NIC
  - RAID array

✓ 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/anti-glare 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 converters
  - 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
  - Touch pads
  - Smart card readers
  - Digital cameras
  - Microphone
  - Webcam
  - Camcorder
- Output devices
  - Printers
  - Speakers
  - Display devices
- Input & output devices
  - Touch screen
  - KVM
  - Smart TV
  - Set-top Box
  - MIDI-enabled devices
✓ 1.13 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
      - TCP/Bonjour/AirPrint
    - Data privacy
      - User authentication on the device
      - Hard drive caching

✓ 1.14 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

✓ 1.15 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
1. What is the distance limitation of the FireWire 800 standard when implemented over fiber-optic cable?
   A. 4.5 meters  
   B. 100 meters  
   C. 400 meters  
   D. 800 meters  

2. Which motherboard form factor measures 6.7” x 6.7”?
   A. Mini-ITX  
   B. Nano-ITX  
   C. Pico-ITX  
   D. Mobile-ITX  

3. Which of the following statements are not true regarding CPUs and operating systems? (Choose two.)
   A. A 32-bit OS can run only on a 32-bit CPU.  
   B. A 64-bit OS can run only on a 64-bit CPU.  
   C. A 64-bit OS can run on a 32-bit CPU or a 64-bit CPU.  
   D. A 32-bit OS can run on a 32-bit CPU or a 64-bit CPU.  

4. The DCPS within a laser printer converts AC power into what three voltages? (Choose three.)
   A. +5VDC  
   B. –5VDC  
   C. +24VDC  
   D. –24VDC  

5. Identify the cable type shown here.
   A. Component  
   B. Composite  
   C. Coaxial  
   D. RCA
6. A technician is looking to buy a new LCD monitor. Which type of LCD monitor has faster response times and is less expensive than others?
   A. TN
   B. IPS
   C. LED
   D. Plasma

7. Which computer peripheral is most likely to use a mini-DIN 6 connector?
   A. Keyboard
   B. Monitor
   C. Hard drive
   D. Sound card

8. Which type of storage device is composed of a conventional hard drive and a substantial amount of solid-state storage?
   A. SSD
   B. HDD
   C. Mesh
   D. Hybrid

9. An administrator ordered replacement printer paper that is a thicker caliper than recommended by the printer manufacturer. What is the biggest risk in using this paper?
   A. Smeared images
   B. Paper will not feed
   C. Paper jams
   D. Images will not print

10. You need to share printers on your network with multiple client operating systems, such as Windows, macOS, and Linux. Which of the following services will best meet your needs?
    A. Bonjour
    B. AirPrint
    C. TCP printing
    D. Virtual printing

11. Which one of the following connector types are you most likely to find on the end of a CAT6a cable?
    A. RJ-11
    B. RJ-45
    C. BNC
    D. SATA
12. Identify the video connector shown here.

13. What type of printer technology will often use a roll of paper as opposed to individual sheets?
   A. Ink-jet
   B. Thermal
   C. Laser
   D. Fax machine

14. Which RAM feature will detect errors within memory but is not able to fix them?
   A. Parity
   B. Non-parity
   C. ECC
   D. Non-ECC

15. Which of the following types of printers require the replacement of some sort of ink or toner? (Choose all that apply.)
   A. Laser
   B. Thermal
   C. Impact
   D. Ink-jet
16. You are working on repairing a defective laser printer. Which of the following is a true statement regarding the imaging drum in a laser printer?
A. It can hold a charge only when it's not exposed to light.
B. It can hold a charge only when it's exposed to light.
C. It can hold a charge regardless of light exposure.
D. It is not required to hold a charge.

17. What are the dimensions of a micro-ATX motherboard?
A. 12” × 9.6”
B. 9.6” × 9.6”
C. 6.7” × 6.7”
D. 3.9” × 2.8”

18. When discussing video monitors, what is the term used to describe the number of pixels used to draw the screen?
A. Refresh rate
B. Frame rate
C. Aspect ratio
D. Resolution

19. You have three hard disks, each 1TB in size. After installing them as a RAID 5 array in a computer, how much usable storage space will you have?
A. 1.5TB
B. 2TB
C. 2.5TB
D. 3TB

20. Which of the following statements most accurately describes the functionality of the disable execute bit?
A. It prevents the CPU from working if the computer is stolen.
B. It prevents the CPU from working if the CPU has been set to run at too high a speed (overclocking).
C. It prevents the computer from being booted remotely in a PXE boot environment.
D. It protects the computer from certain types of viruses or malicious code.

21. You need to enable clients to print to your networked printers, regardless of their location worldwide. Which service will best suit your needs?
A. Bonjour
B. AirPrint
C. Virtual printing
D. Cloud printing
22. Identify the computer component shown here.

