

# A+ Core Hardware Service Technician Examination Objectives

2/15/01

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## Introduction

For A+ Certification, the examinee must pass both this examination and the A+ Operating System Technologies examination. The Core Hardware examination measures essential competencies for a microcomputer hardware service technician with six months of on-the-job experience. The examinee must demonstrate basic knowledge of installing, configuring, upgrading, troubleshooting, and repairing microcomputer systems at the standard defined by this test specification.

The skills and knowledge measured by this examination are derived from an industry-wide and worldwide job task analysis which was validated through a survey of almost 2,000 A+ certified professionals. The results of the survey are used in weighting the domains and ensuring that the weighting is representative of the relative importance of that content to the job requirements of a service technician with six months on-the-job experience. The intent is to certify individuals in a body of knowledge that is identified and accepted as the baseline or foundation of any entry-level PC technician.

The results of the job task analysis and survey can be found in the following report: CompTIA A+ Certification Core Hardware and OS Technologies examinations Job Task Analysis. This report is available for distribution.

The exam is in adaptive format, therefore, will be presented with 20-30 questions. You will have 30 minutes to complete the exam. Please be aware that a score determination could be made before the maximum number of questions is presented. Once a score determination is made, the exam will shut off. The exam is translated in the following languages: Japanese, French, Spanish and German.

**NOTE:** This examination blueprint for the A+ Core Hardware examination includes the weighting, test objectives, and example content. Example topics and concepts are included to clarify the test objectives and should not be construed as a comprehensive listing of all the content of this examination.

The table below lists the domains measured by this examination and the extent to which they are represented in the examination.

| Domain  | % Of Examination |
|---|------------------|
| 1.0 Installation, Configuration and Upgrading | 30%              |
| 2.0 Diagnosing and Troubleshooting            | 30%              |
| 3.0 Preventive Maintenance                    | 5%               |
| 4.0 Motherboard/Processors/Memory             | 15%              |
| 5.0 Printers                                  | 10%              |
| 6.0 Basic Networking                          | 10%              |
| Total   | 100.00%          |

# A+ Core Hardware Service Technician Examination Objectives

2/15/01

---

## ***Response Limits***

The examinee selects, from four (4) or more response options and the option(s) that best completes the statement or answers the question. Distracters or wrong answers are response options that examinees with incomplete knowledge or skill would likely choose, but are generally plausible responses fitting into the content area. Test item formats used in this examination are:

**Multiple-choice:** The examinee selects one option that best answers the question or completes a statement. The option can be embedded in a graphic where the examinee “points and clicks” on their selection choice to complete the test item.

**Multiple-response:** The examinee selects more than one option that best answers the question or completes a statement.

### **Sample Directions:**

Read the statement or question and from the response options, select only the option(s) that represent the most correct or best answer(s).

# A+ Core Hardware Service Technician Examination Objectives

2/15/01

---

## Domain 1.0 Installation, Configuration, and Upgrading

This domain requires the knowledge and skills to identify, install, configure, and upgrade microcomputer modules and peripherals, following established basic procedures for system assembly and disassembly of field replaceable modules. Elements included are listed below with each test objective.

### Content Limits

#### 1.1 Identify basic terms, concepts, and functions of system modules, including how each module should work during normal operation and during the boot process.

##### Examples of concepts and modules are:

- o System board
- o Power supply
- o Processor /CPU
- o Memory
- o Storage devices
- o Monitor
- o Modem
- o Firmware
- o BIOS
- o CMOS
- o LCD (portable systems)
- o Ports
- o PDA (Personal Digital Assistant)

#### 1.2 Identify basic procedures for adding and removing field replaceable modules for both desktop and portable systems.

##### Examples of modules:

- o System board
- o Storage device
- o Power supply
- o Processor /CPU
- o Memory
- o Input devices
- o Hard drive
- o Keyboard
- o Video board
- o Mouse
- o Network Interface Card (NIC)

##### Portable system components

- o AC adapter
- o Digital Camera
- o DC controller
- o LCD panel
- o PC Card
- o Pointing Devices

# A+ Core Hardware Service Technician Examination Objectives

2/15/01

---

## **1.3 Identify available IRQs, DMAs, and I/O addresses and procedures for device installation and configuration.**

### **Content may include the following:**

- o Standard IRQ settings
- o Modems
- o Floppy drive controllers
- o Hard drive controllers
- o USB ports
- o Infrared ports
- o Hexidecimal/Addresses

