CompTIA A+ Practical Application (2009 Edition) Objectives
Exam Number: 220-702

Introduction

In order to receive CompTIA A+ certification a candidate must pass two exams. The first exam is CompTIA A+ Essentials, exam number 220-701. Objectives for the CompTIA A+ Essentials examination are available at www.comptia.org. The CompTIA A+ 220-702 exam, Practical Application, is the second exam required in order for CompTIA A+ certification candidates to complete their certification in the 2009 Edition of CompTIA A+.

The CompTIA A+ Practical Application exam measures the necessary competencies for an entry-level IT professional who has hands-on experience in the lab or the field. Successful candidates will have the skills required to install, configure, upgrade, and maintain PC workstations, the Windows OS and SOHO networks. The successful candidate will utilize troubleshooting techniques and tools to effectively and efficiently resolve PC, OS, and network connectivity issues and implement security practices. Job titles in some organizations which are descriptive of the role of this individual may be: Enterprise technician, IT administrator, field service technician, PC or Support technician, etc. Ideally, the CompTIA A+ Practical Application candidate has already passed the CompTIA A+ Essentials examination.

CompTIA A+ is ISO 17024 Accredited (Personnel Certification Accreditation) and, as such, undergoes regular reviews and updates to the exam objectives. The following CompTIA A+ Practical Application objectives reflect the subject areas in the 2009 Edition of this exam, and result from subject matter expert workshops and industry-wide survey results regarding the skills and knowledge required of an entry-level IT professional with some hands-on experience. The percentages in this document represent the relative importance of the subject areas (domains) in the associated body of knowledge, and together establish the foundation for an entry-level IT professional.

This examination blueprint includes domain 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.

Candidates are encouraged to use this document to guide their studies. The contents of the examination blueprint help prioritize topics and provide a guide of what to expect on the CompTIA A+ Practical Application exam. The table below lists the domains measured by this examination and the extent to which they are represented. The CompTIA A+ Practical Application (2009 Edition) exam is based on these objectives.

Domain	Percentage of Examination
1.0 Hardware	38%
2.0 Operating Systems	34%
3.0 Networking	15%
4.0 Security	13%
Total	100%

**Note: The lists of examples provided in bulleted format below each objective are not exhaustive lists. Other examples of technologies, processes or tasks pertaining to each objective may also be included on the exam although not listed or covered in this objectives document.

CompTIA is constantly reviewing the content of our exams and updating test questions to be sure our exams are current and the security of the questions is protected. When necessary, we will publish updated exams based on existing exam objectives. Please know that all related exam preparation materials will still be valid.

1.0 Hardware

1.1 Given a scenario, install, configure and maintain personal computer components

- Storage devices
  - HDD
    - SATA
    - PATA
    - Solid state
  - FDD
  - Optical drives
    - CD / DVD / RW / Blu-Ray
  - Removable
  - External
- Motherboards
  - Jumper settings
  - CMOS battery
  - Advanced BIOS settings
  - Bus speeds
  - Chipsets
  - Firmware updates
  - Socket types
  - Expansion slots
  - Memory slots
  - Front panel connectors
  - I/O ports
    - Sound, video, USB 1.1, USB 2.0, serial, IEEE 1394 / Firewire, parallel, NIC, modem, PS/2)
- Power supplies
  - Wattages and capacity
  - Connector types and quantity
  - Output voltage
- Processors
  - Socket types
  - Speed
  - Number of cores
  - Power consumption
  - Cache
  - Front side bus
  - 32bit vs. 64bit
- Memory
- Adapter cards
  - Graphics cards
  - Sound cards
  - Storage controllers
    - RAID cards (RAID array – levels 0,1,5)
    - eSATA cards
  - I/O cards
    - Firewire
    - USB
    - Parallel
    - Serial
  - Wired and wireless network cards
  - Capture cards (TV, video)

    - Media reader
- Cooling systems
    - Heat sinks
    - Thermal compound
    - CPU fans
    - Case fans

