PEARSON IT

CYBERSECURITY CURRICULUM

COMPLETE A+ GUIDE TO IT HARDWARE AND SOFTWARE

CompTIA® A+ Core 1 and Core 2 Exams (V15)

CHERYL A. SCHMIDT
CHRISTOPHER A. LEE

Complete A+ Guide to IT Hardware and Software

A CompTIA A+ Core 1 and Core 2 Exams (V15) Textbook

TENTH EDITION

CHERYL A. SCHMIDT
CHRISTOPHER A. LEE
FLORIDA STATE COLLEGE AT JACKSONVILLE

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About the Authors

Cheryl Schmidt is a professor of Network Engineering Technology at Florida State College at Jacksonville. Prior to joining the faculty ranks, she oversaw the LAN and PC support for the college and other organizations. She started her career as an electronics technician in the U.S. Navy. She teaches computer repair and various networking topics, including CCNA, network management, and network design. She has published other works with Pearson, including *IP Telephony Using CallManager Express* and *Routing and Switching in the Enterprise Lab Guide*.

Cheryl has won awards for teaching and technology, including Outstanding Faculty of the Year, Innovative Teacher of the Year, Cisco Networking Academy Instructor Excellence Award, and Cisco Networking Academy Stand Out Instructor. She has presented at U.S. and international conferences. Cheryl keeps busy maintaining her technical certifications and teaching but also loves to travel, hike, do all types of puzzles, and read.

Christopher Lee teaches Information Technology, Electronics, and Robotics at Florida State College at Jacksonville. A native of Greenville, South Carolina, Chris earned a bachelor's degree and a master's degree in Electrical Engineering from Georgia Institute of Technology. He taught his first computer programming classes at age 14! Since then, he has worked for a variety of companies, including IBM, Nortel Networks, Evans Solutions, Convergys Corporation, NGA Human Resources, and himself. His experience spans several industries: telecommunications, youth outside the educational mainstream, information technology, higher education, human resources outsourcing, and community development.

Chris has devoted countless volunteer hours to technology outreach. He enjoys helping children and adults (especially those in underserved communities) learn the skills and access the resources they need in order to be competitive in today's technological society. He has built strong partnerships with and implemented successful programs in organizations such as National Society of Black Engineers Jr (NSBE Jr), FIRST LEGO® League, Mentoring Families and Kids, Tristan's Acceleration Academy, and Builders of Tomorrow.

Dedications

A Note to Instructors from Cheryl Schmidt:

I was a teacher long before I had the title professor. Sharing what I know has always been as natural as walking to me, but sitting still to write what I know is not as natural, so composing this text has always been one of my greatest challenges. Thank you so much for choosing this text. I thank you for sharing your knowledge and experience with your students. Your dedication to education is what makes the student experience so valuable.

A Note to Students from Cheryl Schmidt:

Writing a textbook is really different from teaching class. I have said for years that my students are like my children, except that I don't have to pay to send them through college. I am happy to claim any of you who have this text. I wish that I could be in each classroom with you as you start your IT career. How exciting!

Another thing that I tell my students is that I am not an expert. IT support is an ever-changing field, and I have been in it since PCs started being used. You have to be excited about the never-ending changes to be good in this field. You can never stop learning, or you will not be very good anymore. I offer one important piece of advice:

> Consistent, high-quality service boils down to two equally important things: caring and competence.
> —Chip R. Bell and Ron Zemke

I dedicate this book to you, the reader. I can help you with the competence piece, but you are going to have to work on the caring part. Do not ever forget that there are people behind those machines that you love to repair. Taking care of people is as important as taking care of the computers.

A Note to Students from Chris Lee:

I dedicate this book to my late grandfather, Roosevelt Nelson. During our weekly phone calls, he would often ask me, "What projects are you working on, son?" The list would include a variety of things like remote server labs, robotic competitions, car repairs, lawn sprinkler systems, summer camp workshops, home renovations, or new recipes. Sometimes, he would say, "You'll never go hungry with all those skills."

He encouraged me to learn as much as possible so I could choose the life I want to live. I offer the same advice to everyone who uses this book. The CompTIA A+ Certification is a gateway to many amazing opportunities in information technology. As you travel along this journey, take time to explore other facets of life, either as hobbies or as careers. You'll appreciate the diversion from the pressures of the IT world, and you'll discover people and ideas that you would otherwise never experience. This additional education (whether formal or informal) will increase your "value" at home, in your profession, and throughout your community.

Acknowledgments

From Cheryl Schmidt:

I am so thankful for the many blessings from God throughout my lifetime and the support of my family during the production of this book. My husband, Karl, daughter, Raina, and son-in-law, Marc, are always a source of encouragement. My grandsons, Gavin, Riley, Logan, and Liam, and my granddaughters, Brie and Liv, are a constant source of wonderment for me. They are shining lights for me. Thanks to my mother, Barbara Cansler, who recently passed and who taught me to love words and my brother Jeff Cansler for just listening. Thanks to my walking buddy, Kellie, for the miles of letting me work through knotty sections. Thanks to my colleagues, adjuncts, and students at my college who offered numerous valuable suggestions for improvement and tested the new material. A special thanks to my colleagues Pamela Brauda and David Singletary as well as Jason Brenneman for helping me with my weak areas. Finally,

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Finally, thank you to the students who have taken the time to share their recommendations for improvement. You are the reason I write this book each time. Please send me any ideas and comments you may have. I love hearing from you and of your successes. I may be reached at cheryl.schmidt@fscj.edu.

From Chris Lee:

I am thankful for the lifetime of support and guidance that have enabled me to achieve my dreams and contribute to this book. My parents, Brenda McClinton and Herman Brown, have always encouraged me to follow my own path. They have also been my favorite remote "clients," as they have embraced computer technology, whereas many of their peers find it intimidating. My grandparents, Roosevelt (deceased) and Bettye Nelson, have always been my biggest cheerleaders; Grandma still reminds me to take some time for myself in the midst of all that I do. I appreciate the patience and motivation from my son, Jawara, as he discovers his own niche in the world of video game programming and in life itself. And I thank my colleague and principal author Cheryl Schmidt for the wealth of guidance during my career at Florida College at Jacksonville and for the opportunity to contribute to this book.

