

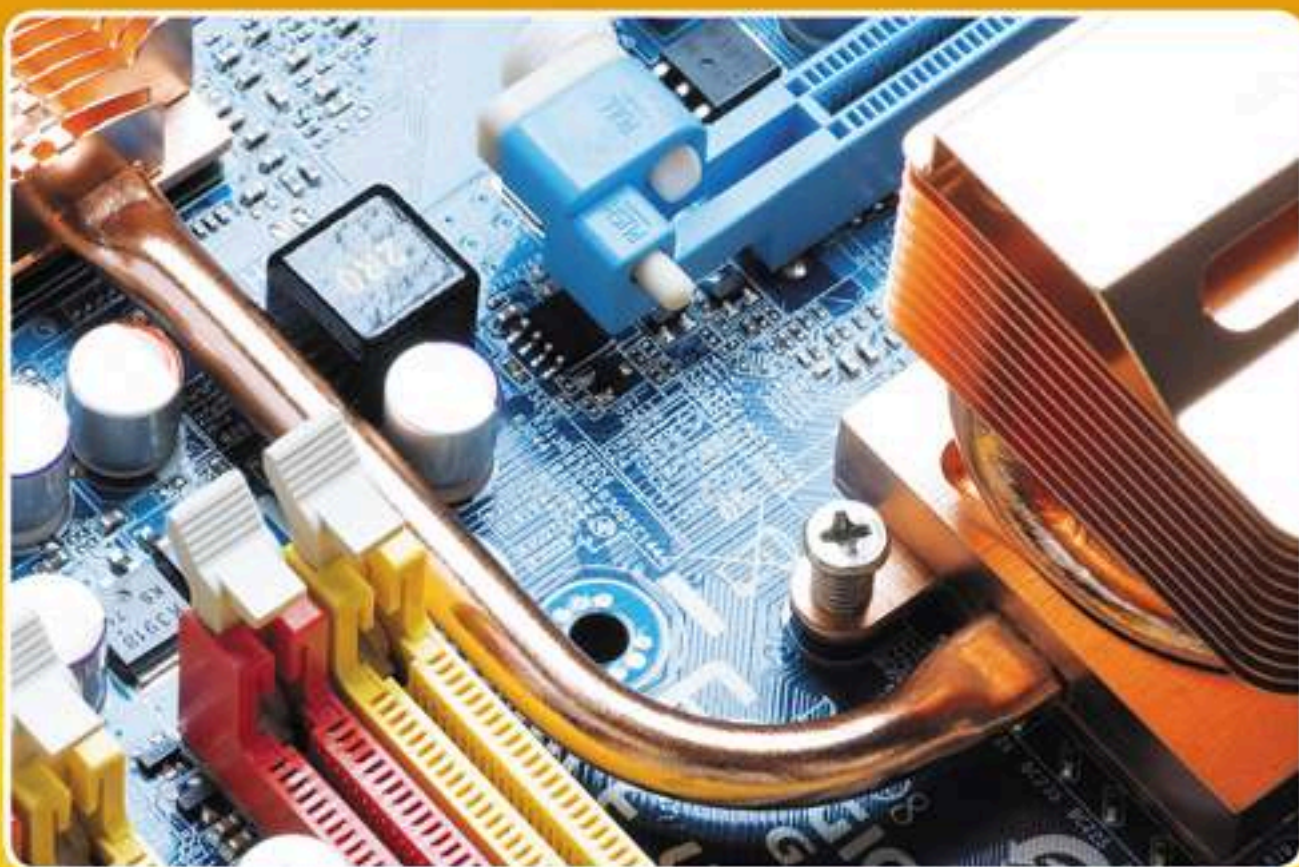
CompTIA

A+

Guide to Hardware

Managing, Maintaining, and Troubleshooting

6th Edition



000 A+™

CompTIA Certified



Jean Andrews

CompTIA A+ 220-801 Exam

	Objectives	Chapters
Domain 1.0	PC Hardware	
1.1	Configure and apply BIOS settings.	3
1.2	Differentiate between motherboard components, their purposes, and properties.	2, 3, 4
1.3	Compare and contrast RAM types and features.	4
1.4	Install and configure expansion cards.	3, 5, 6, 10
1.5	Install and configure storage devices and use appropriate media.	5, 6
1.6	Differentiate among various CPU types and features and select the appropriate cooling method.	2, 3, 4
1.7	Compare and contrast various connection interfaces and explain their purpose.	1, 5, 6
1.8	Install an appropriate power supply based on a given scenario.	1, 2
1.9	Evaluate and select appropriate components for a custom configuration, to meet customer specifications or needs.	7
1.10	Given a scenario, evaluate types and features of display devices.	6
1.11	Identify connector types and associated cables.	1, 5, 6, 10, 12
1.12	Install and configure various peripheral devices.	6, 12
Domain 2.0	Networking	
2.1	Identify types of network cables and connectors.	10
2.2	Categorize characteristics of connectors and cabling.	10
2.3	Explain properties and characteristics of TCP/IP.	9
2.4	Explain common TCP and UDP ports, protocols, and their purpose.	9
2.5	Compare and contrast wireless networking standards and encryption types.	9
2.6	Install, configure, and deploy a SOHO wireless/wired router using appropriate settings.	9
2.7	Compare and contrast Internet connection types and features.	10
2.8	Identify various types of networks.	10
2.9	Compare and contrast network devices their functions and features.	10
2.10	Given a scenario, use appropriate networking tools.	10
Domain 3.0	Laptops	
3.1	Install and configure laptop hardware and components.	11
3.2	Compare and contrast the components within the display of a laptop.	11
3.3	Compare and contrast laptop features.	11
Domain 4.0	Printers	
4.1	Explain the differences between the various printer types and summarize the associated imaging process.	12
4.2	Given a scenario, install, and configure printers.	12
4.3	Given a scenario, perform printer maintenance.	12
Domain 5.0	Operational Procedures	
5.1	Given a scenario, use appropriate safety procedures.	1, 2, 8
5.2	Explain environmental impacts and the purpose of environmental controls.	1, 8
5.3	Given a scenario, demonstrate proper communication and professionalism.	7
5.4	Explain the fundamentals of dealing with prohibited content/activity.	7

