

CompTIA A+ 220-801
Study Guide – Domain 1 - Hardware
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Introduction

The CompTIA A+ Certification requires the test candidate to pass two exams. The first exam is CompTIA A+ 220-801, and the second is the CompTIA A+ 220-802. The exams are designed to measure the candidate’s competencies based on an entry-level IT professional with the equivalent knowledge of at least 12 months experience in the lab or field.

Knowledge required to pass the exam is based upon the ability to assemble components based on customer requirements, install, configure and maintain devices, PCs and software for end users, understand the basics of networking and security/forensics, properly and safely diagnose, resolve and document common hardware and software issues while applying troubleshooting skills. Successful candidates will also provide appropriate customer support; understand the basics of virtualization, desktop imaging, and deployment.

The CompTIA exam objectives are **NOT** a comprehensive listing of all the content of this examination. The CompTIA exam objectives are to be used as a guide of the general test content. There can be material on the test not included in the exam objectives.

Domain	Percent of Exam
PC Hardware	40 %
Networking	27 %
Laptops	11 %
Printers	11 %
Operational Procedures	11 %
Total	100 %

The CompTIA test content is constantly being reviewed and updated. The test can change from this list of original objectives. The Comptia organization always includes the following disclaimer as part of the test objectives “**The CompTIA A+ 220-801 Objectives are subject to change without notice.**” This means that you should always check the CompTIA website for the very latest test objectives before taking the test.

The guide is designed to help you prepare for the CompTIA A+ Exam 220-801. You should write your notes in the spaces provided for the objectives listed. Many of the objectives are wide open to interpretation and there can be a tremendous amount of notes for a given objective.

In general, all objectives only require entry level knowledge, rather than a deep understanding of the topic presented. You should be able to define each topic, and provide general technical specifications when appropriate. For example you should be able to provide the expected data rate for a USB 1.0 type cable and identify the physical connector shape. You must know all acronyms for the test because acronyms are commonly used in the test questions rather than the words they represent. For example, the acronym **HDD** will appear in the question or the multiple choice answers rather than the words “**hard disk drive.**”

This CompTIA A+ 200-801 exam concentrates on computer repair hardware basics. Be able to identify each connector type listed in the objectives, as well as be able to match expected data transfer rates for each.

In addition to the textbook, Computer Service and Repair, by Richard M. Roberts, below list of some websites that can help prepare you fill out the test objective study guide.

www.RMRoberts.com lots of free test preparation materials.

www.proprofs.com again, lots of free test preparation materials. The site does require you to register, but we have found that it appears to not generate any spam or solicitation of any kind. Students relate their test experiences, as well as offer suggestions to prepare for the test.

http://h71036.www7.hp.com/hho/downloads/HP_connector_chart.pdf a great color chart from HP available for download and printing listing all common connector types.

<http://www.intel.com/support/motherboards/desktop/sb/CS-020304.htm> Intel website with a complete listing of all BIOS/Firmware setup terminology and procedures. This is essential for both 801 and 802 test objectives.

<http://www.formfactors.org/formfactor.asp> The form factors organization website with specifications on all major motherboard form factors. There is also information for power supplies.

<http://www.intel.com/support/motherboards/desktop/dz77ga-70k/sb/CS-033216.htm> This is a complete PDF booklet on a high end Intel motherboard with information about everything concerning the typical motherboard. You will find data rates for ports and such and BIOS information as well as other PC basics. Look it over well or download a different motherboard booklet. This can serve as a reference not only for the 220-801 but also the 220-802 objectives.

Note: Special comments and possible instructions by the author will appear in gray font are added to the CompTIA list of objectives to help clarify what might be required for the test and to emphasize important information related to the test objective.

1.0 PC Hardware

1.1 Configure and apply BIOS settings.

- Install firmware upgrades – flash BIOS
Describe how to perform a BIOS upgrade.

- BIOS component information

This is a very limited list of BIOS components. Be sure to review a complete list of BIOS component information by performing hands on experience. Also, read the complete BIOS configuration guide provided by the BIOS manufacturer. You can see an example of a BIOS guide at [\(link to BIOS hand book for mother board\)](#).

- RAM
- Hard drive
- Optical drive
- CPU

- BIOS configurations

- Boot sequence

Describe how to change a boot sequence and which hardware devices are affected.

When would you need to change the boot sequence?