1.2 Given a scenario, detect problems, troubleshoot and repair/replace personal computer components

- Storage devices
    - HDD
        - SATA
        - PATA
        - Solid state
    - FDD
    - Optical drives
        - CD / DVD / RW / Blu-Ray
    - Removable
    - External
- Motherboards
    - Jumper settings
    - CMOS battery
    - Advanced BIOS settings
    - Bus speeds
    - Chipsets
    - Firmware updates
    - Socket types
    - Expansion slots
    - Memory slots
    - Front panel connectors
    - I/O ports
        - Sound, video, USB 1.1, USB 2.0, serial, IEEE 1394 / Firewire, parallel, NIC, modem, PS/2)
- Power supplies
    - Wattages and capacity
    - Connector types and quantity
    - Output voltage
- Processors
    - Socket types
    - Speed
    - Number of cores
    - Power consumption
    - Cache
    - Front side bus
    - 32bit vs. 64bit
- Memory
- Adapter cards
    - Graphics cards - memory
    - Sound cards
    - Storage controllers
        - RAID cards
        - eSATA cards
    - I/O cards

        - Firewire
        - USB
        - Parallel
        - Serial
    - Wired and wireless network cards
    - Capture cards (TV, video)
    - Media reader
- Cooling systems
    - Heat sinks
    - Thermal compound
    - CPU fans
    - Case fans

1.3 Given a scenario, install, configure, detect problems, troubleshoot and repair/replace laptop components

- Components of the LCD including inverter, screen and video card
- Hard drive and memory
- Disassemble processes for proper re-assembly
    - Document and label cable and screw locations
    - Organize parts
    - Refer to manufacturer documentation
    - Use appropriate hand tools
- Recognize internal laptop expansion slot types
- Upgrade wireless cards and video card
- Replace keyboard, processor, plastics, pointer devices, heat sinks, fans, system board, CMOS battery, speakers

1.4 Given a scenario, select and use the following tools

- Multimeter
- Power supply tester
- Specialty hardware / tools
- Cable testers
- Loop back plugs
- Anti-static pad and wrist strap
- Extension magnet

1.5 Given a scenario, detect and resolve common printer issues

- Symptoms
    - Paper jams
    - Blank paper
    - Error codes
    - Out of memory error
    - Lines and smearing
    - Garbage printout
    - Ghosted image

    - No connectivity

- Issue resolution
    - Replace fuser
    - Replace drum
    - Clear paper jam
    - Power cycle
    - Install maintenance kit (reset page count)
    - Set IP on printer
    - Clean printer

2.0 Operating Systems - **unless otherwise noted, operating systems referred to within include Microsoft Windows 2000, Windows XP Professional, XP Home, XP MediaCenter, Windows Vista Home, Home Premium, Business and Ultimate, *Windows 7 Starter, Home Premium, Professional and Ultimate.***

2.1 Select the appropriate commands and options to troubleshoot and resolve problems

- MSCONFIG
- DIR
- CHKDSK (/f /r)
- EDIT
- COPY (/a /v /y)
- XCOPY
- FORMAT
- IPCONFIG (/all /release /renew)
- PING (-t –l)
- MD / CD / RD
- NET
- TRACERT
- NSLOOKUP
- [command name] /?
- SFC

2.2 Differentiate between Windows Operating System directory structures (Windows 2000, XP, Vista, and *Windows 7*)

- User file locations
- User profile and program files
- System file locations
- Fonts
- Temporary files
- Program files
- Offline files and folders

2.3 Given a scenario, select and use system utilities / tools and evaluate the results

- Disk management tools

    - DEFRAG
    - NTBACKUP
    - Check Disk
- Disk Manager
    - Active, primary, extended and logical partitions
    - Mount points
    - Mounting a drive
    - FAT32, NTFS, FAT64 *(exFAT)*
        - External hard drives
        - Flash drives
    - Drive status
        - Foreign drive
        - Healthy
        - Formatting
        - Active unallocated
        - Failed
        - Dynamic
        - Offline
        - Online
- System monitor
- Administrative tools
    - Event Viewer
    - Computer Management
    - Services
    - Performance Monitor
- Device Manager
    - Enable
    - Disable
    - Warnings
    - Indicators
- Task Manager
    - Process list
    - Resource usage
    - Process priority
    - Termination
- System Information
- System restore
- Remote Desktop Protocol (Remote Desktop / Remote Assistance)
- Task Scheduler
- Regional settings and language settings

2.4 Evaluate and resolve common issues

- Operational Problems
    - Windows specific printing problems
        - Print spool stalled
        - Incorrect / incompatible driver / form printing
    - Auto-restart errors
    - Bluescreen error
    - System lock-up
    - Devices drivers failure (input / output devices)
    - Application install, start or load failure
    - Service fails to start
- Error Messages and Conditions