A. CPU heat sink and fan  
B. Passive CPU heat sink  
C. Power supply fan  
D. Secondary cooling fan

23. Which of the following connectors transmit analog signals? (Choose two.)
   A. VGA  
   B. RJ-45  
   C. RJ-11  
   D. HDMI

24. A business partner who is visiting your corporate office wants to print to a printer using a Bluetooth connection. What type of connection is this?
   A. Permanent  
   B. Ad hoc  
   C. On demand  
   D. Infrastructure

25. You have a motherboard that supports up-plugging. Which of the following statements regarding PCIe are true? (Choose two.)
   A. You can put an x1 card into an x8 slot.  
   B. You can put an x8 card into an x16 slot.  
   C. You can put an x8 card into an x1 slot.  
   D. You can put an x16 card into an x8 slot.
26. A technician needs to increase the fault tolerance of his computer’s storage system, and he has two hard drives available. Which of the following options is his best choice?
   A. Install both drives and configure them as separate volumes.
   B. Install both drives and implement RAID 0.
   C. Install both drives and implement RAID 1.
   D. Install both drives and implement RAID 5.

27. During which step of the laser printer imaging process does a fluorescent lamp discharge the photosensitive drum?
   A. Cleaning
   B. Charging
   C. Exposing
   D. Developing

28. Which type of laptop monitor technology uses a current of electricity to stimulate a sealed panel of inert gas?
   A. OLED
   B. LED
   C. Plasma
   D. LCD

29. What type of front- or top-panel connector uses a standard 3.5mm jack to make connections?
   A. USB
   B. Audio
   C. FireWire
   D. Thunderbolt

30. The motherboard in your desktop computer supports dual-channel memory. Which of the following statements regarding RAM is true?
   A. The RAM will work only if it’s installed in pairs.
   B. The RAM will work only if it’s installed in pairs or if one double-sided RAM module is used.
   C. The RAM will work if only one module is installed, but only at half of its rated speed.
   D. The RAM will work if only one module is installed.

31. A single lane of PCIe 4.0 operates at what data rate?
   A. 250MBps
   B. 500MBps
   C. 1GBps
   D. 2GBps
32. A technician needs to replace a failed power supply in a desktop computer. When choosing a replacement power supply, which two specifications are most important to consider? (Choose two.)
   A. Wattage
   B. Dual rail
   C. Dual voltage options
   D. Number of connectors

33. What is an advantage of using double-sided memory over single-sided memory?
   A. It allows the memory to operate twice as fast.
   B. It allows the CPU to access twice as much RAM at one time.
   C. It’s required for use in dual-channel motherboards.
   D. It allows for twice as much memory to be used in the same amount of space.

34. You need to replace the magnetic hard drive in your manager’s laptop. She wants a high-speed, high-capacity drive. What are the most common issues associated with her request? (Choose two.)
   A. Increased battery usage
   B. Increased heat production
   C. Decreased component lifespan
   D. Decreased space for other peripherals

35. What are the two speeds at which PCI expansion buses can operate in desktop computers? (Choose two.)
   A. 33MHz
   B. 66MHz
   C. 133MHz
   D. 266MHz

36. A designer from the corporate office is visiting your field office. He tries to print from his MacBook Pro to a networked printer, but it does not work. Local users in the office are able to print to the device using their Windows 8 computers. What would most likely solve the problem?
   A. Select the Enable Mac Printing option in the print server configuration settings.
   B. Select the Enable Bonjour option in the print server configuration settings.
   C. Install a Mac printer driver on the print server.
   D. Stop and restart the print spooler service.

37. The users on your network in the Human Resources department often have sensitive materials shown on their computer screens. What is their best option to dramatically limit the viewing angle of their monitors?
   A. Lower the brightness setting.
   B. Lower the contrast setting.
   C. Install an antiglare filter.
   D. Install a privacy filter.
38. Identify the peripheral connector shown here.

![Peripheral Connector]

A. USB Type A  
B. USB Type B  
C. USB Standard mini-B  
D. Thunderbolt

39. You have an OLED monitor that you just plugged into a desktop computer. One of your co-workers changes the resolution from 1920×1080 to 1920×1200, but then the image looks highly distorted. What is the most likely cause of this?
   A. The video driver does not support 1920×1200 resolution.  
   B. The monitor has a native resolution of 1920×1080.  
   C. The video adapter has a native resolution of 1920×1080.  
   D. The monitor is plugged into the wrong monitor interface to support the new resolution.