CompTIA A+ 220-802 Exam

	Objectives	Chapters
Domain 1.0	Operating Systems	
1.1	Compare and contrast the features and requirements of various Microsoft Operating Systems.	See <i>A+ Guide to Software, 6th Edition</i>
1.2	Given a scenario, install, and configure the operating system using the most appropriate method.	See <i>A+ Guide to Software</i>
1.3	Given a scenario, use appropriate command line tools.	See <i>A+ Guide to Software</i>
1.4	Given a scenario, use appropriate operating system features and tools.	12 and see <i>A+ Guide to Software</i>
1.5	Given a scenario, use Control Panel utilities.	6, 9, 11, 12 and see <i>A+ Guide to Software</i>
1.6	Setup and configure Windows networking on a client/desktop.	9, 10 and see <i>A+ Guide to Software</i>
1.7	Perform preventive maintenance procedures using appropriate tools.	See <i>A+ Guide to Software</i>
1.8	Explain the differences among basic OS security settings.	See <i>A+ Guide to Software</i>
1.9	Explain the basics of client-side virtualization.	See <i>A+ Guide to Software</i>
Domain 2.0	Security	
2.1	Apply and use common prevention methods.	See <i>A+ Guide to Software</i>
2.2	Compare and contrast common security threats.	See <i>A+ Guide to Software</i>
2.3	Implement security best practices to secure a workstation.	See <i>A+ Guide to Software</i>
2.4	Given a scenario, use the appropriate data destruction/disposal method.	See <i>A+ Guide to Software</i>
2.5	Given a scenario, secure a SOHO wireless network.	9
2.6	Given a scenario, secure a SOHO wired network.	9
Domain 3.0	Mobile Devices	
3.1	Explain the basic features of mobile operating systems.	See <i>A+ Guide to Software</i>
3.2	Establish basic network connectivity and configure email.	See <i>A+ Guide to Software</i>
3.3	Compare and contrast methods for securing mobile devices.	See <i>A+ Guide to Software</i>
3.4	Compare and contrast hardware differences in regards to tablets and laptops.	See <i>A+ Guide to Software</i>
3.5	Execute and configure mobile device synchronization.	See <i>A+ Guide to Software</i>
Domain 4.0	Troubleshooting	
4.1	Given a scenario, explain the troubleshooting theory.	See <i>A+ Guide to Software</i>
4.2	Given a scenario, troubleshoot common problems related to motherboards, RAM, CPU and power with appropriate tools.	1, 8
4.3	Given a scenario, troubleshoot hard drives and RAID arrays with appropriate tools.	8 and see <i>A+ Guide to Software</i>
4.4	Given a scenario, troubleshoot common video and display issues.	8
4.5	Given a scenario, troubleshoot wired and wireless networks with appropriate tools.	10 and see <i>A+ Guide to Software</i>
4.6	Given a scenario, troubleshoot operating system problems with appropriate tools.	See <i>A+ Guide to Software</i>
4.7	Given a scenario, troubleshoot common security issues with appropriate tools and best practices.	See <i>A+ Guide to Software</i>
4.8	Given a scenario, troubleshoot, and repair common laptop issues while adhering to the appropriate procedures.	11
4.9	Given a scenario, troubleshoot printers with appropriate tools.	12



**A+ Guide to Hardware:
Managing, Maintaining,
and Troubleshooting**
SIXTH EDITION

Jean Andrews, Ph.D.



Australia • Canada • Mexico • Singapore • Spain • United Kingdom • United States

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1 2 3 4 5 6 7 16 15 14 13 12

Table of Contents

**CompTIA A+ 220-801 Exam,
2012 Edition Examination Objectives
Mapped to Chapters vii**

**CompTIA A+ 220-802 Exam,
2012 Edition Examination Objectives
Mapped to Chapters xx**

CHAPTER 1

First Look at Computer Parts and Tools. 1

What's Inside the Case.....	2
Form Factors Used by Computer Cases, Power Supplies, and Motherboards	9
Drives, Their Cables, and Connectors	18
Protecting Yourself and the Equipment against Electrical Dangers	23
Measures and Properties of Electricity	24
Protect Yourself against Electrical Shock and Burns	28
Protect the Equipment against Static Electricity or ESD.	29
Tools Used by a PC Repair Technician.....	33
POST Diagnostic Cards.	35
Power Supply Tester	37
Multimeter.	37
Loopback Plugs	37
Proper Use of Cleaning Pads and Solutions . . .	39
Managing Cables.	40
Lifting Heavy Objects	40

CHAPTER 2

Working Inside a Computer 45

How to Work Inside a Computer Case	46
Step 1: Plan and Organize Your Work	46
Step 2: Open the Computer Case and Examine the System	47
Step 3: Remove Expansion Cards	52
Step 4: Remove the Motherboard, Power Supply, and Drives	55
Steps to Put a Computer Back Together	60
Cooling Methods and Devices	67
Processor Coolers, Fans, and Heat Sinks	67

Case Fans and Other Fans and Heat Sinks	69
Liquid Cooling Systems	71
Dealing with Dust.	72
Selecting a Power Supply.....	73
Types and Characteristics of Power Supplies	74
How to Calculate Wattage Capacity.	75

CHAPTER 3

All About Motherboards 81

Motherboard Types and Features	82
Motherboard Form Factors	82
Processor Sockets	84
The Chipset	89
Buses and Expansion Slots	94
On-board Ports and Connectors	104
Configuring a Motherboard.....	106
Using Jumpers to Configure a Motherboard	108
Using Setup BIOS to Configure a Motherboard	110
Maintaining a Motherboard	122
Updating Motherboard Drivers	122
Flashing BIOS.	124
Replacing the CMOS Battery	125
Installing or Replacing a Motherboard.....	126
How to Select a Motherboard.	126
How to Install or Replace a Motherboard . . .	127