Some very special teachers also deserve recognition. Mr. William Marshall at the Phyllis Wheatley Community Center allowed me to make or build whatever I wanted in the arts and crafts room. He saw the budding engineer in me and allowed me to discover my passion. Mrs. Linda Dillard at Duncan Chapel Elementary School instilled the discipline that I needed to stay focused amid so many distractions. Mrs. Jeanne Perkinson at Wade Hampton High School took my B.A.S.I.C. programming to the next level and introduced me to structured programming. Dr. George Lee Cain helped me weather my first term at Georgia Tech. OMED Student Services and Dr. Gary S. May at Georgia Tech gave me numerous resources to navigate college life and exposed me to several opportunities to develop my skills and serve my community.

We Want to Hear from You!

As the reader of this book, *you* are our most important critic and commentator. We value your opinion and want to know what we're doing right, what we could do better, what areas you'd like to see us publish in, and any other words of wisdom you're willing to pass our way.

We welcome your comments. You can email or write to let us know what you did or didn't like about this book—as well as what we can do to make our books better.

Please note that we cannot help you with technical problems related to the topic of this book.

When you write, please be sure to include this book's title and author as well as your name and email address. We will carefully review your comments and share them with the author and editors who worked on the book.

Email: community@informit.com

Reader Services

Register your copy of *Complete A+ Guide to IT Hardware and Software*, tenth edition, for convenient access to downloads, updates, and corrections as they become available. To start the registration process, go to www.pearsonitcertification.com/register and log in or create an account*. Enter the product ISBN 9780135439777 and click Submit. When the process is complete, you will find any available bonus content under Registered Products.

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Introduction

Complete A+ Guide to IT Hardware and Software, tenth edition, is a textbook and optional lab manual intended for one or more courses geared toward CompTIA A+ Certification and computer repair. It covers all the material needed for the CompTIA A+ Core 1 (220-1201) and CompTIA A+ Core 2 (220-1202) exams. The book is written so that it is easy to read and understand, with concepts presented in building-block fashion. The book focuses on hardware, software, mobile devices, virtualization, basic networking, and security.

Some of the best features of the book include the coverage of difficult subjects in a step-by-step manner, carefully developed graphics that illustrate concepts, photographs that demonstrate various technologies, reinforcement questions, critical thinking skills, soft skills, and hands-on exercises at the end of each chapter. Also, this book is written by teachers who understand the value of a textbook from authors who have been in IT their entire career.

What's New in the Tenth Edition?

This edition has been revised to provide coverage of SIMs/eSIMs, BYOD mobile devices, updated server types, additional DNS/DHCP concepts, updated display types and attributes, USB-C as a video cable type, BIOS temperature monitoring, power supply energy efficiency, printer firmware, expanded virtualization requirements, containers, updated cloud concepts, and troubleshooting situations.

Now Available Online for Free: The Companion Lab Manual!

The *Complete A+ Guide to IT Hardware and Software Lab Manual* offers hands-on practice with computer parts, mobile devices, networking, operating systems, and security. With 140 step-by-step labs, students can experiment with real technologies, answer reflection questions, and build practical skills. Challenge sections in some labs provide extra practice to deepen understanding. The Lab Manual helps students gain the experience and confidence needed for success in the IT industry.

This edition also includes more information regarding the installation/uninstallation of apps, a deeper dive into the Mac system, system folders, and common configuration files, and installing specific cloud apps and tools. The security sections throughout the book have been updated, and some additional information on change management is also provided.

The following are a few of the many new features of this edition:

- This book conforms to the latest CompTIA A+ exam requirements, including those of the CompTIA A+ Core 1 (220-1201) and CompTIA A+ Core 2 (220-1202) exams.
- Chapter 12 includes new information regarding containers.
- Chapter 16 discusses the installation and configuration of cloud-based productivity tools such as spreadsheets, word processing tools, and video conferencing.
- Chapter 17 discusses the purpose and content of macOS's most important system folders, and it describes the installation procedures for `.pkg`, `.app`, and `.dmg` files. The chapter also the explores System Settings, which replaces System Preferences.
- The book has always been filled with graphics and photos, but even more have been added to target those who are naturally drawn to the IT field. This edition is full color.
- There are questions at the end of each chapter, and even more questions are available in the test bank available from the Pearson Instructor Resource Center.

Organization of the Text

The text is organized to allow thorough coverage of all topics and also to be a flexible teaching tool. It is not necessary to cover all the chapters, nor do the chapters have to be covered in order.

Chapters 1 through 9 focus on hardware. Chapter 10 covers mobile devices. Chapter 11 is on computer design and serves as a troubleshooting review. Chapter 12 covers internet connectivity, virtualization, and cloud computing. Chapter 13 dives into networking. Chapters 14 through 17 cover operating systems. Chapter 18 handles security concepts. Finally, Chapter 19 discusses operational procedures. Appendix A provides an introduction to subnetting. Here's a closer look at what each chapter covers:

- **Chapter 1** provides an introduction to IT and careers that need the information in this book. It identifies computer parts. Chapter 1 does not have a specific soft skills section, as do the other chapters. Instead, it focuses on common technician qualities that are explored in greater detail in the soft skills sections of later chapters. Finally, Chapter 1 provides information on using Notepad, the Windows Snipping Tool, and internet search techniques.
- **Chapter 2** is about connecting things to the computer and port identification. Details are provided on video, USB, and sound ports. The soft skills section is on using appropriate titles.
- **Chapter 3** details components, features, and concepts related to motherboards, including processors, caches, expansion slots, and chipsets. Active listening skills are the focus of the soft skills section.
- **Chapter 4** deals with system configuration basics. BIOS options, UEFI BIOS, and system resources are key topics. The soft skills section covers the importance of doing one thing at a time when replacing components.
- **Chapter 5** steps through how to disassemble and reassemble a computer. Tools, ESD, EMI, and preventive maintenance are discussed. Subsequent chapters also include preventive maintenance topics. Basic electronics and computer power concepts are also included in this chapter. The soft skills section involves written communication.
- **Chapter 6** covers memory installation, preparation, and troubleshooting. The importance of teamwork is emphasized as the soft skill.
- **Chapter 7** deals with storage devices, including SATA, SAS, and SSDs. RAID is also covered. Phone communication skills are covered in the soft skills section of this chapter.
- **Chapter 8** covers video and multimedia devices, including optical drives, sound cards, cameras, scanners, and speakers. The chapter ends with a section on having a positive, proactive attitude.
- **Chapter 9** provides details on printers and multifunction devices. A discussion of work ethics finishes the chapter.
- **Chapter 10** is on mobile devices, including details on mobile device operating systems, configuration, backup, security, and troubleshooting. The soft skills section takes a brief foray into professional appearance.
- **Chapter 11** covers computer design. It discusses the specialized computers and components needed within the types of systems covered, and also explores computer subsystem design. Because design and troubleshooting use higher levels of critical thinking skills, the chapter also includes a review of troubleshooting, including logic, error codes, and troubleshooting flowcharts. The soft skills section provides recommendations for dealing with irate customers.
- **Chapter 12** handles internet connectivity, virtualization, and cloud technologies. It covers internet browser configuration, along with the soft skill mentoring.
- **Chapter 13** introduces networking. Basic concepts, terminology, and exercises make this chapter a favorite. Appendix A provides an introduction to subnetting that can be used in conjunction with this chapter. The focus of the soft skills section is being proactive instead of reactive.
- **Chapter 14** provides an introduction to operating systems in general and discusses basic differences between the Windows versions and how to function in the various Windows environments. The soft skills section includes tips on how to stay current in this fast-paced field.
- **Chapter 15** provides an introduction to scripting and includes how to function at the command prompt and the basics of scripting in Python, JavaScript, shell scripting, VBScript, batch files, and PowerShell. The soft skills section discusses looking at a problem from the user's perspective and being more empathetic.

- **Chapter 16** covers Windows 10 and 11, including how to install, configure, and troubleshoot the environment. This chapter also discusses the installation and configuration of cloud-based productivity tools such as email, word processing tools, and video conferencing tools. Avoiding burnout is the soft skill discussed in this chapter.
- **Chapter 17** provides a basic introduction to macOS and Linux to help technicians become familiar with these operating systems and a few tools. The soft skills section talks about being humble.
- **Chapter 18** describes computer, mobile device, and network security. The soft skills section is on building customer trust.
- **Chapter 19** guides the student through operational procedures such as workplace safety, recycling, disposal, a review of power protection, change management, and communication skills.

Features of This Book

The following key features of the book are designed to enable a better learning experience.

- **Objectives:** Each chapter begins with chapter objectives and the CompTIA A+ exam objectives.
- **Graphics and photographs:** Many more full-color images and all-new graphics have been added to the book to better illustrate concepts.
- **Tech Tips:** The chapters are filled with Tech Tips that highlight technical issues and certification exam topics.
- **Key terms in context:** As you read each chapter, you will find terms that appear in **blue**. They are considered key terms and are defined in the glossary.
- **Key Terms list:** At the end of the chapter, all key terms are listed.
- **Soft Skills:** Technology is not the only thing you must learn and practice; each chapter offers advice, activities, and examples of how to be a good technician, an ethical technician, a good work mate, a good communicator, and so on.
- **Chapter Summary:** The summary recaps the key concepts of the chapter, and you can use it for review to ensure that you've mastered the chapter's learning objectives.
- **A+ Certification Exam Tips:** Read through these tips on the CompTIA A+ exams so you aren't caught off guard when you sit for the exam.
- **Review Questions:** Hundreds of review questions, including true/false, multiple-choice, matching, fill-in-the-blank, and open-ended questions, help you assess your knowledge of the topics taught in each chapter.
- **Applying your knowledge:** This book provides hundreds of exercises and activities to help you put into practice what you are learning:
  - **Exercises:** Sometimes called "paper labs," the exercises can be completed without lab devices and can be completed in the classroom or for homework.
  - **Activities:** The activities provide extensive practice with internet discovery, soft skills, and critical thinking skills to round out your technical knowledge so that you can be prepared for IT work. These can be used to "Flip the Classroom" so that instruction is interactive and in the hands of the students.

Companion Website

Register this book to get access to sample videos and additional bonus content to help you succeed with this course and the certification exam. Check this site regularly for any updates or errata that might become available for this book. Be sure to check the box indicating that you would like to hear from us to receive news of updates and exclusive discounts on related products.

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2. Enter the ISBN *9780135439777*.
3. Answer the challenge question as proof of purchase.
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Please note that many of our companion content files can be very large, especially image and video files.

If you are unable to locate the files for this title by following the steps above, please visit www.pearsonITcertification.com/contact and select the *Site Problems/Comments* option. Our customer service representatives will assist you.

CompTIA A+ Exam Objectives

To earn CompTIA A+ certification, you must pass both the CompTIA A+ Core 1 (220-1201) and CompTIA A+ Core 2 (220-1202) certification exams.

Tables I-1 and I-2 summarize the domain content for each exam.

TABLE I-1 CompTIA A+ Core 1 (220-1201) exam

Domain	Percentage of examination
1.0 Mobile Devices	13%
2.0 Networking	23%
3.0 Hardware	25%
4.0 Virtualization and Cloud Computing	11%
5.0 Hardware and Network Troubleshooting	28%
Total	100%

TABLE I-2 CompTIA A+ Core 2 (220-1202) exam

Domain	Percentage of examination
1.0 Operating Systems	28%
2.0 Security	28%
3.0 Software Troubleshooting	23%
4.0 Operational Procedures	21%
Total	100%

Table I-3 shows a summary of the exam domains addressed in each chapter. Each chapter lists the certification objectives it covers in the chapter opener. See Appendix B on the companion website for a detailed table that identifies where you can find all the CompTIA A+ exam objectives covered in this book.