- Enabling and disabling devices (Where do you disable a hardware device?)
- Date/time
- Clock speeds
- Virtualization support
- BIOS security (passwords, drive encryption: TPM, lo-jack)
- Use built-in diagnostics
- Monitoring
 - Temperature monitoring
 - Fan speeds
 - Intrusion detection/notification
 - Voltage
 - Clock
 - Bus speed

1.2 Differentiate between motherboard components, their purposes, and properties.

- **Sizes** identify the three main motherboard form factors by measured size. There are more sizes than the three listed here.
 - ATX
 - Micro-ATX
 - ITX
- **Expansion slots** identify each expansion slot type, and provide a brief description of their most common purpose and data rate.
 - PCI
 - PCI-X
 - PCIe
 - miniPCI
 - CNR
 - AGP2x, 4x, 8x
- RAM slots
- CPU sockets
- Chipsets

The North Bridge and south bridge are motherboard chip sets. What is the purpose of the North Bridge and south bridge, and what devices normally connect to each?

- North Bridge
- South Bridge
- CMOS battery

What is the function of the CMOS battery? How do you know when the battery needs replaced?

- Jumpers

What is the function of the CMOS jumpers do?

- Power connections and types

Identify the various power connections found on the mother board and what type of device they commonly connect to..

- Fan connectors

Be able to identify the type of connector used to provide power to a fan.

- Front panel connectors

Identify front panel connectors and ports and list the most common purpose of the front panel connections. What do they connect to?

Typical front panel connections are listed below.

- USB
- Audio
- Power button
- Power light
- Drive activity lights
- Reset button
- Bus speeds

Plain and simple, memorize motherboard bus speeds. What typical busses exist on a typical motherboard?

1.3 Compare and contrast RAM types and features.

How many pins for each type of RAM? What is the most RAM Recognized by Windows 32-bit systems? What type of RAM is used in portable devices such as laptops?

- Types
 - DDR
 - DDR2
 - DDR3
 - SDRAM
 - SODIMM
 - RAMBUS
 - DIMM
 - Parity vs. non-parity
 - ECC vs. non-ECC
 - RAM configurations
- Single channel vs. dual channel vs. triple channel
- Single sided vs. double sided
- RAM compatibility and speed

What happens when two different RAM types are installed?

1.4 Install and configure expansion cards.

Below is a list of typical expansion cards you are expected to know how to install. It is best to locate expansion cards on the Internet that match the ones on the list. Then download a copy of the device manual and read it to see how they are installed and what problems might be encountered.

- Sound cards
- Video cards
- Network cards
- Serial and parallel cards
- USB cards

- Firewire 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.

Again, go to the Internet and download the manual associated with each type of device listed below. Read the installation requirements and review typical problems encountered for each type of device.

- Optical drives
 - CD-ROM
 - DVD-ROM
 - Blu-Ray
- Combo drives and burners
 - CD-RW
 - DVD-RW
 - Dual Layer DVD-RW
 - BD-R
 - BD-RE
- Connection types

Be able to identify each cable and port type listed below.

 - External
 - USB
 - Firewire
 - eSATA
 - Ethernet
 - Internal SATA, IDE and SCSI
 - IDE configuration and setup (Master, Slave, Cable Select)
 - SCSI IDs (0 – 15)
 - Hot swappable drives
- Hard drives
 - Magnetic
 - 5400 rpm
 - 7200 rpm
 - 10,000 rpm
 - 15,000 rpm
- Solid state/flash drives

- Compact flash
- SD
- Micro-SD
- Mini-SD
- xD
- SSD
- RAID types

Describe how many physical drives are required for each RAID type. Also which RAID type offers no data protection? Explain how data is organized across the physical RAID system.

 - 0
 - 1
 - 5
 - 10
- Floppy drive
- Tape drive
- Media capacity

What is the maximum capacity for each type of storage media except for tape?

 - CD
 - CD-RW
 - DVD-RW
 - DVD
 - Blu-Ray
 - Tape
 - Floppy
 - DL DVD

1.6 Differentiate among various CPU types and features and select the appropriate cooling method.

- Socket types
 - Intel: LGA, 775, 1155, 1156, 1366
 - AMD: 940, AM2, AM2+, AM3, AM3+, FM1, F
- Characteristics
 - Speeds
 - Cores
 - Cache size/type
 - Hyperthreading
 - Virtualization support
 - Architecture (32-bit vs. 64-bit)
 - Integrated GPU
- Cooling
 - Heat sink

- Fans
- Thermal paste
- Liquid-based

1.7 Compare and contrast various connection interfaces and explain their purpose.

- Physical connections
 - USB 1.1 vs. 2.0 vs. 3.0 speed and distance characteristics
- Connector types: A, B, mini, micro
 - Firewire 400 vs. Firewire 800 speed and distance characteristics
 - SATA1 vs. SATA2 vs. SATA3, eSATA, IDE speeds
 - Other connector types

Again be able to identify each type of connector.