## **1.4 Identify common peripheral ports, associated cabling, and their connectors.**

### **Content may include the following:**

- o Cable types
- o Cable orientation
- o Serial versus parallel
- o Pin connections

### **Examples of types of connectors:**

- o DB-9
- o DB-25
- o RJ-11
- o RJ-45
- o BNC
- o PS2/MINI-DIN
- o USB
- o IEEE 1394

## **1.5 Identify proper procedures for installing and configuring IDE/EIDE devices.**

### **Content may include the following:**

- o Master/Slave
- o Devices per channel
- o Primary/Secondary

## **1.6 Identify proper procedures for installing and configuring SCSI devices.**

### **Content may include the following:**

- o Address/Termination conflicts
- o Cabling
- o Types (example: regular, wide, ultra-wide)
- o Internal versus external
- o Expansion slots, EISA, ISA, PCI
- o Jumper block settings (binary equivalents)

# A+ Core Hardware Service Technician Examination Objectives

2/15/01

---

## 1.7 Identify proper procedures for installing and configuring peripheral devices.

### Content may include the following:

- o Monitor/Video Card
- o Modem
- o USB peripherals and hubs
- o IEEE 1284
- o IEEE 1394
- o External storage

### Portables

- o Docking stations
- o PC cards
- o Port replicators
- o Infrared devices

## 1.8 Identify hardware methods of upgrading system performance, procedures for replacing basic subsystem components, unique components and when to use them.

### Content may include the following:

- o Memory
- o Hard Drives
- o CPU
- o Upgrading BIOS
- o When to upgrade BIOS

### Portable Systems

- o Battery
- o Hard Drive
- o Types I, II, III cards
- o Memory

# A+ Core Hardware Service Technician Examination Objectives

2/15/01

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## Domain 2.0 Diagnosing and Troubleshooting

This domain requires the ability to apply knowledge relating to diagnosing and troubleshooting common module problems and system malfunctions. This includes knowledge of the symptoms relating to common problems.

### Content Limits

#### 2.1 Identify common symptoms and problems associated with each module and how to troubleshoot and isolate the problems.

**Content may include the following:**

- o Processor/Memory symptoms
- o Mouse
- o Floppy drive
- o Parallel ports
- o Hard Drives
- o CD-ROM
- o DVD
- o Sound Card/Audio
- o Monitor/Video
- o Motherboards
- o Modems
- o BIOS
- o USB
- o NIC
- o CMOS
- o Power supply
- o Slot covers
- o POST audible/visual error codes
- o Troubleshooting tools, e.g., multimeter
- o Large LBA, LBA
- o Cables
- o Keyboard
- o Peripherals

#### 2.2 Identify basic troubleshooting procedures and how to elicit problem symptoms from customers.

**Content may include the following:**

- o Troubleshooting/isolation/problem determination procedures
- o Determine whether hardware or software problem
- o Gather information from user regarding, e.g.,
  - o Customer Environment
  - o Symptoms/Error Codes
  - o Situation when the problem occurred

# A+ Core Hardware Service Technician Examination Objectives

2/15/01

---

## Domain 3.0 Preventive Maintenance

This domain requires the knowledge of safety and preventive maintenance. With regard to safety, it includes the potential hazards to personnel and equipment when working with lasers, high voltage equipment, ESD, and items that require special disposal procedures that comply with environmental guidelines. With regard to preventive maintenance, this includes knowledge of preventive maintenance products, procedures, environmental hazards, and precautions when working on microcomputer systems.

### Content Limits

#### 3.1 Identify the purpose of various types of preventive maintenance products and procedures and when to use them.

**Content may include the following:**

- o Liquid cleaning compounds
- o Types of materials to clean contacts and connections
- o Non-static vacuums (chassis, powersupplies, fans)

#### 3.2 Identify issues, procedures and devices for protection within the computing environment, including people, hardware and the surrounding workspace.

**Content may include the following:**

- o UPS (Uninterruptible Power Supply) and suppressors
- o Determining the signs of power issues
- o Proper methods of storage of components for future use

**Potential hazards and proper safety procedures relating Lasers**

- o High-voltage equipment
- o Power supply
- o CRT

**Special disposal procedures that comply with environmental guidelines.**

- o Batteries
- o CRTs
- o Toner kits/cartridges
- o Chemical solvents and cans
- o MSDS (Material Safety Data Sheet)

**ESD (Electrostatic Discharge) precautions and procedures**

- o What ESD can do, how it may be apparent, or hidden
- o Common ESD protection devices
- o Situations that could present a danger or hazard

# A+ Core Hardware Service Technician Examination Objectives

2/15/01

---

## Domain 4.0 Motherboard/Processors/Memory

This domain requires knowledge of specific terminology, facts, ways and means of dealing with classifications, categories and principles of motherboards, processors, and memory in microcomputer systems.