CHAPTER 4

Supporting Processors and Upgrading Memory 137

Types and Characteristics of Processors	138
How a Processor Works	140
Intel Processors	142
AMD Processors	145
Selecting and Installing a Processor	146
Select a Processor to Match System Needs. . .	146
Install a Processor	147
Memory Technologies	162
DIMM Technologies.	165
RIMM Technologies.	171
Memory Technologies and Memory Performance	172

How to Upgrade Memory.....	173
How Much Memory Do I Need and How Much Is Currently Installed?	173
How Many and What Kind of Memory Modules Are Currently Installed?.	175
How Many and What Kind of Modules Can Fit on My Motherboard?.	176
How Do I Select and Purchase the Right Memory Modules?.	180
How Do I Install the New Modules?	182

CHAPTER 5

Supporting Hard Drives 189

Hard Drive Technologies and Interface	
Standards.....	190
Technologies Used Inside a Hard Drive	190
Interface Standards Used by a Hard Drive . .	193
How to Select and Install Hard Drives.....	204
Selecting a Hard Drive	204
Steps to Install a Serial ATA Drive	205
Steps to Configure and Install a Parallel ATA Drive.	214
Setting Up Hardware RAID	220
About Tape Drives and Floppy Drives.....	228
Installing Tape Drives and Selecting Tape Media	228
Installing a Floppy Drive.	230

CHAPTER 6

Supporting I/O and Storage Devices..... 237

Basic Principles for Supporting Devices.....	238
Using the Action Center and Device Manager	238
Ports and Wireless Connections Used by Peripheral Devices.	244
Installing I/O Peripheral Devices.....	250
Mouse or Keyboard	251
Barcode Readers.	252
Biometric Devices	253
Digital Cameras and Camcorders.	254
Webcams	255
Graphics Tablets.	256
MIDI Devices	257

Touch Screens	258
KVM Switches	259
Installing and Configuring Adapter Cards.....	260
Sound Cards and Onboard Sound	265
TV Tuner and Video Capture Cards	266
Supporting the Video Subsystem.....	268
Monitor Technologies and Features	268
Video Cards and Connectors.	272
Changing Monitor Settings	277
Video Memory and Windows 7/Vista.	280
Supporting Storage Devices.....	282
File Systems Used by Storage Devices.	282
Standards Used by Optical Drives and Discs . .	284
Installing an Optical Drive.	288
Solid-State Storage.	290

CHAPTER 7

Satisfying Customer Needs 301

Job Roles and Responsibilities.....	302
Certification and Professional Organizations	303
Record-keeping and Information Tools	305
What Customers Want: Beyond	
Technical Know-how.....	306
Planning for Good Service.....	310
Initial Contact with a Customer	311
Interview the Customer.	312
Set and Meet Customer Expectations	314
Working with a Customer on Site.	315
Working with a Customer on the Phone	316
Dealing with Difficult Customers	318
The Customer Decides When the Work Is Done	321
Sometimes You Must Escalate a Problem. . . .	322
The Job Isn't Finished until the Paperwork Is Done.	322
Working with Co-workers	323
Dealing with Prohibited Content and Activity....	328
Customizing Computer Systems.....	329
Graphics or CAD/CAM Workstation	330
Audio and Video Editing Workstation.	332
Virtualization Workstation.	333
Gaming PC.	334
Home Theater PC	335
Home Server PC	337
Thick Client and Thin Client	338

CHAPTER 8**Troubleshooting Hardware Problems 345**

How to Approach a Hardware Problem	346
Troubleshooting the Electrical System	352
Problems That Come and Go	355
Power Problems with the Motherboard	356
Problems with Overheating	357
Troubleshooting POST before Video Is Active	363
Troubleshooting Error Messages during the Boot	364
Troubleshooting the Motherboard, Processor, and RAM	366
Problems with Installations	373
Troubleshooting Hard Drives	376
Troubleshooting Monitors and Video	380
Protecting a Computer and the Environment	388
Physically Protect Your Equipment	388
Document Preventive Maintenance	392
How to Dispose of Used Equipment	393

CHAPTER 9**Connecting to and Setting Up a Network 401**

Understanding TCP/IP and Windows Networking	402
Layers of Network Communication	402
How IP Addresses Get Assigned	406
How IPv4 IP Addresses Are Used	407
How IPv6 IP Addresses Are Used	412
View IP Address Settings	414
Character-Based Names Identify Computers and Networks	415
TCP/IP Protocol Layers	417
Connecting a Computer to a Network	423
Connect to a Wired Network	423
Connect to a Wireless Network	428
Connect to a Wireless WAN (Cellular) Network	434
Create a Dial-up Connection	439
Setting Up a Multifunction Router for a SOHO Network	441
Functions of a SOHO Router	442
Install and Configure the Router on the Network	444

CHAPTER 10**Networking Types, Devices, and Cabling 463**

Network Types and Topologies	464
Network Technologies Used for Internet Connections	467
Hardware Used by Local Networks	476
Wired and Wireless Network Adapters	476
Dial-up Modems	482
Switches and Hubs	482
Wireless Access Points and Bridges	484
Other Network Devices	485
Ethernet Cables and Connectors	486
Setting Up and Troubleshooting Network Wiring	491
Tools Used by Network Technicians	492
How Twisted-pair Cables and Connectors Are Wired	496