- Boot
  - Invalid boot disk
  - Inaccessible boot drive
  - Missing NTLDR
- Startup
  - Device / service failed to start
  - Device / program in registry not found
- Event viewer (errors in the event log)
- System Performance and Optimization
  - Aero settings
  - Indexing settings
  - UAC
  - Side bar settings
  - Startup file maintenance
  - Background processes

3.0 Networking

3.1 Troubleshoot client-side connectivity issues using appropriate tools

- TCP/IP settings
  - Gateway
  - Subnet mask
  - DNS
  - DHCP (dynamic vs.static)
  - NAT (private and public)
- Characteristics of TCP/IP
  - Loopback addresses
  - Automatic IP addressing
- Mail protocol settings
  - SMTP
  - IMAP
  - POP
- FTP settings
  - Ports
  - IP addresses
  - Exceptions
  - Programs
- Proxy settings
  - Ports
  - IP addresses
  - Exceptions
  - Programs
- Tools (use and interpret results)
  - Ping
  - Tracert
  - Nslookup
  - Netstat
  - Net use
  - Net /?
  - Ipconfig
  - telnet
  - SSH
- Secure connection protocols

    - SSH
    - HTTPS
- Firewall settings
    - Open and closed ports
    - Program filters

3.2 Install and configure a small office home office (SOHO) network

- Connection types
    - Dial-up
    - Broadband
        - DSL
        - Cable
        - Satellite
        - ISDN
    - Wireless
        - All 802.11
        - WEP
        - WPA
        - SSID
        - MAC filtering
        - DHCP settings
    - Routers / Access Points
        - Disable DHCP
        - Use static IP
        - Change SSID from default
        - Disable SSID broadcast
        - MAC filtering
        - Change default username and password
        - Update firmware
        - Firewall
    - LAN (10/100/1000BaseT, Speeds)
    - Bluetooth (1.0 vs. 2.0)
    - Cellular
    - Basic VoIP (consumer applications)
- Basics of hardware and software firewall configuration
    - Port assignment / setting up rules (exceptions)
    - Port forwarding / port triggering
- Physical installation
    - Wireless router placement
    - Cable length

4.0 Security

4.1 Given a scenario, prevent, troubleshoot and remove viruses and malware

- Use antivirus software
- Identify malware symptoms
- Quarantine infected systems
- Research malware types, symptoms and solutions (virus encyclopedias)
- Remediate infected systems
- Update antivirus software
    - Signature and engine updates
    - Automatic vs. manual
- Schedule scans

- Repair boot blocks
- Scan and removal techniques
    - Safe mode
    - Boot environment
- Educate end user

4.2 Implement security and troubleshoot common issues

- Operating systems
    - Local users and groups: Administrator, Power Users, Guest, Users
    - *Vista/Windows 7 User Account Control (UAC)*
    - NTFS vs. Share permissions
        - Allow vs. deny
        - Difference between moving and copying folders and files
        - File attributes
    - Shared files and folders
        - Administrative shares vs. local shares
        - Permission propogation
        - Inheritance
    - System files and folders
    - Encryption (Bitlocker, EFS)
    - User authentication
- System
    - BIOS security
        - Drive lock
        - Passwords
        - Intrusion detection
        - TPM

CompTIA A+ Acronyms

Introduction
The following is a list of acronyms which appear on the CompTIA A+ exams. Candidates are encouraged to review the complete list and attain a working knowledge of all listed acronyms as a part of a comprehensive exam preparation program.

ACRONYM	SPELLED OUT
AC	alternating current
ACPI	advanced configuration and power interface
ACT	activity
ADF	automatic document feeder
ADSL	asymmetrical digital subscriber line
AGP	accelerated graphics port
AMD	advanced micro devices
APIPA	automatic private internet protocol addressing
APM	advanced power management
ARP	address resolution protocol
ASR	automated system recovery
ATA	advanced technology attachment
ATAPI	advanced technology attachment packet interface
ATM	asynchronous transfer mode
ATX	advanced technology extended
BHO	browser helper object
BIOS	basic input/output system
BNC	Bayonet-Neill-Concelman or British Naval Connector
BTX	balanced technology extended
CD	compact disc
CD-ROM	compact disc-read-only memory
CD-RW	compact disc-rewritable
CDFS	compact disc file system
CFS	Central File System, Common File System, Command File System
CMOS	complementary metal-oxide semiconductor
COMx	communication port (x=port number)
CPU	central processing unit
CRT	cathode-ray tube
DAC	discretionary access control
DB-25	serial communications D-shell connector, 25 pins
DB-9	9 pin D shell connector
DC	direct current
DDOS	distributed denial of service
DDR	double data-rate
DDR RAM	double data-rate random access memory