TABLE I-3 Summary of exam domains by chapter

Table of contents	220-1201 domains	220-1202 domains
Chapter 1: Introduction to the World of IT	3	4
Chapter 2: Connectivity	1, 2, 3	4
Chapter 3: On the Motherboard	3, 5	4
Chapter 4: Introduction to Configuration	3, 5	
Chapter 5: Disassembly and Power	3, 5	4
Chapter 6: Memory	3, 5	1
Chapter 7: Storage Devices	3, 5	1, 2, 3, 4
Chapter 8: Video and Multimedia Devices	3	1, 4
Chapter 9: Printers/Multifunction Devices	2, 3, 5	1, 3, 4
Chapter 10: Mobile Devices	1, 2, 3, 5	1, 2, 3
Chapter 11: Computer Design and Troubleshooting Review	3, 5	4
Chapter 12: Internet Connectivity, Virtualization, and Cloud Technologies	2, 3, 4	1, 2, 3
Chapter 13: Networking	2, 3, 4, 5	1, 2, 3, 4
Chapter 14: Introduction to Operating Systems		1, 2, 3
Chapter 15: Introduction to Scripting		1, 3, 4
Chapter 16: Advanced Windows		1, 2, 3, 4
Chapter 17: macOS and Linux Operating Systems		1, 3
Chapter 18: Computer and Network Security	2, 3	1, 2, 3, 4
Chapter 19: Operational Procedures		4

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1 Introduction to the World of IT

In this chapter you will learn:

- Qualities a technician should have
- Basic skills needed to function in the Windows environment and in the technical world
- Important computer parts
- Basic computer terms

CompTIA Exam Objectives:

- ✓ 1201-3.2 Summarize basic cable types and their connectors, features, and purposes.
- ✓ 1202-4.4 Given a scenario, use common safety procedures.
- ✓ 1202-4.7 Given a scenario, use proper communication techniques and professionalism.

Who Needs This Book?

More types of people than you would first think need this book. People who obviously need this information are those who will fix computers or work on a help desk or support desk. However, there are other types of users who might not be so obvious. Many folks who break into the information technology (IT) world do so through jobs that require the A+ certification. Consider medical electronics technicians who repair common equipment used in hospitals. These technicians need this material because many medical devices connect to a PC or have PC-based software that controls the device. Further, the medical devices commonly attach to wired and wireless networks.

Look at Figure 1.1 to see the types of jobs and people who need the information in this book. It might also give you ideas about something you might like to do for a career.

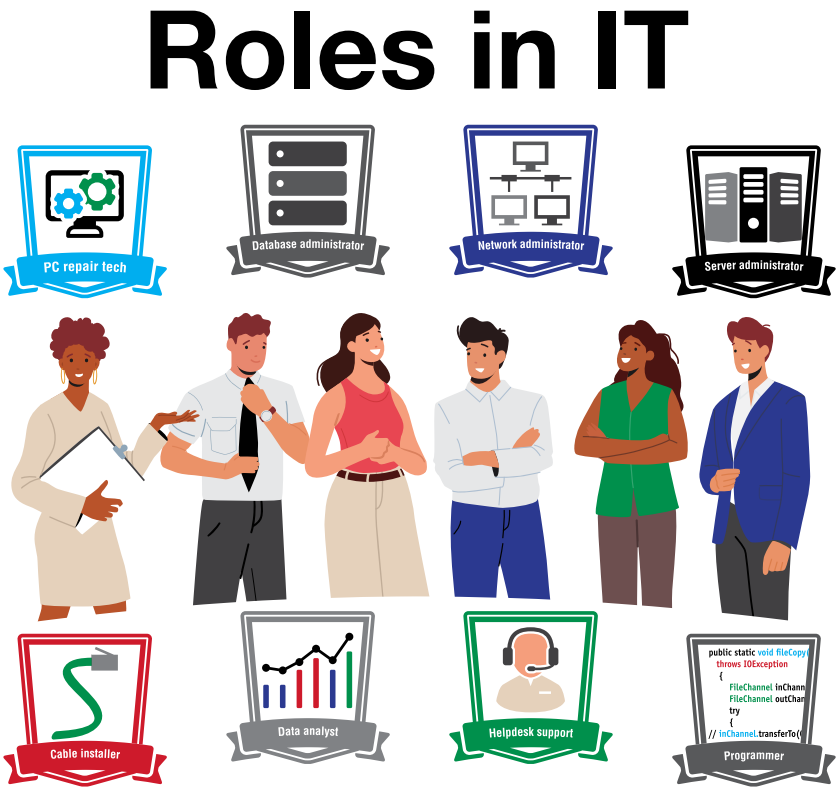


FIGURE 1.1 IT roles

Technician Qualities

Each chapter includes a small bit of space on qualities a technician should possess or strive toward. Spending a little brain power on improving what many call your "soft skills" will pay off in promotions. Three of the most important qualities of a technician are active listening skills, a good attitude, and logic. Active listening means that you truly listen to what a person (especially one who is having a problem) is saying. **Active listening skills** involve good eye contact, nodding your head every now and then to show that you are following the conversation, taking notes on important details, and avoiding distractions such as incoming cell phone calls or text messages. **Clarify customer statements** by asking pertinent questions and avoid interrupting. Listen to the entire problem. Ask **open-ended questions**—questions that allow the user to expand on the answer rather than answer with a single word, such as *yes* or *no*. Figure 1.2 illustrates this point.

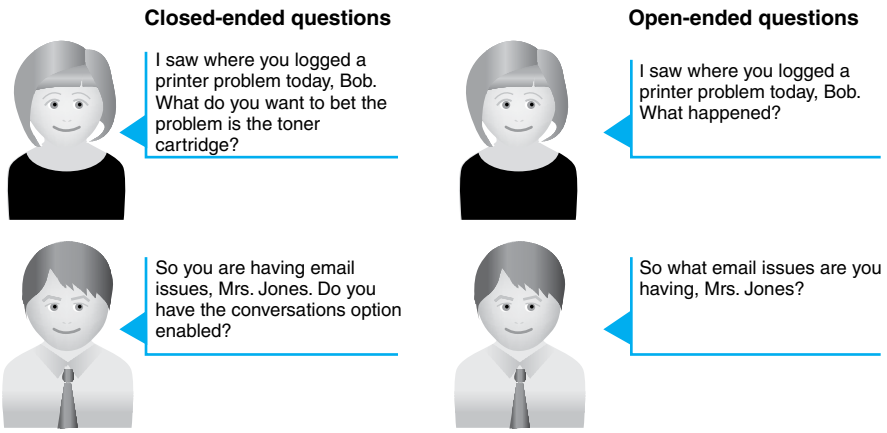


FIGURE 1.2 Asking technical questions

A positive attitude is probably the best quality a technician can possess. A technician with a positive attitude does not diminish the customer's problem; every problem is equally important to the computer user. A positive attitude is critical for being successful in the computer service industry. Figure 1.3 illustrates how maintaining a positive attitude can enhance your chances of success in the workplace.