CHAPTER 11**Supporting Notebooks 513**

Special Considerations when Supporting Notebooks	514
Warranty Concerns	516
Service Manuals and Other Sources of Information	517
Diagnostic Tools Provided by Manufacturers	519
The OEM Operating System Build	520
Maintaining Notebooks and Notebook Components	523
Special Keys, Buttons, and Input Devices on a Notebook	524
PCMCIA and ExpressCard Slots	527
Updating Port or Slot Drivers	530
Power and Electrical Devices	531
Power Management	533
Port Replicators and Docking Stations	536
Replacing and Upgrading Internal Parts	539
Three Approaches to Dealing with a Broken Internal Device	539
Upgrading Memory	540
Replacing a Hard Drive	544
Disassembling and Reassembling a Notebook Computer	546
Working Inside an All-in-one Computer	567

Troubleshooting Notebooks	571	Cleaning a Printer	610
Problems Logging onto Windows	571	Printer Maintenance Kits	612
No Wireless Connectivity	571	Upgrade the Printer Memory or	
Power or Battery Problems	573	Hard Drive	617
No Display	574	Print Servers and the Print	
Flickering, Dim, or Otherwise Poor Video ...	575	Management Tool	619
		Troubleshooting Printers.....	622
		Printer Does Not Print	623
		Poor Print Quality	634
CHAPTER 12			
<hr/>			
Supporting Printers 581			
Printer Types and Features.....	582		
Printer Languages	582		
Types of Printers	583		
Using Windows to Install, Share, and			
Manage Printers.....	591		
Installing a Local or Network Printer	593		
Sharing an Installed Printer	602		
Installing a Shared Printer	604		
Managing Printer Features and			
Add-on Devices	605		
Managing the Printer Queue	607		
Printer Maintenance and Upgrades.....	608		
Online Support for Printers	608		
		APPENDIX A	
		<hr/>	
		Keystroke Shortcuts in Windows 643	
		APPENDIX B	
		<hr/>	
		CompTIA A+ Acronyms 647	
		Glossary..... 657	
		Index..... 677	

CompTIA A+ 220-801 Exam, 2012 Edition Examination Objectives Mapped to Chapters

A+ *Guide to Hardware* and A+ *Guide to Software* when used together fully meet all of the CompTIA A+ exams objectives. If the A+ exam objective is covered in the corresponding textbook, it is referenced in the Page Numbers column.

DOMAIN 1.0 PC HARDWARE

1.1 Configure and apply BIOS settings.

OBJECTIVES	CHAPTER	PAGE NUMBERS
▲ Install firmware upgrades – flash BIOS	3	106–126
▲ BIOS component information	3	106–126
• RAM	3	106–126
• Hard drive	3	106–126
• Optical drive	3	106–126
• CPU	3	106–126
▲ BIOS configurations	3	106–126
• Boot sequence	3	106–126
• Enabling and disabling devices	3	106–126
• Date/time	3	106–126
• Clock speeds	3	106–126
• Virtualization support	3	106–126
■ BIOS security (passwords, drive encryption: TPM, lo-jack)	3	106–126
▲ Use built-in diagnostics	3	106–126
▲ Monitoring	3	106–126
• Temperature monitoring	3	106–126
• Fan speeds	3	106–126
• Intrusion detection/notification	3	106–126
• Voltage	3	106–126
• Clock	3	106–126
• Bus speed	3	106–126

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

OBJECTIVES	CHAPTER	PAGE NUMBERS
▲ Sizes	3	82–106, 125–131
• ATX	3	82–106, 125–131
• Micro-ATX	3	82–106, 125–131
• ITX	3	82–106, 125–131
▲ Expansion slots	3	82–106, 125–131
• PCI	3	82–106, 125–131
• PCI-X	3	82–106, 125–131
• PCIe	3	82–106, 125–131
• miniPCI	3	82–106, 125–131
• AGP2x, 4x, 8x	3	82–106, 125–131
▲ RAM slots	4	162–184
▲ CPU sockets	3	82–106, 125–131
▲ Chipsets	3	82–106, 125–131
• North Bridge	3	82–106, 125–131
• South Bridge	3	82–106, 125–131
• CMOS battery	3	82–106, 125–131

▲ Jumpers	3	82–106, 125–131
▲ Power connections and types	3	82–106, 125–131
▲ Fan connectors	3	82–106, 125–131
▲ Front panel connectors	2	46–67
• USB	2	46–67
• Audio	2	46–67
• Power button	2	46–67
• Power light	2	46–67
• Drive activity lights	2	46–67
• Reset button	2	46–67
▲ Bus speeds	3	82–106, 125–131

1.3 Compare and contrast RAM types and features.

OBJECTIVES	CHAPTER	PAGE NUMBERS
▲ Types	4	162–184
• DDR	4	162–184
• DDR2	4	162–184
• DDR3	4	162–184
• SDRAM	4	162–184
• SODIMM	4	162–184
• RAMBUS	4	162–184
• DIMM	4	162–184
• Parity vs. non-parity	4	162–184
• ECC vs. non-ECC	4	162–184
• RAM configurations	4	162–184
■ Single channel vs. dual channel vs. triple channel	4	162–184
• Single sided vs. double sided	4	162–184
▲ RAM compatibility and speed	4	162–184

1.4 Install and configure expansion cards.

OBJECTIVES	CHAPTER	PAGE NUMBERS
▲ Sound cards	6	260–282
▲ Video cards	6	260–282
▲ Network cards	10	476–482
▲ Serial and parallel cards	6	260–282
▲ USB cards	6	260–282
▲ Firewire cards	6	260–282
▲ Storage cards	5	220–227
▲ Modem cards	10	476–482
▲ Wireless/cellular cards	10	476–482
▲ TV tuner cards	6	260–282
▲ Video capture cards	6	260–282
▲ Riser cards	3	101

1.5 Install and configure storage devices and use appropriate media.

OBJECTIVES	CHAPTER	PAGE NUMBERS
▲ Optical drives	6	238–293
• CD-ROM	6	238–293
• DVD-ROM	6	238–293
• Blu-Ray	6	238–293