- Serial
- Parallel
- VGA
- HDMI
- DVI
- Audio
- RJ-45
- RJ-11
 - Analog vs. digital transmission
- VGA vs. HDMI
- Speeds, distances and frequencies of wireless device connections

Stick to the speeds and frequencies listed by the standards for wireless, not the advertised speeds of the manufacturers. If you do not know what a standard or a standard organization is, you better learn. Conduct a search using the key terms of the type of device and the key term “standard”. Again the advertised speed for a Bluetooth or wireless device can be far greater than the actual standard. Most exams will be based on standards set by recognized organizations.

- Bluetooth
- IR
- RF

1.8 Install an appropriate power supply based on a given scenario.

This is a tricky one and open to interpretation. In general the size of a power supply is subjective and few technicians actually calculate the required size. Most technicians guesstimate. The key point here is a standard power supply will work for general computer applications. High performance video cards generally require a larger than average power

supply. What size is needed? Good question. Do some research. Specifications for video cards recommend a minimum size power supply. Amps times volts equal power.

- **Connector types and their voltages**

Memorize the connectors and their associated voltages. Real difficult questions may ask what voltage is associated with each color conductor for a given type of connector. Those types of questions are not practical but may occur on a certification exam. Sorry but I did not write the exam and if I did, I would not ask what voltage is associated with each plug type, just what type of device it connects to.

- SATA
- Molex
- 4/8-pin 12v
- PCIe 6/8-pin

Explain the difference between a 20-pin and 24-pin power connection and I don't mean the number of pins. Why was a 24-pin connector created?

- 20-pin
- 24-pin
- Floppy
- **Specifications**
 - Wattage
 - Size
 - Number of connectors
 - ATX
 - Micro-ATX
- **Dual voltage options**

1.9 Evaluate and select appropriate components for a custom configuration, to meet customer specifications or needs.

- **Graphic / CAD / CAM design workstation**
 - Powerful 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**
 - Powerful processor
 - High-end video/specialized GPU
 - Better 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 running Windows
- Thin client
 - Basic applications
 - Meets minimum requirements for running Windows
- Home Server PC
 - Media streaming
 - File sharing
 - Print sharing
 - Gigabit NIC
 - RAID array

1.10 Given a scenario, evaluate types and features of display devices.

- Types
 - CRT
 - LCD
 - LED
 - Plasma
 - Projector
 - OLED
- Refresh rates
- Resolution
- Native resolution
- Brightness/lumens
- Analog vs. digital
- Privacy/antiglare filters
- Multiple displays

1.11 Identify connector types and associated cables.

This is straight forward. Be able to identify the types of cable connectors and ports associated with each connector listed below. You will most likely encounter a picture referred to as an exhibit on the certification test and asked to identify the type of port or cable connector is in the picture.

- Display connector types
 - DVI-D

- DVI-I
- DVI-A
- Display port
- RCA
- DB-15
- BNC
- miniHDMI
- RJ-45
- miniDin-6
- Display cable types
 - HDMI
 - DVI
 - VGA
 - Component
 - Composite
 - S-video
 - RGB
 - Coaxial
 - Ethernet
- Device connectors and pin arrangements
 - SATA
 - eSATA
 - PATA
- IDE
- EIDE
 - Floppy
 - USB
 - IEEE1394
 - SCSI
 - PS/2
 - Parallel
 - Serial
 - Audio
 - RJ-45
- Device cable types
 - SATA
 - eSATA
 - IDE
 - EIDE
 - Floppy
 - USB
 - IEEE1394

- SCSI
- 68pin vs. 50pin vs. 25pin
 - Parallel
 - Serial
 - Ethernet
 - Phone

1.12 Install and configure various peripheral devices.

For this section you need to either install these devices or download the manual for each of the devices and read the installation procedure as well as the common problems associated with each device. The basic test 220-801 will most likely not ask about common problems but it will most likely ask installation procedure questions. Problem questions will most likely appear on the 220-802 certification test. Go ahead and learn it now.

- Input devices
 - Mouse
 - Keyboard
 - Touch screen
 - Scanner
 - Barcode reader
 - KVM
 - Microphone
 - Biometric devices
 - Game pads
 - Joysticks
 - Digitizer
- Multimedia devices
 - Digital cameras
 - Microphone
 - Webcam
 - Camcorder
 - MIDI enabled devices
- Output devices
 - Printers
 - Speakers
 - Display devices