40. Which of the following are advantages of using a CPU liquid cooling system over an air-based system? (Choose two.)
   A. Easier to install and maintain  
   B. More efficient  
   C. Quieter  
   D. Safer for internal components

41. You need to perform preventive maintenance on an impact printer. What are two areas you should examine that you would not need to on most inkjet printers? (Choose two.)
   A. Ink cartridges  
   B. Output tray  
   C. Print head  
   D. Tractor feed mechanism
42. Which expansion bus technology uses lanes, which are switched point-to-point signal paths between two components?
   A. PCI
   B. PCI-X
   C. PCIe
   D. miniPCI

43. You are installing new computers in a machine shop. The computers on the shop floor don’t need to run local applications or have their own hard drives, but they do need to connect to the shop’s server. What type of custom configuration should you recommend?
   A. Thin client
   B. Thick client
   C. Virtualization workstation
   D. CAD/CAM workstation

44. Which PC component reboots the computer from a cold startup point without removing power from the components?
   A. Power button
   B. Suspend button
   C. Reset button
   D. Reboot button

45. Which type of LCD panel is considered to have the best color representation at wider angles of viewing?
   A. TN
   B. IPS
   C. LED
   D. Plasma

46. You have a user who needs recommendations for installing a home server PC. She wants her family to be able to share files and videos on their home network. She also wants her data to be protected in the event of a hard drive failure. Which two components do you recommend she include?
   A. Dedicated print server
   B. RAID array
   C. Gigabit NIC
   D. Dual processors

47. Your motherboard does not support up-plugging for PCIe adapter cards. Which of the following statements is true?
   A. You can’t put an x8 card into an x16 slot.
   B. You can put an x8 card into an x16 slot, but it will run at x1 speed.
   C. You can put an x8 card into an x16 slot, and it will run at x8 speed.
   D. You can put an x8 card into an x16 slot, and it will run at x16 speed.
48. Which system component enables the use of Secure Boot technology?
   A. BIOS
   B. UEFI
   C. AMI
   D. SATA

49. Which type of DIMM has 184 pins?
   A. DDR
   B. DDR2
   C. DDR3
   D. SODIMM

50. Which CPU technology allows for the assignment of two logical cores for every physical core present?
   A. Multicore
   B. 32-bit vs. 64-bit
   C. Integrated GPU
   D. Hyperthreading

51. On what type of printer are you most likely to use tractor feed paper?
   A. Dot-matrix
   B. Thermal
   C. Laser
   D. Inkjet

52. Which type of flash memory is capable of being embedded on the circuit board of mobile devices?
   A. xD
   B. miniSD
   C. microSD
   D. eMMC

53. Which motherboard form factor is common in desktop computers and measures 12” × 9.6”?
   A. ATX
   B. MicroATX
   C. Mini-ITX
   D. ITX
54. What two components within an inkjet printer are responsible for moving the print head into proper position?
   A. Carriage and belt
   B. Roller and belt
   C. Carriage motor and roller
   D. Carriage motor and belt
   E. Belt motor and roller

55. Your company just hired a video producer to create exciting videos for the sales team. For her custom computer, which two upgrades are the most useful? (Choose two.)
   A. Video card
   B. CPU
   C. NIC
   D. Hard drive

56. You need to enable virtualization support for one of your Windows 8–based desktop computers using an Intel Core i5 CPU. Which two of the following must be true? (Choose two.)
   A. The CPU must have Intel VT.
   B. The CPU must have Intel VR.
   C. You need to enable virtualization in Windows 8.
   D. You need to enable virtualization in the BIOS.

57. Your business employs four graphic designers who need new computers. These designers create graphical content such as advertisements, posters, and full-color brochures. Which of the following components is the least important to enhance in their custom-configured machines?
   A. Hard drive
   B. Processor
   C. Video card
   D. RAM

58. An analog LCD monitor is most likely to have what type of connector?
   A. DisplayPort
   B. RCA
   C. VGA
   D. BNC
59. What is the name of the measure that specifies how many times an image can be redrawn on a computer screen, in one second?
   A. Refresh rate
   B. Frame rate
   C. Native resolution
   D. Aspect ratio

60. Which PC peripheral connection type operates at 20Gbps bandwidth, with a port that provides 18V and 9.9W of power?
   A. FireWire 800
   B. USB 3.0
   C. eSATA
   D. Thunderbolt

61. Inside a laser printer, approximately what temperature does the fuser get heated to?
   A. 250° F
   B. 350° F
   C. 450° F
   D. 550° F

62. You have a user who needs a custom PC configuration to run common desktop applications and simply meet the recommended requirements for a selected operating system. What should you recommend?
   A. Thin client
   B. Thick client
   C. Home server PC
   D. Virtualization workstation

63. In the laser printer printing process, which step immediately follows the exposing step?
   A. Charging
   B. Fusing
   C. Developing
   D. Transferring

64. What are the two power requirements that a PCI expansion bus may have in a desktop computer? (Choose two.)
   A. 1.7V
   B. 3.3V
   C. 5V
   D. 6.6V
65. Which of the following is a standard for a secure cryptoprocessor that can secure hardware (and the system boot process) using cryptographic keys?
   A. TPM
   B. LoJack
   C. Secure Boot
   D. BitLocker

66. In a laser printer, what is the function of the transfer corona assembly?
   A. It transfers a high-voltage charge to the paper.
   B. It transfers a high-voltage charge to the imaging drum.
   C. It transfers the toner from the imaging drum to the paper.
   D. It transfers the image from the laser to the imaging drum.