▲ Combo drives and burners	6	238–293
• CD-RW	6	238–293
• DVD-RW	6	238–293
• Dual Layer DVD-RW	6	238–293
• BD-R	6	238–293
• BD-RE	6	238–293
▲ Connection types	6	238–293
• External	6	238–293
■ USB	6	238–293
■ Firewire	6	238–293
■ eSATA	5	190–232
■ Ethernet	6	238–293
• Internal SATA, IDE and SCSI	5	190–232
■ IDE configuration and setup (Master, Slave, Cable Select)	5	190–232
■ SCSI IDs (0 – 15)	5	190–232
• Hot swappable drives	5	190–232
▲ Hard drives	5	190–232
• Magnetic	5	190–232
• 5400 rpm	5	190–232
• 7200 rpm	5	190–232
• 10,000 rpm	5	190–232
• 15,000 rpm	5	190–232
▲ Solid state/flash drives	5	190–232
• Compact flash	6	238–293
• SD	6	238–293
• Micro-SD	6	238–293
• Mini-SD	6	238–293
• xD	6	238–293
• SSD	5	190–232
▲ RAID types	5	190–232
• 0	5	190–232
• 1	5	190–232
• 5	5	190–232
• 10	5	190–232
▲ Floppy drive	5	190–232
▲ Tape drive	5	190–232
▲ Media capacity	6	238–293
• CD	6	238–293
• CD-RW	6	238–293
• DVD-RW	6	238–293
• DVD	6	238–293
• Blu-Ray	6	238–293
• Tape	5	190–232
• Floppy	5	190–232
• DL DVD	6	238–293

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

OBJECTIVES	CHAPTER	PAGE NUMBERS
▲ Socket types	3	84–89
• Intel: LGA, 775, 1155, 1156, 1366	3	84–89
• AMD: 940, AM2, AM2+, AM3, AM3+, FM1, F	3	84–89

▲ Characteristics	4	138–162
• Speeds	4	138–162
• Cores	4	138–162
• Cache size/type	4	138–162
• Hyperthreading	4	138–162
• Virtualization support	4	138–162
• Architecture (32-bit vs. 64-bit)	4	138–162
• Integrated GPU	4	138–162
▲ Cooling	2	67–73
• Heat sink	2	67–73
• Fans	2	67–73
• Thermal paste	2	67–73
• Liquid-based	2	67–73

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

OBJECTIVES	CHAPTER	PAGE NUMBERS
▲ Physical connections		
• USB 1.1 vs. 2.0 vs. 3.0 speed and distance characteristics	6	238–293
■ Connector types: A, B, mini, micro	6	238–293
• Firewire 400 vs. Firewire 800 speed and distance characteristics	6	238–293
• SATA1 vs. SATA2 vs. SATA3, eSATA, IDE speeds	5	190–204
• Other connector types	1	2–5
■ Serial	1	2–5
■ Parallel	1	2–5
■ VGA	1	2–5
■ HDMI	1	2–5
■ DVI	1	2–5
■ Audio	1	2–5
■ RJ-45	1	2–5
■ RJ-11	1	2–5
• Analog vs. digital transmission	1	2–5
■ VGA vs. HDMI	1	2–5
▲ Speeds, distances and frequencies of wireless device connections	6	238–293
• Bluetooth	6	238–293
• IR	6	238–293
• RF	6	238–293

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

OBJECTIVES	CHAPTER	PAGE NUMBERS
▲ Connector types and their voltages	1	2–23
• SATA	1	2–23
• Molex	1	2–23
• 4/8-pin 12v	1	2–23
• PCIe 6/8-pin	1	2–23
• 20-pin	1	2–23
• 24-pin	1	2–23
• Floppy	1	2–23
▲ Specifications	2	73–77
• Wattage	2	73–77

• Size	2	73–77
• Number of connectors	2	73–77
• ATX	1	2–23
• Micro-ATX	1	2–23
▲ Dual voltage options	1	2–23

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

OBJECTIVES	CHAPTER	PAGE NUMBERS
▲ Graphic / CAD / CAM design workstation	7	329–339
• Powerful processor	7	329–339
• High-end video	7	329–339
• Maximum RAM	7	329–339
▲ Audio/Video editing workstation	7	329–339
• Specialized audio and video card	7	329–339
• Large fast hard drive	7	329–339
• Dual monitors	7	329–339
▲ Virtualization workstation	7	329–339
• Maximum RAM and CPU cores	7	329–339
▲ Gaming PC	7	329–339
• Powerful processor	7	329–339
• High-end video/specialized GPU	7	329–339
• Better sound card	7	329–339
• High-end cooling	7	329–339
▲ Home Theater PC	7	329–339
• Surround sound audio	7	329–339
• HDMI output	7	329–339
• HTPC compact form factor	7	329–339
• TV tuner	7	329–339
▲ Standard thick client	7	329–339
• Desktop applications	7	329–339
• Meets recommended requirements for running Windows	7	329–339
▲ Thin client	7	329–339
• Basic applications	7	329–339
• Meets minimum requirements for running Windows	7	329–339
▲ Home Server PC	7	329–339
• Media streaming	7	329–339
• File sharing	7	329–339
• Print sharing	7	329–339
• Gigabit NIC	7	329–339
• RAID array	7	329–339

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

OBJECTIVES	CHAPTER	PAGE NUMBERS
▲ Types	6	238–293
• CRT	6	238–293
• LCD	6	238–293
• LED	6	238–293
• Plasma	6	238–293
• Projector	6	238–293
• OLED	6	238–293

▲ Refresh rates	6	238–293
▲ Resolution	6	238–293
▲ Native resolution	6	238–293
▲ Brightness/lumens	6	238–293
▲ Analog vs. digital	6	238–293
▲ Privacy/antiglare filters	6	238–293
▲ Multiple displays	6	238–293