### Content Limits

#### 4.1 Distinguish between the popular CPU chips in terms of their basic characteristics.

**Content may include the following:**

- o Popular CPU chips (Intel, AMD, Cyrix)
- o Characteristics
- o Physical size
- o Voltage
- o Speeds
- o On board cache or not
- o Sockets
- o SEC (Single Edge Contact)

#### 4.2 Identify the categories of RAM (Random Access Memory) terminology, their locations, and physical characteristics.

**Content may include the following:**

- o Terminology:
- o EDO RAM (Extended Data Output RAM)
- o DRAM (Dynamic Random Access Memory)
- o SRAM (Static RAM)
- o RIMM (Rambus Inline Memory Module 184 Pin)
- o VRAM (Video RAM)
- o SDRAM (Synchronous Dynamic RAM)
- o WRAM (Windows Accelerator Card RAM)
- o Locations and physical characteristics:
- o Memory bank
- o Memory chips (8-bit, 16-bit, and 32-bit)
- o SIMMS (Single In-line Memory Module)
- o DIMMS (Dual In-line Memory Module)
- o Parity chips versus non-parity chips

# A+ Core Hardware Service Technician Examination Objectives

2/15/01

---

## 4.3 Identify the most popular type of motherboards, their components, and their architecture (bus structures and power supplies).

**Content may include the following:**

- o Types of motherboards:
  - o AT (Full and Baby)
  - o ATX
- o Components:
  - o Communication ports
  - o SIMM and DIMM
  - o Processor sockets
  - o External cache memory (Level 2)
  - o Bus Architecture
  - o ISA
  - o PCI
  - o AGP
  - o USB (Universal Serial Bus)
  - o VESA local bus (VL-Bus)
  - o Basic compatibility guidelines
  - o IDE (ATA, ATAPI, ULTRA-DMA, EIDE)
  - o SCSI (Wide, Fast, Ultra, LVD(Low Voltage Differential))

## 4.4 Identify the purpose of CMOS (Complementary Metal-Oxide Semiconductor), what it contains and how to change its basic parameters.

**Example Basic CMOS Settings:**

- o Printer parallel port—Uni., bi-directional, disable/enable, ECP, EPP
- o COM/serial port—memory address, interrupt request, disable
- o Floppy drive—enable/disable drive or boot, speed, density
- o Hard drive—size and drive type
- o Memory—parity, non-parity
- o Boot sequence
- o Date/Time
- o Passwords
- o Plug & Play BIOS

# A+ Core Hardware Service Technician Examination Objectives

2/15/01

---

## Domain 5.0 Printers

This domain requires knowledge of basic types of printers, basic concepts, and printer components, how they work, how they print onto a page, paper path, care and service techniques, and common problems.

### Content Limits

#### 5.1 Identify basic concepts, printer operations and printer components.

##### Content may include the following:

Paper feeder mechanisms

Types of Printers

- o Laser
- o Inkjet
- o Dot Matrix

##### Types of printer connections and configurations

- o Parallel
- o Network
- o USB
- o Infrared
- o Serial

#### 5.2 Identify care and service techniques and common problems with primary printer types.

##### Content may include the following:

- o Feed and output
- o Errors (printed or displayed)
- o Paper jam
- o Print quality
- o Safety precautions
- o Preventive maintenance

# A+ Core Hardware Service Technician Examination Objectives

2/15/01

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## Domain 6.0 Basic Networking

This domain requires knowledge of basic network concepts and terminology, ability to determine whether a computer is networked, knowledge of procedures for swapping and configuring network interface cards, and knowledge of the ramifications of repairs when a computer is networked. The scope of this topic is specific to hardware issues on the desktop and connecting it to a network.

### Content Limits

**6.1 Identify basic networking concepts, including how a network works and the ramifications of repairs on the network.**

**Content may include the following:**

- o Installing and configuring network cards
- o Network access
- o Full-duplex, half-duplex
- o Cabling—Twisted Pair, Coaxial, Fiber Optic, RS-232
- o Ways to network a PC
- o Physical Network topographies
- o Increasing bandwidth
- o Loss of data
- o Network slowdown
- o Infrared
- o Hardware protocols