67. What type of connector is shown here?
   A. Molex
   B. SATA
   C. PCIe
   D. ATX

68. A technician has installed a printer driver on a Windows 8 client computer. What is the best next step the technician can take to ensure that the printer is installed properly?
   A. Ping the printer's IP address.
   B. Check the printer status and ensure it says “Ready.”
   C. Stop and restart the spooler service.
   D. Print a test page.
69. Which component within a laser printer converts AC current into usable energy for the charging corona and transfer corona?
   A. LVPS
   B. HVPS
   C. ACPS
   D. Transfer corona assembly

70. You are connecting a laptop to a printer on the network using Wi-Fi. The user will need to use the printer frequently when they are in the office. What type of wireless connection will you establish with the printer?
   A. Permanent
   B. Ad hoc
   C. On demand
   D. Infrastructure

71. What is the maximum throughput of PCI-X adapters?
   A. 533MBbps
   B. 1066MBps
   C. 4266MBps
   D. 8533MBps

72. What is the name of the boot routine that verifies the size and integrity of the system memory?
   A. RAMCheck
   B. BIOS
   C. UEFI
   D. POST

73. You have been asked to install and configure a RAID 10 storage array for a computer. What is the minimum number of hard disks required for this configuration?
   A. 2
   B. 3
   C. 4
   D. 5
74. Identify the peripheral connector shown here.

A. HDMI  
B. PATA  
C. SATA  
D. eSATA

75. A technician is recommending that his company use removable memory cards. Which of the following should he tell his manager?

A. MiniSD and microSD cards work in a standard SD card slot.  
B. MiniSD cards work in a standard SD slot, but microSD cards do not.  
C. MicroSD cards work in a standard SD slot, but miniSD cards do not.  
D. Neither miniSD nor microSD cards will work in a standard SD slot.

76. You are purchasing new laptops for your company. When thinking about the monitor quality, which type of backlight will produce better-quality pictures?

A. LED  
B. OLED  
C. Plasma  
D. Fluorescent

77. Which component of the motherboard chipset is responsible for managing high-speed peripheral communications?

A. Northbridge  
B. Southbridge  
C. Eastbridge  
D. Westbridge
78. A graphical designer in your office needs two monitors to do her work. Which of the following should you install to set up her desktop computer for this configuration?
   A. A video splitter
   B. A second video driver
   C. A second video adapter
   D. A video replicator

79. Which of the following statements are true regarding buffered memory modules? (Choose two.)
   A. They increase the electrical load placed on the controller.
   B. They decrease the electrical load placed on the controller.
   C. When used, the memory controller communicates in series with the register.
   D. When used, the memory controller communicates in parallel with the memory chips.

80. You have a desktop computer that is about five years old, with a single-channel memory architecture. You want to upgrade the memory. After checking the documentation, you purchase a higher-capacity RAM module that runs at the required bus speed. After you install it, the new RAM is not recognized, but the old RAM is. The computer store tests the RAM and it’s fine. What should you try next?
   A. Flash the BIOS.
   B. Purchase a second memory module of the same type, and install them as a pair.
   C. Return the memory module and purchase a lower-capacity one.
   D. Replace the motherboard.

81. A client needs to connect to the Internet using telephone lines. What type of expansion card should you configure in his computer?
   A. USB
   B. Cellular
   C. Modem
   D. NIC

82. Which of the following types of computer peripherals are considered input and output devices? (Choose two.)
   A. Digitizer
   B. Touch screen
   C. KVM
   D. Printer

83. You have a motherboard designed to hold DDR3–1600 memory. What will happen if you attempt to install DDR2–667 memory into the motherboard?
   A. It won’t fit.
   B. It will operate at 667MHz.
   C. It will operate at 1133MHz.
   D. It will operate at 1600MHz.
84. What happens during the transferring step of the laser printer printing process?
   A. The image is transferred to the imaging drum.
   B. The toner is transferred to the imaging drum.
   C. The toner is transferred to the paper.
   D. A strong, uniform negative charge is transferred to the imaging drum.