1.11 Identify connector types and associated cables.

OBJECTIVES	CHAPTER	PAGE NUMBERS
▲ Display connector types	6	268–282
• DVI-D	6	268–282
• DVI-I	6	268–282
• DVI-A	6	268–282
• Displayport	1	2–5
• RCA	6	268–282
• DB-15	1	2–5
• BNC	10	476–490
• miniHDMI	6	268–282
• RJ-45	10	476–506
• miniDin-6	6	268–282
▲ Display cable types	6	268–282
• HDMI	6	268–282
• DVI	6	268–282
• VGA	6	268–282
• Component	6	268–282
• Composite	6	268–282
• S-video	6	268–282
• RGB	6	268–282
• Coaxial	10	476–490
• Ethernet	10	476–490
▲ Device connectors and pin arrangements	5	190–204
• SATA	5	190–204
• eSATA	6	238–293
• PATA	5	190–204
■ IDE	5	190–204
■ EIDE	5	190–204
• Floppy	5	228–232
• USB	6	238–293
• IEEE1394	1	2–5
• SCSI	5	190–204
• PS/2	1	2–5
• Parallel	1	2–5
• Serial	1	2–5
• Audio	1	2–5
• RJ-45	10	476–506
▲ Device cable types		
• SATA	5	190–204
• eSATA	6	238–293
• IDE	5	190–204

• EIDE	5	190–204
• Floppy	5	228–232
• USB	6	238–293
• IEEE1394	6	238–293
• SCSI	5	190–204
■ 68pin vs. 50pin vs. 25pin	5	190–204
• Parallel	12	596–602
• Serial	6	238–293
• Ethernet	10	476–506
• Phone	10	476–490

1.12 Install and configure various peripheral devices.

OBJECTIVES	CHAPTER	PAGE NUMBERS
▲ Input devices	6	238–282
• Mouse	6	238–282
• Keyboard	6	238–282
• Touch screen	6	238–282
• Scanner	6	238–282
• Barcode reader	6	238–282
• KVM	6	238–282
• Microphone	6	238–282
• Biometric devices	6	238–282
• Game pads	6	238–282
• Joysticks	6	238–282
• Digitizer	6	238–282
▲ Multimedia devices	6	238–282
• Digital cameras	6	238–282
• Microphone	6	238–282
• Webcam	6	238–282
• Camcorder	6	238–282
• MIDI enabled devices	6	238–282
▲ Output devices	6	238–282
• Printers	12	591–608
• Speakers	6	238–282
• Display devices	6	238–282

DOMAIN 2.0 NETWORKING

2.1 Identify types of network cables and connectors.

OBJECTIVES	CHAPTER	PAGE NUMBERS
▲ Fiber	10	476–506
• Connectors: SC, ST and LC	10	476–506
▲ Twisted Pair	10	476–506
• Connectors: RJ-11, RJ-45	10	476–506
• Wiring standards: T568A, T568B	10	476–506
▲ Coaxial	10	476–506
• Connectors: BNC, F-connector	10	476–506

2.2 Categorize characteristics of connectors and cabling.

OBJECTIVES	CHAPTER	PAGE NUMBERS
▲ Fiber	10	476–490
• Types (single-mode vs. multi-mode)	10	476–490
• Speed and transmission limitations	10	476–490
▲ Twisted pair	10	476–490
• Types: STP, UTP, CAT3, CAT5, CAT5e, CAT6, plenum, PVC	10	476–490
• Speed and transmission limitations	10	476–490
▲ Coaxial	10	476–490
• Types: RG-6, RG-59	10	476–490
• Speed and transmission limitations	10	476–490

2.3 Explain properties and characteristics of TCP/IP.

OBJECTIVES	CHAPTER	PAGE NUMBERS
▲ IP class	9	402–415
• Class A	9	402–415
• Class B	9	402–415
• Class C	9	402–415
▲ IPv4 vs. IPv6	9	402–415
▲ Public vs. private vs. APIPA	9	402–415
▲ Static vs. dynamic	9	402–415
▲ Client-side DNS	9	402–415
▲ DHCP	9	402–415
▲ Subnet mask	9	402–415
▲ Gateway	9	402–415

2.4 Explain common TCP and UDP ports, protocols, and their purpose.

OBJECTIVES	CHAPTER	PAGE NUMBERS
▲ Ports	9	415–423
• 21 – FTP	9	415–423
• 23 – TELNET	9	415–423
• 25 – SMTP	9	415–423
• 53 – DNS	9	415–423
• 80 – HTTP	9	415–423
• 110 – POP3	9	415–423
• 143 – IMAP	9	415–423
• 443 – HTTPS	9	415–423
• 3389 – RDP	9	415–423
▲ Protocols	9	415–423
• DHCP	9	415–423
• DNS	9	415–423
• LDAP	9	415–423
• SNMP	9	415–423
• SMB	9	415–423
• SSH	9	415–423
• SFTP	9	415–423
▲ TCP vs. UDP	9	415–423

2.5 Compare and contrast wireless networking standards and encryption types.

OBJECTIVES	CHAPTER	PAGE NUMBERS
▲ Standards	9	452–456
• 802.11 a/b/g/n	9	452–456
• Speeds, distances, and frequencies	9	452–456
▲ Encryption types	9	452–456
• WEP, WPA, WPA2, TKIP, AES	9	452–456

2.6 Install, configure, and deploy a SOHO wireless/wired router using appropriate settings.

OBJECTIVES	CHAPTER	PAGE NUMBERS
▲ MAC filtering	9	441–456
▲ Channels (1 – 11)	9	441–456
▲ Port forwarding, port triggering	9	441–456
▲ SSID broadcast (on/off)	9	441–456
▲ Wireless encryption	9	441–456
▲ Firewall	9	441–456
▲ DHCP (on/off)	9	441–456
▲ DMZ	9	441–456
▲ NAT	9	441–456
▲ WPS	9	441–456
▲ Basic QoS	9	441–456