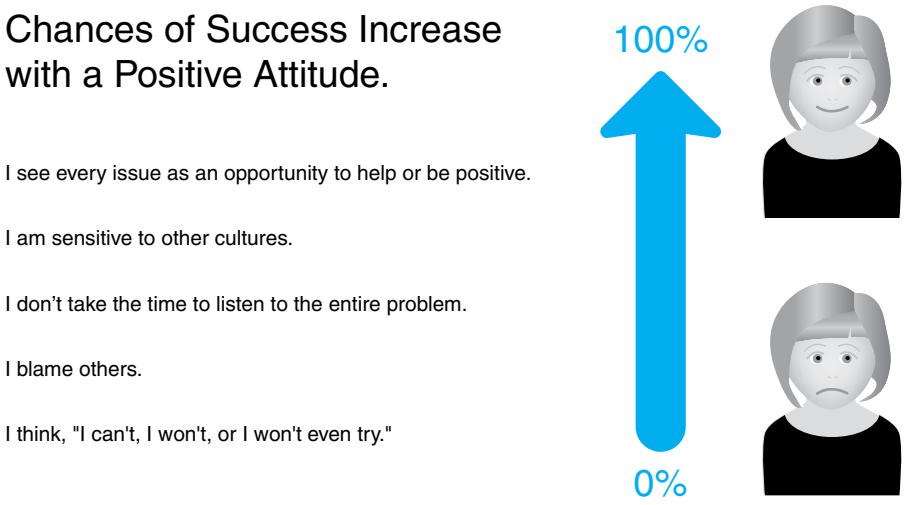


FIGURE 1.3 Have a positive attitude

Avoid developing tunnel vision (that is, thinking that there is only one answer to a problem). Step back and look at the problem so that all possible issues can be evaluated. Be logical in your assessment and the methods used to troubleshoot and repair. This book will help you by explaining computer terms in easy-to-understand language and offering examples to use when talking to customers.

Before delving into computer topics, you should remember that a class can't fully prepare you for every aspect of a job. You must learn things on your own and constantly strive to update your skills so you do not become obsolete. The IT field changes rapidly. Figure 1.4 illustrates this concept. Finally, you will find that you must be a jack-of-all-trades, as shown in Figure 1.5.

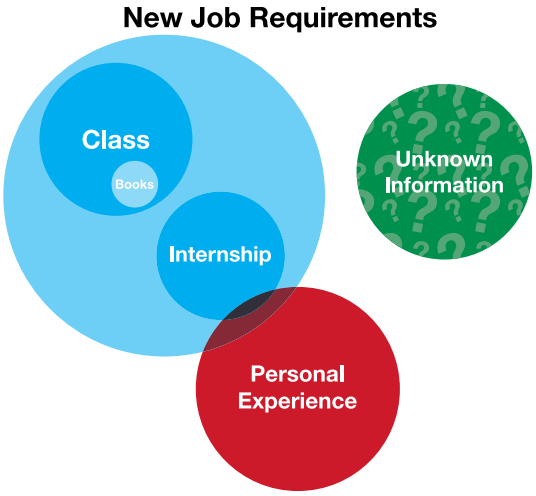


FIGURE 1.4 Preparing for IT job requirements

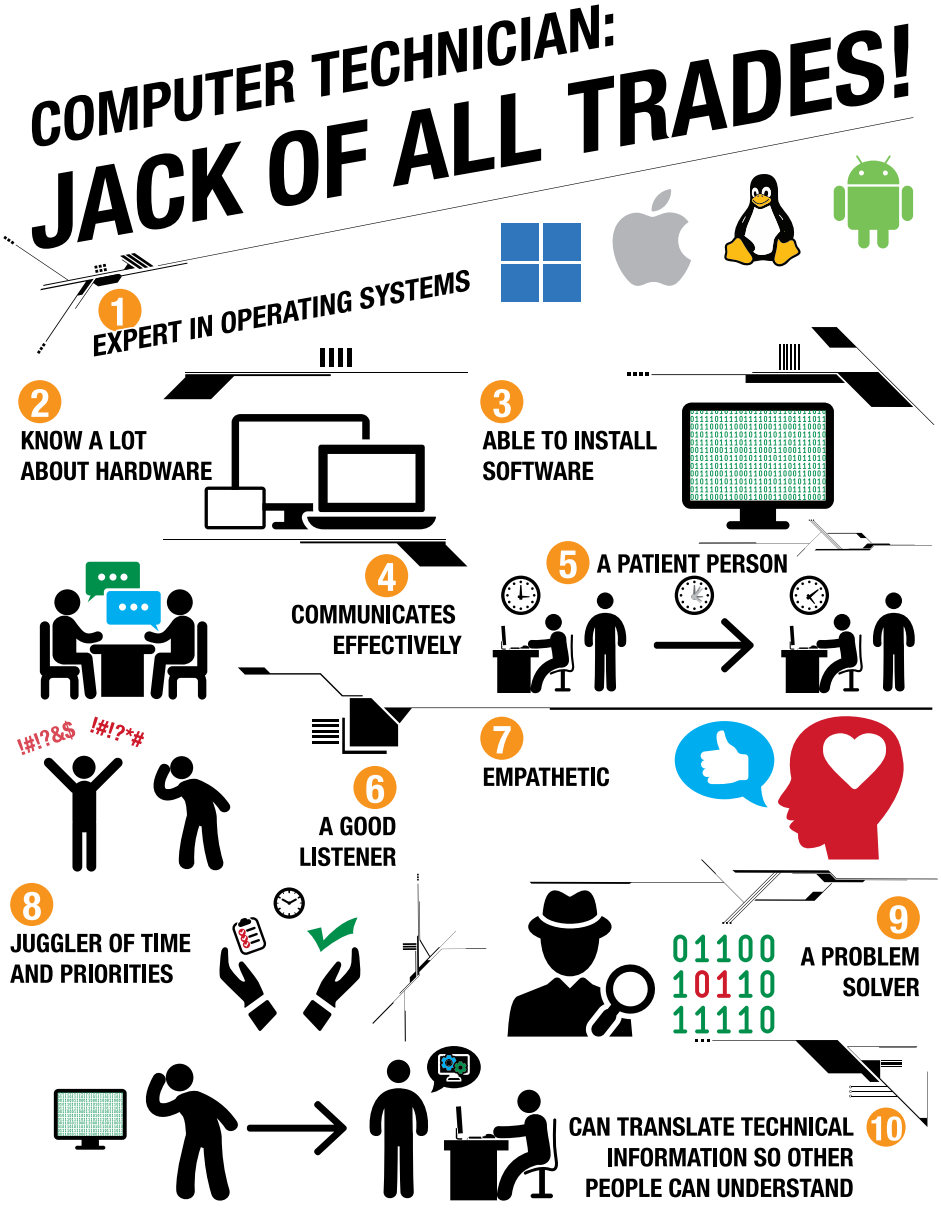


FIGURE 1.5 Computer technician skills

Breaking into IT with the CompTIA A+ Certification

Many IT-related jobs require the A+ certification. Even if not required, the certification shows that you have a good understanding of how computers work. This certification doesn't guarantee a job, but it can help you get into the interview process even if you lack IT experience.