85. The set of signal pathways on a motherboard between the CPU and RAM is called what?
   A. Northbridge
   B. Southbridge
   C. Frontside bus
   D. Backside bus

86. One of your users needs to print several copies of a 20-page document. She wants to ensure that all the pages print in order so she doesn’t have to reorganize the documents later. Which option does she need to set properly in her printer configuration settings?
   A. Duplex
   B. Collate
   C. Page order
   D. Orientation

87. Which of the following video resolutions is compatible with the 4:3 aspect ratio?
   A. UXGA 1600×1200
   B. ATSC 1920×1080
   C. WUXGA 1920×1200
   D. WQXGA 2560×1600

88. You upgraded the RAM on your system and are now having boot issues. The manufacturer’s website recommends updating the BIOS. What is the easiest way to do this?
   A. Replace the BIOS chip.
   B. Replace the CMOS battery.
   C. Install a new motherboard.
   D. Flash the BIOS.

89. A technician needs to install an optical storage device as cheaply as possible. His client needs to store approximately 500MB of data at a time. Which technology is the best solution for this situation?
   A. CD-RW
   B. DVD-RW
   C. DVD-RW DL
   D. BD-RE
90. A technician needs to install an optical disc system with capacity to burn discs storing about 12GB of data at one time. What is the minimum technology required to get him over this threshold?

A. DVD-R SS, DL  
B. DVD-R DS, SL  
C. DVD-R DS, DL  
D. BD-R SS, DL

91. Identify the connector type on the cable shown here.

A. BNC  
B. RCA  
C. MiniDIN  
D. HD15

92. You are buying a new video projector for the executive conference room. The administrative assistant tells you that the room often has bright sunlight, so the projector needs to be bright. What is the key specification you should pay attention to when selecting this projector?

A. Frame rate  
B. Native resolution  
C. Aspect ratio  
D. Lumens

93. Which home and office printing technology typically employs a reservoir of ink, contained in a cartridge, as its medium to form images on paper?

A. Laser  
B. Thermal  
C. Inkjet  
D. Impact
94. You have been asked to purchase new RAM for three workstations. The workstations call for DDR3–1600 chips. What throughput will these modules support?
   A. 1600MBps
   B. 3200Mbps
   C. 6400Mbps
   D. 12800Mbps

95. Historically, which display type has been preferred to watch fast-motion programs such as sporting events?
   A. Plasma
   B. Fluorescent
   C. LED
   D. LCD

96. A technician needs to purchase new RAM for a motherboard. The motherboard specifications call for 400MHz DDR2 RAM. Which RAM modules should the technician use?
   A. PC3200
   B. PC6400
   C. PC2–3200
   D. PC2–6400

97. Identify the connector type shown here in the center.

   A. eSATA
   B. Thunderbolt
   C. PCIe
   D. FireWire
98. On your network, users want to print easily from their iPads and iPhones. Which service supports this?
   A. Bonjour
   B. AirPrint
   C. TCP printing
   D. Virtual printing

99. You have a new computer that needs to communicate with other computers on a wireless network. What type of expansion card do you need to install?
   A. WAP
   B. NIC
   C. KVM
   D. WPA

100. The WUXGA video standard, running at a resolution of 1920×1200, operates at what aspect ratio?
    A. 4:3
    B. 5:4
    C. 16:9
    D. 16:10

101. When printing, which component is responsible for converting the data being printed into the format that the printer can understand?
    A. PDL
    B. Print driver
    C. Print feeder
    D. Print spooler

102. Which of the following statements best describes the function of a typical power supply fan?
    A. It cools the power supply by blowing in air from outside the case.
    B. It cools the power supply by blowing hot air out the back of the power supply.
    C. It cools the computer by blowing in air from outside the case, through the power supply, and into the computer.
    D. It cools the computer by pulling hot air from inside the case, through the power supply, and blowing it out the back of the power supply.

103. A technician needs to install a new hard drive for her client. Access speed is far more important to this client than disk space. What type of hard drive is best suited for this client?
    A. SSD
    B. HDD
    C. SD
    D. BD-R
104. Serial and Parallel ATA port communication to other components on a motherboard is managed by what?
   A. Northbridge
   B. Southbridge
   C. Frontside bus
   D. Backside bus

105. What is the maximum data rate for a USB 2.0 connection?
   A. 12Mbps
   B. 480Mbps
   C. 1Gbps
   D. 5Gbps

106. A technician has been asked to install and configure a RAID 5 array in a working computer that contains one hard drive. How many additional hard drives, at a minimum, does he need to bring with him to the job?
   A. 1
   B. 2
   C. 3
   D. 4

107. You need to increase network security. A consultant suggests that you install a peripheral device to scan user fingerprints as a requirement to log in. What type of device will you install?
   A. Scanner
   B. Digitizer
   C. Biometric device
   D. Touch pad

108. Which CPU architecture term describes a CPU with multiple physical processor dies in the same package?
   A. Multicore
   B. 64-bit
   C. Integrated GPU
   D. Hyperthreading

109. Which of the following optical disc standards provides the highest capacity?
   A. DVD-R SS, SL
   B. DVD-R DS, SL
   C. DVD-R SS, DL
   D. DVD+R SS, DL
110. Your company recently shipped five desktop computers from Germany to the United States. After switching the power cord to an American-style plug, you try to power one on and it doesn’t work. You try the others and none of them power on either. What is the most likely cause?
   A. All of the computers were damaged during shipping.
   B. German power supplies work only with German power cords.
   C. The power supplies won't work because they expect 50Hz frequency from the wall outlet and the United States standard is 60Hz.
   D. The power supply voltage switch needs to be moved.