2.7 Compare and contrast Internet connection types and features.

OBJECTIVES	CHAPTER	PAGE NUMBERS
▲ Cable	10	464–476
▲ DSL	10	464–476
▲ Dial-up	10	464–476
▲ Fiber	10	464–476
▲ Satellite	10	464–476
▲ ISDN	10	464–476
▲ Cellular (mobile hotspot)	10	464–476
▲ Line of sight wireless internet service	10	464–476
▲ WiMAX	10	464–476

2.8 Identify various types of networks.

OBJECTIVES	CHAPTER	PAGE NUMBERS
▲ LAN	10	464–476
▲ WAN	10	464–476
▲ PAN	10	464–476
▲ MAN	10	464–476
▲ Topologies	10	464–476
• Mesh	10	464–476
• Ring	10	464–476
• Bus	10	464–476
• Star	10	464–476
• Hybrid	10	464–476

2.9 Compare and contrast network devices their functions and features.

OBJECTIVES	CHAPTER	PAGE NUMBERS
▲ Hub	10	476–490
▲ Switch	10	476–490
▲ Router	10	476–490
▲ Access point	10	476–490
▲ Bridge	10	476–490
▲ Modem	10	476–490
▲ NAS	10	476–490
▲ Firewall	10	476–490
▲ VoIP phones	10	476–490
▲ Internet appliance	10	476–490

2.10 Given a scenario, use appropriate networking tools.

OBJECTIVES	CHAPTER	PAGE NUMBERS
▲ Crimper	10	491–506
▲ Multimeter	10	491–506
▲ Toner probe	10	491–506
▲ Cable tester	10	491–506
▲ Loopback plug	10	491–506
▲ Punchdown tool	10	491–506

DOMAIN 3.0 LAPTOPS

3.1 Install and configure laptop hardware and components.

OBJECTIVES	CHAPTER	PAGE NUMBERS
▲ Expansion options	11	523–571
• Express card /34	11	523–571
• Express card /54	11	523–571
• PCMCIA	11	523–571
• SODIMM	11	523–571
• Flash	11	523–571
▲ Hardware/device replacement	11	523–571
• Keyboard	11	523–571
• Hard Drive (2.5 vs. 3.5)	11	523–571
• Memory	11	523–571
• Optical drive	11	523–571
• Wireless card	11	523–571
• Mini-PCIe	11	523–571
• screen	11	523–571
• DC jack	11	523–571
• Battery	11	523–571
• Touchpad	11	523–571
• Plastics	11	523–571
• Speaker	11	523–571
• System board	11	523–571
• CPU	11	523–571

3.2 Compare and contrast the components within the display of a laptop.

OBJECTIVES	CHAPTER	PAGE NUMBERS
▲ Types	11	564–567
• LCD	11	564–567
• LED	11	564–567
• OLED	11	564–567
• Plasma	11	564–567
▲ Wi-Fi antenna connector/placement	11	564–567
▲ Inverter and its function	11	564–567
▲ Backlight	11	564–567

3.3 Compare and contrast laptop features.

OBJECTIVES	CHAPTER	PAGE NUMBERS
▲ Special function keys	11	514–538
• Dual displays	11	514–538
• Wireless (on/off)	11	514–538
• Volume settings	11	514–538
• Screen brightness	11	514–538
• Bluetooth (on/off)	11	514–538
• Keyboard backlight	11	514–538
▲ Docking station vs. port replicator	11	514–538
▲ Physical laptop lock and cable lock	11	514–538

DOMAIN 4.0 PRINTERS

4.1 Explain the differences between the various printer types and summarize the associated imaging process.

OBJECTIVES	CHAPTER	PAGE NUMBERS
▲ Laser	12	582–591
• Imaging drum, fuser assembly, transfer belt, transfer roller, pickup rollers, separate pads, duplexing assembly	12	582–591
• Imaging process: processing, charging, exposing, developing, transferring, fusing and cleaning	12	582–591
▲ Inkjet	12	582–591
• Ink cartridge, print head, roller, feeder, duplexing assembly, carriage and belt	12	582–591
• Calibration	12	582–591
▲ Thermal	12	582–591
• Feed assembly, heating element	12	582–591
• Special thermal paper	12	582–591
▲ Impact	12	582–591
• Print head, ribbon, tractor feed	12	582–591
• Impact paper	12	582–591

4.2 Given a scenario, install, and configure printers.

OBJECTIVES	CHAPTER	PAGE NUMBERS
▲ Use appropriate printer drivers for a given operating system	12	591–608
▲ Print device sharing	12	591–608
• Wired	12	591–608
■ USB	12	591–608
■ Parallel	12	591–608
■ Serial	12	591–608
■ Ethernet	12	591–608
• Wireless	12	591–608
■ Bluetooth	12	591–608
■ 802.11x	12	591–608
■ Infrared (IR)	12	591–608
• Printer hardware print server	12	591–608
▲ Printer sharing	12	591–608
• Sharing local/networked printer via Operating System settings	12	591–608

4.3 Given a scenario, perform printer maintenance.

OBJECTIVES	CHAPTER	PAGE NUMBERS
▲ Laser	12	608–619
• Replacing toner, applying maintenance kit, calibration, cleaning	12	608–619
▲ Thermal	12	608–619
• Replace paper, clean heating element, remove debris	12	608–619
▲ Impact	12	608–619
• Replace ribbon, replace print head, replace paper	12	608–619

DOMAIN 5.0 OPERATIONAL PROCEDURES**5.1 Given a scenario, use appropriate safety procedures.**