A+ certification requires that you take two exams: Core 1 (220-1201) and Core 2 (220-1202). Each of these exams covers specific material. Tables 1.1 and 1.2 show the major categories (domains) for each exam and the extent to which they are represented.

TABLE 1.1 CompTIA Core 1 (220-1201) A+ certification domains

Domain	Percentage of examination	Chapter(s)
1.0 Mobile Devices	13%	10
2.0 Networking	23%	12–13
3.0 Hardware	25%	1–9, 11
4.0 Virtualization and Cloud Computing	11%	3, 12
5.0 Hardware and Network Troubleshooting	28%	1–13

TABLE 1.2 CompTIA Core 2 (220-1202) A+ certification domains

Domain	Percentage of examination	Chapter(s)
1.0 Operating Systems	28%	14–17
2.0 Security	28%	18
3.0 Software Troubleshooting	23%	14–18
4.0 Operational Procedures	21%	19

"What are the exams like?" you might ask. The exams include multiple-choice and performance-based questions. A performance-based question might be a drag-and-drop scenario or might ask you to do something specific on a particular device or within a particular operating system environment. Each exam is 90 minutes long and contains a maximum of 90 questions. The testing system allows you to bookmark questions that you might want to return to at the end if you have time. More information can be found on the CompTIA website (www.comptia.org).

At the beginning of each chapter, you will see a list of the CompTIA A+ exam objectives that are covered in that chapter. At the end of each chapter, I've provided some A+ certification exam tips—tips to definitely pay attention to if you plan on taking the A+ exams. I recommend that you review the exam objectives, study material specific to them, and take some practice exams. Pearson IT Certification, the publisher of this book, develops many different certification exam prep resources that suit various study styles. See the back of this book for more information or go to http://pearsonitcertification.com/aplus to browse the options.

Basic Skills for This Course

In order to repair a computer, you need a few basic skills that include being familiar with the keyboard and inputting information, searching for information on the internet, and capturing information. Just because you may not be a good typist does not mean that you will not be good in an IT-related field.

Searching for Information on the Internet

IT people need to use all available resources, including online resources. As noted, you need to be capable of searching for information online. Figure 1.6 illustrates various online resources that IT people search all the time.

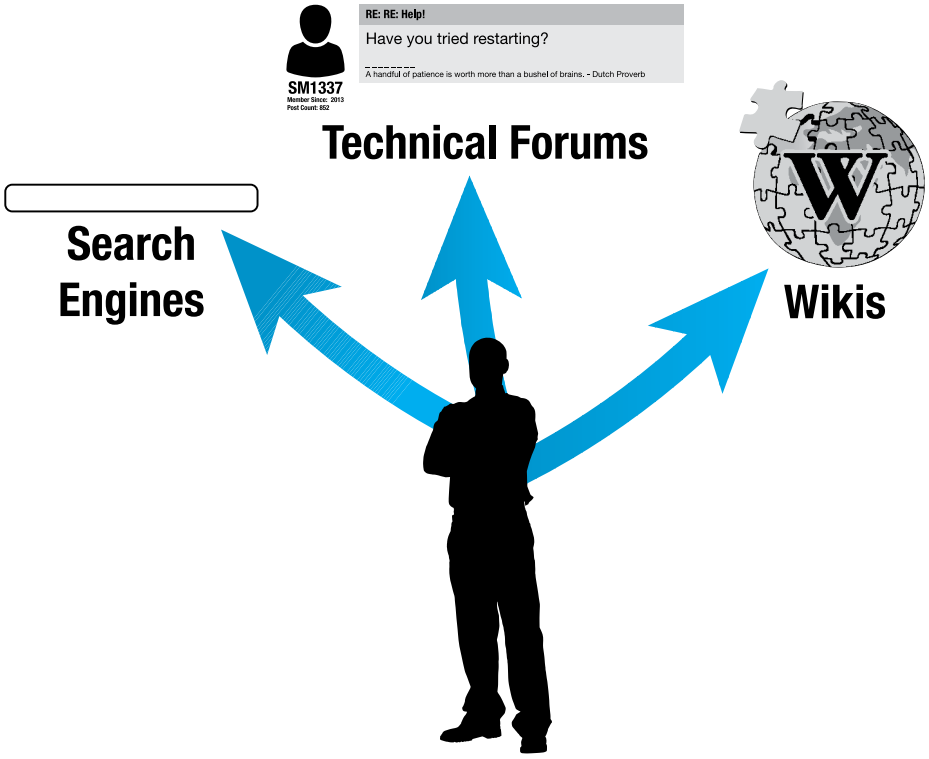


FIGURE 1.6 Search skills

Each chapter in the book has an activity at the end of it that enables you to practice searching the internet for information relevant to the chapter. Tips for searching include the following:

- Remember that search engines use different algorithms, so if one does not work, try another one. Examples of search engines are Google, Bing, Yahoo, Brave, DuckDuckGo, and Ask. To access a search engine, open a web browser and type one of the search engine names followed by `.com`. Figure 1.7 shows where you enter the search engine name in the address bar.

FIGURE 1.7 Web browser address bar

- Use descriptive key words.
- Do not include common words like *the*, *in*, *at*, or *for* because search engines tend to skip these words anyway. If you do want to use one of them, put a plus sign (+) in front of the word.