111. What are the dimensions of a mobile-ITX motherboard?
   A. 9.6” x 9.6”
   B. 6.7” x 6.7”
   C. 3.9” x 2.8”
   D. 2.4” x 2.4”

112. Which of the following printer types are considered impact printers? (Choose two.)
   A. Laser
   B. Daisy-wheel
   C. Dot-matrix
   D. Thermal

113. Which type of video display technology does not require a separate display unit and light source?
   A. Plasma
   B. OLED
   C. LED
   D. LCD

114. Which type of bus architecture provides faster speeds?
   A. Serial (1 bit at a time).
   B. Parallel (8 bits at a time).
   C. They are the same speed.
   D. More information is needed to answer this question.

115. Which hardware component is responsible for prefetching data or code that the CPU will need to use and storing most recently used data or code?
   A. RAM
   B. SSD
   C. Buffer
   D. Cache
116. Which two CPU sockets are capable of supporting Intel Core i7 processors? (Choose two.)
   A. LGA1156 (Socket H)
   B. LGA2011 (Socket R)
   C. Socket AM3+
   D. Socket FM2

117. You are discussing data storage needs with a client who is a videographer and media producer. She stores dozens of large files and needs immediate access to them for editing. What is the most appropriate storage technology for her to use?
   A. SSD
   B. HDD
   C. SD
   D. BD-R

118. You have a client who wants to build a high-end custom home theater PC. Which two components will you suggest he install in the computer? (Choose two.)
   A. Sound card with surround sound
   B. High-end cooling
   C. Video card with HDMI outputs
   D. Multicore processor

119. You are searching for a new monitor on the Internet and find a used digital LCD monitor for sale. What are the two most likely types of connector you will find on this monitor? (Choose two.)
   A. Composite
   B. DVI-D
   C. HDMI
   D. VGA

120. A technician needs to purchase a new laptop for a manager. The manager has had several laptops fail and wants her new one to have as few components as possible to reduce the risk of failure. Which type of light source technology does not require an inverter and therefore is a better choice?
   A. OLED
   B. Plasma
   C. Fluorescent
   D. LED

121. Which of the following are typical formats supported by virtual printing? (Choose three.)
   A. Print to PDF
   B. Print to XPS
   C. Print to DOC
   D. Print to image
122. A bidirectional PCIe 1.1 x1 link provides how much data throughput?
   A. 250MBps
   B. 500MBps
   C. 1GBps
   D. 2GBps

123. Which component in a laser printer is responsible for heating up and melting the toner into the paper to create a permanent image?
   A. Transfer corona assembly
   B. Pickup rollers
   C. Exit assembly
   D. Fuser assembly

124. During which step in the laser printer printing process does a wire or roller apply a strong, uniform negative charge to the surface of the imaging drum?
   A. Charging
   B. Conditioning
   C. Exposing
   D. Transferring

125. You are installing two new RAM modules into a single channel of a dual-channel motherboard. Which of the following is true?
   A. Both RAM modules need to have the same parameters.
   B. The RAM modules can be different sizes but must be the same speed.
   C. The RAM modules can be different speeds but must be the same size.
   D. The RAM modules can have different speeds and sizes, as long as they are the same type.

126. Which of the following printer components is not found in a laser printer?
   A. Fuser assembly
   B. Imaging drum
   C. Transfer roller
   D. Carriage motor

127. What type of common printer can potentially release harmful ozone into the atmosphere and therefore may contain an ozone filter?
   A. Laser
   B. Inkjet
   C. Thermal
   D. Impact
128. There are four servers in your server closet. You need to access each of them, but not at the same time. Which device will allow you to share one set of input and output devices for all four servers?
A. Touch screen
B. Docking station
C. Set-top controller
D. KVM switch

129. A user on your network has an older laser printer with no Ethernet connection. It’s connected to his computer with a parallel cable. He has shared it on the network for others to use. Now, he wants no part of the printer, but others still need to use it on the network. What would be the best upgrade to install in this printer to allow others to send print jobs to it directly over the network?
A. A network card
B. An integrated print server
C. TCP/IP printing
D. AirPrint

130. A technician needs to perform maintenance on an inkjet’s dirty paper pickup rollers. What should she use to clean them?
A. Rubbing alcohol
B. Mild soap and water
C. A dry lint-free cloth
D. Compressed air