OBJECTIVES	CHAPTER	PAGE NUMBERS
▲ ESD straps	1	24–33, 39–40
▲ ESD mats	1	24–33, 39–40
▲ Self-grounding	1	24–33, 39–40
▲ Equipment grounding	1	24–33, 39–40
▲ Personal safety	1	24–33, 39–40
• Disconnect power before repairing PC	2	46–67
• Remove jewelry	2	46–67
• Lifting techniques	1	24–33, 39–40
• Weight limitations	1	24–33, 39–40
• Electrical fire safety	1	24–33, 39–40
• CRT safety – proper disposal	1	24–33, 39–40
• Cable management	1	24–33, 39–40
▲ Compliance with local government regulations	8	388–395

5.2 Explain environmental impacts and the purpose of environmental controls.

OBJECTIVES	CHAPTER	PAGE NUMBERS
▲ MSDS documentation for handling and disposal	1	24–33, 39–40
▲ Temperature, humidity level awareness and proper ventilation	8	388–395

▲ Power surges, brownouts, blackouts	8	388–395
• Battery backup	8	388–395
• Surge suppressor	1	24–33, 39–40
▲ Protection from airborne particles	8	388–395
• Enclosures	8	388–395
• Air filters	8	388–395
▲ Dust and debris	8	388–395
• Compressed air	8	388–395
• Vacuums	8	388–395
▲ Component handling and protection	1	24–33, 39–40
• Antistatic bags	1	24–33, 39–40
▲ Compliance to local government regulations	8	388–395

5.3 Given a scenario, demonstrate proper communication and professionalism.

OBJECTIVES	CHAPTER	PAGE NUMBERS
▲ Use proper language – avoid jargon, acronyms, slang when applicable	7	302–328
▲ Maintain a positive attitude	7	302–328
▲ Listen and do not interrupt the customer	7	302–328
▲ Be culturally sensitive	7	302–328
▲ Be on time (if late contact the customer)	7	302–328
▲ Avoid distractions	7	302–328
• Personal calls	7	302–328
• Talking to co-workers while interacting with customers	7	302–328
• Personal interruptions	7	302–328
▲ Dealing with difficult customer or situation	7	302–328
• Avoid arguing with customers and/or being defensive	7	302–328
• Do not minimize customer’s problems	7	302–328
• Avoid being judgmental	7	302–328
• Clarify customer statements (ask open ended questions to narrow the scope of the problem, restate the issue or question to verify understanding)	7	302–328
▲ Set and meet expectations/timeline and communicate status with the customer	7	302–328
• Offer different repair/replacement options if applicable	7	302–328
• Provide proper documentation on the services provided	7	302–328
• Follow up with customer/user at a later date to verify satisfaction	7	302–328
▲ Deal appropriately with customers confidential materials	7	302–328
• Located on a computer, desktop, printer, etc.	7	302–328

5.4 Explain the fundamentals of dealing with prohibited content/activity.

OBJECTIVES	CHAPTER	PAGE NUMBERS
▲ First response	7	328–329
• Identify	7	328–329
• Report through proper channels	7	328–329
• Data/device preservation	7	328–329
▲ Use of documentation/documentation changes	7	328–329
▲ Chain of custody	7	328–329
• Tracking of evidence/documenting process	7	328–329

CompTIA A+ 220-802 Exam, 2012 Edition Examination Objectives Mapped to Chapters

A+ *Guide to Hardware* and A+ *Guide to Software* when used together fully meet all of the CompTIA A+ exams objectives. If the A+ exam objective is covered in the corresponding textbook, it is referenced in the Page Numbers column.

DOMAIN 1.0 OPERATING SYSTEMS

1.1 Compare and contrast the features and requirements of various Microsoft Operating Systems.

OBJECTIVES	CHAPTER	PAGE NUMBERS
<ul style="list-style-type: none"> ▲ Windows XP Home, Windows XP Professional, <i>Windows XP Media Center</i>, <i>Windows XP 64-bit Professional</i> 		See A+ <i>Guide to Software</i>
<ul style="list-style-type: none"> ▲ Windows Vista Home Basic, Windows Vista Home Premium, Windows Vista Business, Windows Vista Ultimate, Windows Vista Enterprise 		See A+ <i>Guide to Software</i>
<ul style="list-style-type: none"> ▲ Windows 7 Starter, Windows 7 Home Premium, Windows 7 Professional, Windows 7 Ultimate, Windows 7 Enterprise 		See A+ <i>Guide to Software</i>
<ul style="list-style-type: none"> ▲ Features: <ul style="list-style-type: none"> • 32-bit vs. 64-bit • Aero, gadgets, user account control, bit-locker, shadow copy, system restore, ready boost, sidebar, compatibility mode, XP mode, easy transfer, administrative tools, defender, Windows firewall, security center, event viewer, file structure and paths, category view vs. classic view 		See A+ <i>Guide to Software</i> See A+ <i>Guide to Software</i> See A+ <i>Guide to Software</i>
<ul style="list-style-type: none"> ▲ Upgrade paths – differences between in place upgrades, compatibility tools, Windows upgrade OS advisor 		See A+ <i>Guide to Software</i>

1.2 Given a scenario, install and configure the operating system using the most appropriate method.

OBJECTIVES	CHAPTER	PAGE NUMBERS
<ul style="list-style-type: none"> ▲ Boot methods <ul style="list-style-type: none"> • USB • CD-ROM • DVD • PXE 		See A+ <i>Guide to Software</i> See A+ <i>Guide to Software</i> See A+ <i>Guide to Software</i> See A+ <i>Guide to Software</i> See A+ <i>Guide to Software</i>
<ul style="list-style-type: none"> ▲ Type of installations <ul style="list-style-type: none"> • Creating image • Unattended installation • Upgrade • Clean install • Repair installation • Multiboot • Remote network installation • Image deployment 		See A+ <i>Guide to Software</i> See A+ <i>Guide to Software</i> See A+ <i>Guide to Software</i> See A+ <i>Guide to Software</i> See A+ <i>Guide to Software</i> See A+ <i>Guide to Software</i> See A+ <i>Guide to Software</i> See A+ <i>Guide to Software</i> See A+ <i>Guide to Software</i>

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