- Avoid using a complex version, plural, or past tense of a word. When you include such word versions, the search engine is likely to eliminate pages that are relevant. For example, to search for how to install a Bluetooth headset, avoid using the word *installation*, *installed*, or *installing* in the search window. Simply include the word *install*.
- To search for an exact phrase (that is, several words used together), put quotation marks around the phrase. For example, to search for Windows 11, enter the search term `"Windows 11"`.
- Use as many distinguishing words as possible.
- If two words have the same meaning and are commonly used, use the word *or* in the search. For example, to search for generic information on a dot matrix printer, which is sometimes called an impact printer, you might search as follows: `"dot matrix" or "impact printer"`. Note that the vertical bar (|), which is the key above the Enter key, can be used instead of the word *or*, as follows: `"dot matrix" | "impact printer"`.
- If a particular term can have two meanings (such as the word *memory* relating to something inside a computer or else relating to a brain function), you can use the minus sign in order to prevent some information from being displayed. `memory -brain`, for example, would be a search for memory without any brain function results included.
- If a particular term (such as memory) is generic, you can add a word and use the word *AND* in order to clarify the search, such as `computer AND memory`.
- When searching for technical information, include the hardware or software manufacturer. A search for `Microsoft Windows 10` provides different results than simply a search for `Windows 10`.
- If nothing relevant is on the first page of links, change the key words used in your search.

Consider the situation of a keyboard that intermittently works on a Microsoft Surface computer. The keyboard does not come standard as part of a Surface purchase. You do not own a Surface yourself and are unfamiliar with the tablet but must support it. An example of what you might type into a search engine is `Microsoft Surface intermittent keyboard`.

Screen Capturing

Documentation is a part of all IT jobs, so no matter what IT job you have when you enter the workforce, you will need to get familiar with it. Sometimes, technical documentation involves being able to capture what is on the screen. Windows versions come with the Snipping Tool and Snip & Sketch. In addition, to take a screenshot on a Windows machine, hold down the ⊞ key and press the ⇧Shift key and, while holding both of these keys down, press the S key. Documenting problems is easy with screenshots, and you can copy what you capture into other applications.

To take a screenshot on a Mac, hold these three keys down one at a time (keeping each one down as you add another key): ⇧Shift+⌘+3.To capture a portion of the screen, use the ⇧Shift+⌘+4 keys. To capture a window or menu, use the ⇧Shift+⌘+4+Spacebar keys. By default the screenshots are saved to the desktop, and you can move them to a folder later.

Creating a Text File

Documentation sometimes involves creating or using a text file, known as a .txt file. Text files are popular because they can be opened by many applications or other mobile apps. Text files commonly include only text, without multiple fonts or graphics.

You might need to send a text file as an attachment, or you might need to create a text file as part of the documentation process or for another part of your job. A text file is one of the easiest types of file to create, especially on a mobile device. Text files can be created using a word processor and the *Save As* process, or they can be created using specific text software or an app. Windows Notepad and Apple TextEdit can be used to create and open text files.

Types of Computers

The simplest place to start to learn about computer technical support is with the devices themselves. **PCs**, or personal computers, come in desktop, tower, and all-in-one models, as well as mobile models such as laptops, smartphones, and tablets. Figure 1.8 shows some of the computing devices technical staff are expected to support.

FIGURE 1.8 Types of computers

Basic Computer Hardware

Computer systems include hardware, software, and firmware. **Hardware** is something you can touch and feel, like the physical computer and the parts inside the computer. The display, keyboard, and mouse are hardware components. **Software** interacts with the hardware. Windows, Linux, macOS, Microsoft 365, Google Chrome, Adobe Acrobat Reader, Intuit TurboTax, and WordPerfect are examples of software.

Without software that directs the hardware to accomplish something, a computer is no more than a doorstop. A computer needs an important piece of software called an **operating system**, which coordinates the interaction between hardware and software applications. The operating system also handles the interaction between a user and the computer. Examples of operating systems include Windows 10 and 11, macOS, and various Linux systems, such as Red Hat and Ubuntu. Firmware is a combination of hardware and software such as the chip used to boot the computer and locate the operating system.

A **device driver** enables the operating system to recognize, control, and use the hardware component. Device drivers are hardware and operating system specific. For example, a printer requires a specific device driver when connected to a computer that has Windows 10 installed. The same printer might require a different device driver when using Windows 11. That Windows print driver would not work on an Apple computer. Each piece of installed hardware requires a device driver for the operating system being used. Figure 1.9 shows how hardware and software must work together.

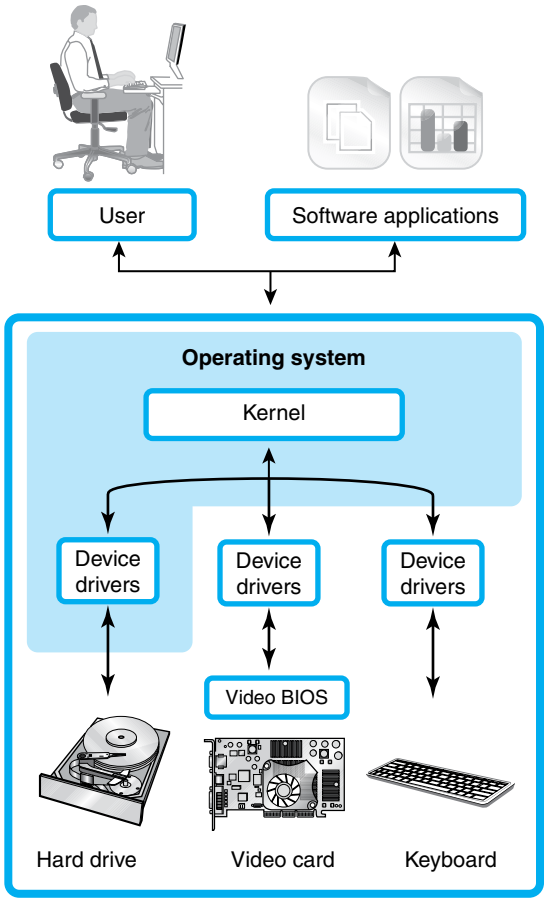


FIGURE 1.9 Hardware and software

Notice in Figure 1.9 the operating system kernel. The kernel is the central part of an operating system. The kernel is the connection between hardware and the applications being used.

A PC typically consists of a case (chassis), a keyboard that allows users to provide input into the computer, a **display** that outputs or displays information, and a mouse that allows data input or is used to select menus and options. Figure 1.10 shows a computer display, which may also be called a flat panel, display, or screen.