131. During which step in the laser printer imaging process is toner attracted to the imaging drum?
A. Exposing
B. Transferring
C. Fusing
D. Developing

132. You are installing and configuring a magnetic hard drive and have several models to choose from. Which hard drive is most likely to have the highest data throughput rates?
A. 500GB, 7200 rpm
B. 750GB, 5400 rpm
C. 750GB, 10,000 rpm
D. 1TB, 7200 rpm
133. What is the name of the software package, typically enabled in the BIOS, that allows you to track the location of a stolen laptop or remotely lock it so it’s inaccessible?
   A. TPM
   B. LoJack
   C. Secure Boot
   D. Drive Encryption

134. Identify the white connector on the section of motherboard shown here.

   A. RAM
   B. PATA
   C. miniPCI
   D. ATX

135. You need to purchase RAM for a computer. Which factor determines the speed of memory you should purchase?
   A. CPU speed
   B. FSB speed
   C. BSB speed
   D. ECC speed

136. Your manager tells you to buy a high-capacity magnetic hard drive with the highest data transfer rate possible. Which hard drive parameter do manufacturers modify to increase hard drive data transfer rates?
   A. Read/write head size
   B. Connector size
   C. Spin rate
   D. Platter size
137. Three of these four motherboard form factors can be mounted in the same style of case. Which ones are they? (Choose three.)
   A. ATX
   B. MicroATX
   C. Mini-ITX
   D. Nano-ITX

138. Which RAM feature can detect and possibly fix errors within memory?
   A. Parity
   B. Non-parity
   C. ECC
   D. Non-ECC

139. You have a client who needs a hot-swappable, nonvolatile, long-term storage technology that lets him conveniently carry data with him from one location to another in his pocket. Which technologies can you recommend? (Choose two.)
   A. USB flash drive
   B. Hybrid SSD
   C. PATA
   D. SD

140. What type of expansion slots are the first, third, and fifth slots (from the top down) on the motherboard shown here?
A. PCIe x1
B. PCIe x8
C. PCIe x16
D. PCI

141. You have been asked to assemble 20 new desktop PCs for a client. When you look at the first motherboard, you see four memory slots. The one closest to the CPU is colored blue. Then in order they are white, blue, and white. Which of the following statements are true? (Choose two.)
   A. This is a quad-channel motherboard.
   B. This is a dual-channel motherboard.
   C. For optimal performance, you should install RAM modules into the two slots closest to the CPU.
   D. For optimal performance, you should install RAM modules into the two blue slots.

142. One of your Windows 8 users has a file they want to print as a .pdf file, but the application they are using does not support printing to .pdf. What would be their best option?
   A. There is no way to print to .pdf if the application does not support it.
   B. Use the Windows 8 native feature to print to .pdf.
   C. Install a third-party app that installs support for printing to .pdf.
   D. Use the Windows 8 native feature to print to .xps and then convert the .xps file into .pdf.

143. You have a computer running Windows 8. Every time you boot, the computer insists on trying to boot from the DVD-ROM drive. Where can you change the setting to have the system boot to the hard drive first?
   A. BIOS
   B. Windows Configuration
   C. System Manager
   D. Device Manager

144. Which of the following types of connectors are generally found on the front or top panel of the computer? (Choose two.)
   A. Hard drive
   B. Optical disk
   C. Power button
   D. USB

145. Your manager is excited because he just purchased a fast USB 3.0 external hard drive for his work team. He wants to set it in the middle of the cubicles and let everyone have access to it. Some of the cubicles are about 15 feet away from each other. What is the recommended maximum cable length for this type of device?
   A. 3 meters
   B. 5 meters
   C. 10 meters
   D. 15 meters
146. A technician has just installed a duplexer on a laser printer. The duplexer was sold by the manufacturer and is compatible with the printer. However, the printer properties will not let anyone choose to print on both sides of the paper. What might resolve the issue?
   A. Removing and reinstalling the duplexer
   B. Turning the printer off and back on
   C. Upgrading the printer’s firmware
   D. Stopping and restarting the spooler service

147. You have a desktop computer with three PCI expansion slots. What will happen when you mix cards of different speeds on the same motherboard?
   A. The cards will operate at their original speeds.
   B. None of the cards will function.
   C. The cards will all operate at the faster speed.
   D. The cards will all operate at the slower speed.

148. Which of the following statements accurately explains what happens during the exposing step in the laser printer printing process?
   A. A laser reduces areas of the drum from a strong negative charge to a slight positive charge.
   B. A laser reduces areas of the drum from a strong negative charge to a slight negative charge.
   C. A laser increases areas of the drum from a slight negative charge to a strong negative charge.
   D. A laser increases areas of the drum from a slight positive charge to a strong positive charge.