DDR SDRAM	double data-rate synchronous dynamic random access memory
DFS	distributed file system
DHCP	dynamic host configuration protocol
DIMM	dual inline memory module
DIN	Deutsche Industrie Norm
DIP	dual inline package
DLT	digital linear tape
DLP	digital light processing
DMA	direct memory access
DMZ	demilitarized zone
DNS	domain name service or domain name server
DOS	denial of service
DRAM	dynamic random access memory
DSL	digital subscriber line
DVD	digital video disc or digital versatile disc
DVD-RAM	digital video disc-random access memory
DVD-ROM	digital video disc-read only memory
DVD-R	digital video disc-recordable
DVD-RW	digital video disc-rewritable
DVI	digital visual interface
ECC	error correction code
ECP	extended capabilities port
EEPROM	electrically erasable programmable read-only memory
EFS	encrypting file system
EIDE	enhanced integrated drive electronics
EMI	electromagnetic interference
EMP	electromagnetic pulse
EPROM	erasable programmable read-only memory
EPP	enhanced parallel port
ERD	emergency repair disk
ESD	electrostatic discharge
EVGA	extended video graphics adapter/array
EVDO	evolution data optimized or evolution data only
FAT	file allocation table
FAT12	12-bit file allocation table
FAT16	16-bit file allocation table
FAT32	32-bit file allocation table
FDD	floppy disk drive
Fn	Function (referring to the function key on a laptop)
FPM	fast page-mode
FRU	field replaceable unit
FSB	Front Side Bus
FTP	file transfer protocol

FQDN	fully qualified domain name
Gb	gigabit
GB	gigabyte
GDI	graphics device interface
GHz	gigahertz
GUI	graphical user interface
GPS	global positioning system
GSM	global system for mobile communications
HAL	hardware abstraction layer
HCL	hardware compatibility list
HDD	hard disk drive
HDMi	high definition media interface
HPFS	high performance file system
HTML	hypertext markup language
HTTP	hypertext transfer protocol
HTTPS	hypertext transfer protocol over secure sockets layer
I/O	input/output
ICMP	internet control message protocol
ICR	intelligent character recognition
IDE	integrated drive electronics
IDS	Intrusion Detection System
IEEE	Institute of Electrical and Electronics Engineers
IIS	Internet Information Services
IMAP	internet mail access protocol
IP	internet protocol
IPCONFIG	internet protocol configuration
IPP	internet printing protocol
IPSEC	internet protocol security
IPX	internetwork packet exchange
IPX/SPX	internetwork packet exchange/sequenced packet exchange
IR	infrared
IrDA	Infrared Data Association
IRQ	interrupt request
ISA	industry standard architecture
ISDN	integrated services digital network
ISO	Industry Standards Organization
ISP	internet service provider
JBOD	just a bunch of disks
Kb	kilobit
KB	Kilobyte or knowledge base
LAN	local area network
LBA	logical block addressing
LC	Lucent connector

LCD	liquid crystal display
LDAP	lightweight directory access protocol
LED	light emitting diode
Li-on	lithium-ion
LPD/LPR	line printer daemon / line printer remote
LPT	line printer terminal
LPT1	line printer terminal 1
LVD	low voltage differential
MAC	media access control / mandatory access control
MAPI	messaging application programming interface
MAU	media access unit, media attachment unit
Mb	megabit
MB	megabyte
MBR	master boot record
MBSA	Microsoft Baseline Security Analyzer
MFD	multi-function device
MFP	multi-function product
MHz	megahertz
MicroDIMM	micro dual inline memory module
MIDI	musical instrument digital interface
MIME	multipurpose internet mail extension
MMC	Microsoft management console
MMX	multimedia extensions
MP3	Moving Picture Experts Group Layer 3 Audio
MP4	Moving Picture Experts Group Layer 4
MPEG	Moving Picture Experts Group
MSCONFIG	Microsoft configuration
MSDS	material safety data sheet
MUI	multilingual user interface
NAC	network access control
NAS	network-attached storage
NAT	network address translation
NetBIOS	networked basic input/output system
NetBEUI	networked basic input/output system extended user interface
NIC	network interface card
NiCd	nickel cadmium
NiMH	nickel metal hydride
NLX	new low-profile extended
NNTP	network news transfer protocol
NTFS	new technology file system
NTLDR	new technology loader
NTP	network time protocol
OCR	optical character recognition