149. Which of the following is the defining characteristic of a passive cooling system for a CPU?
   A. It uses water.
   B. It uses heat pipes.
   C. It uses liquid nitrogen or helium.
   D. It does not require a fan or power.

150. You have an older laptop with a CD burner in it. What is the approximate capacity of the CDs you will be able to create with this device?
   A. 350MB
   B. 700MB
   C. 1.4GB
   D. 4.7GB

151. Which of the following system settings are configurable in the BIOS? (Choose two.)
   A. Date and time
   B. Enabling and disabling services
   C. Enabling and disabling devices
   D. System cooling fan speeds
152. 64-bit SODIMM modules come in which pin configurations? (Choose two.)
   A. 184-pin
   B. 200-pin
   C. 204-pin
   D. 240-pin

153. Which level of cache is typically the smallest and closest to the processor die in a computer?
   A. L1
   B. L2
   C. L3
   D. L4

154. Which computer component gets power from the connector shown here?

   A. Motherboard
   B. Hard drive
   C. Expansion card
   D. Secondary case fan

155. Which of the following are types of CPU sockets? (Choose two.)
   A. LGA
   B. CGA
   C. IGA
   D. PGA
156. You just purchased several used computers from another company. They came with no documentation. When looking at the RAM, you see a sticker that says PC3–10600. What is the FSB speed of this computer?
   A. 667MHz  
   B. 1066MHz  
   C. 1333MHz  
   D. 1600MHz

157. Your engineering team is creating a product prototype that requires a video display. They need the display to be flexible to wrap somewhat around the prototype. What type of technology should they use?
   A. LED  
   B. LCD  
   C. OLED  
   D. Plasma

158. Your office has an inkjet printer, and the manager asks if it can be upgraded to print on both sides of the paper. What type of device can add this functionality?
   A. Flipping assembly  
   B. Dual paper feed assembly  
   C. Duplexing assembly  
   D. Rear paper feed assembly

159. Which component in a laser printer is responsible for converting AC current into usable energy for the logic circuitry and motors?
   A. LVPS  
   B. HVPS  
   C. DCPS  
   D. ACPS

160. What types of RAM modules are shown here, from top to bottom?
A. DDR and DDR2
B. DDR2 and DDR
C. DDR2 and DDR3
D. DDR3 and DDR2

161. The Acme company has a laser printer in its Chicago office that has been used for three months. A technician needs to ship the printer to the Detroit office for use there. What, if any, preparations should be made for the toner cartridge?
A. No preparations are needed for the toner cartridge before shipping.
B. Insert a toner blocker into the toner cartridge before shipping.
C. Seal the toner cartridge with tape before shipping.
D. Remove the toner cartridge from the printer before shipping.

162. You have been asked to implement an external backup solution for a small company. When considering tape backup solutions, which standard provides the best storage capacity?
A. QIC
B. DLT
C. DAT
D. LTO

163. A client wants you to upgrade his desktop computer to have two video cards. You want to be sure that his computer can support the extra adapter. What type of open internal expansion slot should you look for?
A. PCIe
B. ISA
C. VGA
D. DVI

164. Which step immediately follows the fusing step in the laser printer imaging process?
A. Processing
B. Transferring
C. Exposing
D. Cleaning

165. Which of the following are services created by Apple to allow for the automatic discovery of printers on local networks? (Choose two.)
A. Bonjour
B. AirPrint
C. TCP printing
D. Virtual printing
166. After installing a new print cartridge in an inkjet printer, what process must be run before printing to the device?
   A. Degaussing
   B. Driver installation
   C. Rasterizing
   D. Calibration

167. The most common RAM slots used in desktop and laptop computers, respectively, are what?
   A. SODIMM and DIMM
   B. miniDIMM and DIMM
   C. DIMM and miniDIMM
   D. DIMM and SODIMM
   E. SODIMM and miniDIMM
   F. miniDIMM and SODIMM

168. Which type of printing technology uses a heating element to make images on waxy paper?
   A. Laser
   B. Inkjet
   C. Thermal
   D. Dye sublimation
   E. Solid ink

169. You have a laser printer that is displaying the message “Perform user maintenance.” What should you do to resolve this situation?
   A. Apply a maintenance kit and clear the message.
   B. Use compressed air to blow out the inside of the printer and clear the message.
   C. Turn the printer off and back on again to clear the message.
   D. Replace the toner cartridge and clear the message.

170. PCI-X expansion slots are compatible with what other adapters?
   A. 33MHz PCI
   B. 66MHz PCI
   C. 133MHz PCI
   D. 533MHz PCI

171. A user wants to create the ultimate gaming PC. Which of the following peripherals would be most appropriate for this type of system?
   A. Barcode reader
   B. Motion sensor
   C. Joystick
   D. Smart TV