ODBC	open database connectivity
OEM	original equipment manufacturer
OS	operating system
PAN	personal area network
PATA	parallel advanced technology attachment
PC	personal computer
PCI	peripheral component interconnect
PCIe	peripheral component interconnect express
PCIX	peripheral component interconnect extended
PCL	printer control language
PCMCIA	Personal Computer Memory Card International Association
PDA	personal digital assistant
PGA	pin grid array
PGA2	pin grid array 2
PIN	personal identification number
PKI	public key infrastructure
PnP	plug and play
POP3	post office protocol 3
POST	power-on self test
POTS	plain old telephone service
PPP	point-to-point protocol
PPTP	point-to-point tunneling protocol
PRI	primary rate interface
PROM	programmable read-only memory
PS/2	personal system/2 connector
PSTN	public switched telephone network
PSU	power supply unit
PVC	permanent virtual circuit
PXE	preboot execution environment
QoS	quality of service
RAID	redundant array of independent (or inexpensive) discs
RAM	random access memory
RAS	remote access service
RDRAM	RAMBUS® dynamic random access memory
RF	radio frequency
RFI	radio frequency interference
RGB	red green blue
RIMM	RAMBUS® inline memory module
RIP	routing information protocol
RIS	remote installation service
RISC	reduced instruction set computer
RJ	registered jack
RJ-11	registered jack function 11

RJ-45	registered jack function 45
RMA	returned materials authorization
ROM	read only memory
RS-232 or RS-232C	recommended standard 232
RTC	real-time clock
SAN	storage area network
SATA	serial advanced technology attachment
SC	subscription channel
SCP	secure copy protection
SCSI	small computer system interface
SCSI ID	small computer system interface identifier
SD card	secure digital card
SDRAM	synchronous dynamic random access memory
SEC	single edge connector
SFC	system file checker
SGRAM	synchronous graphics random access memory
SIMM	single inline memory module
SLI	scalable link interface or system level integration or scanline interleave mode
S.M.A.R.T.	self-monitoring, analysis, and reporting technology
SMB	server message block or small to midsize business
SMTP	simple mail transport protocol
SNMP	simple network management protocol
SoDIMM	small outline dual inline memory module
SOHO	small office/home office
SP	service pack
SP1	service pack 1
SP2	service pack 2
SP3	service pack 3
SP4	service pack 4
SPDIF	Sony-Philips digital interface format
SPGA	staggered pin grid array
SPX	sequenced package exchange
SRAM	static random access memory
SSH	secure shell
SSID	service set identifier
SSL	secure sockets layer
ST	straight tip
STP	shielded twisted pair
SVGA	super video graphics array
SXGA	super extended graphics array
TB	terabyte
TCP	transmission control protocol
TCP/IP	transmission control protocol/internet protocol

TDR	time domain reflectometer
TFTP	trivial file transfer protocol
UAC	User Account Control
UART	universal asynchronous receiver transmitter
UDF	user defined functions or universal disk format or universal data format
UDMA	ultra direct memory access
UDP	user datagram protocol
UNC	universal naming convention
UPS	uninterruptible power supply
URL	uniform resource locator
USB	universal serial bus
USMT	user state migration tool
UTP	unshielded twisted pair
UXGA	ultra extended graphics array
VESA	Video Electronics Standards Association
VFAT	virtual file allocation table
VGA	video graphics array
VoIP	voice over internet protocol
VPN	virtual private network
VRAM	video random access memory
WAN	wide area network
WAP	wireless application protocol
WEP	wired equivalent privacy
WIFI	wireless fidelity
WINS	windows internet name service
WLAN	wireless local area network
WPA	wireless protected access
WUXGA	wide ultra extended graphics array
XGA	extended graphics array
ZIF	zero-insertion-force
ZIP	zigzag inline package