FIGURE 1.10 Computer display

When the computer cover or side is opened or removed, the parts inside can be identified. The easiest part to identify is the **power supply**, which is the metal box normally located in a back corner of a case. A power cord connects the power supply to a wall outlet or surge strip. One

purpose of the power supply is to convert the outlet AC voltage to the DC voltage used internally in the PC. The power supply distributes this DC voltage using power cables that connect to the various internal computer parts. A fan located inside the power supply helps keep the computer cool to prevent damage to the components.

A PC usually has a device to store software applications and files. Two examples of storage devices are the hard drive and optical drive. The **hard drive**, sometimes called the hard disk, is a rectangular box normally inside the computer's case that is sealed to keep out dust and dirt. The hard drive has no external opening. The computer must be opened in order to access an internal hard drive. An **optical drive**, sometimes called a DVD drive, holds discs (compact discs, or CDs), digital versatile discs (DVDs), or Blu-ray discs (BDs) that have data, music, video, or software applications on them. The front of the optical drive has a tray that can eject outward so a disc may be inserted. Figure 1.11 shows the major components of a tower computer. Figures 1.12 through 1.14 show components as they look before being installed. Figure 1.12 shows a hard drive, Figure 1.13 shows an optical drive, Figure 1.14 shows a power supply, and Figure 1.15 shows a tower computer case.

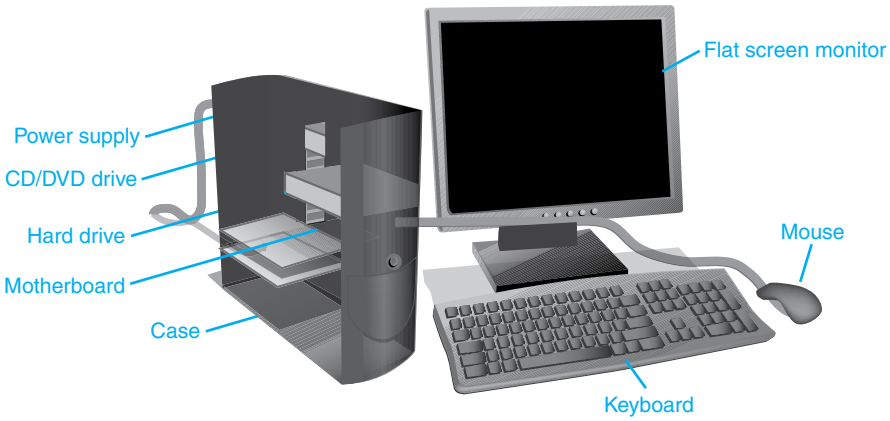


FIGURE 1.11 Tower computer

FIGURE 1.12 Hard drive

FIGURE 1.13 Optical drive

FIGURE 1.14 Power supply

FIGURE 1.15 Tower case

The **motherboard** is the main circuit board inside a PC and contains the most electronics. It is normally located on the bottom of a desktop or laptop computer and mounted on the side of a tower computer. Other names for the motherboard include mainboard, planar, and system board. External devices connect directly to the back of the motherboard or ports on the front of the computer. Figure 1.16 shows a motherboard when it is not installed inside a computer as well as memory and an adapter (card), which are covered next.

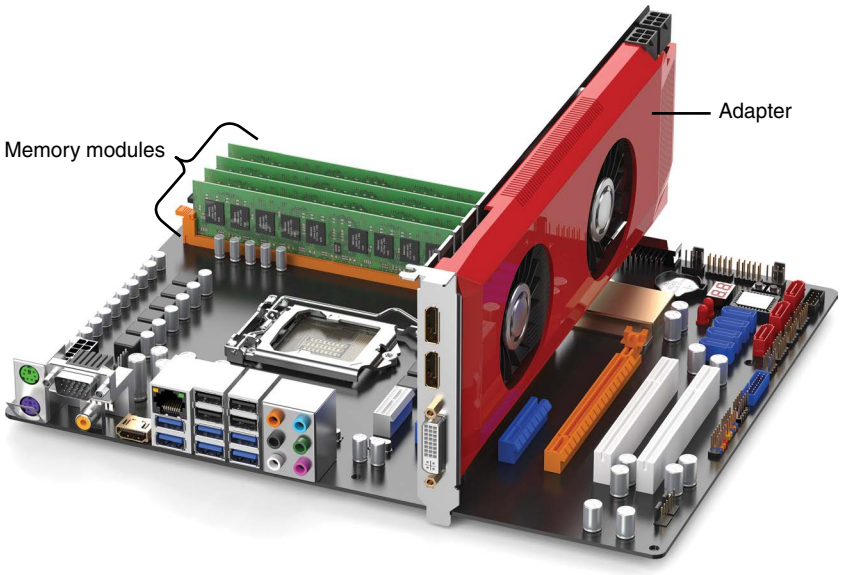


FIGURE 1.16 Computer motherboard

The motherboard holds memory modules. **Memory** modules hold applications, part of the operating system, and user documents. Random-access memory (**RAM**), which is the most common type of memory on the motherboard, is volatile—that is, the data inside the module is lost when power is removed. When a user types a document in a word processing program, both the word processing application and the document are in RAM. If the user turns off the computer without saving the document to removable media, the local drive, or to cloud storage, the document is lost because the information does not stay in RAM. (Note that some applications have the ability to periodically save a document, but this is not a guarantee that it has the latest information.) Figure 1.17 shows memory modules when they are not installed into the motherboard memory slots. Memory is covered in great detail in Chapter 6, "Memory."

FIGURE 1.17 Memory modules

A device may connect directly to the motherboard or to an adapter through a cable that connects the device to either one. An **adapter** is an electronic card that plugs into an **expansion slot** on the motherboard. Other names for an adapter are controller, card, controller card, circuit card, circuit board, and adapter board. Adapters allow someone to add a functionality or enhancement that is not provided through the ports on the motherboard. An example is someone who wants better sound or video graphics or additional ports of some type in order to connect external devices.

Figure 1.18 shows an adapter. Notice how the contacts at the bottom are a particular shape. Chapter 3, "On the Motherboard," goes into more detail about the types of expansion slots and adapters. You can also look back at Figure 1.16 to see a video card/adapter installed into a motherboard expansion slot.

FIGURE 1.18 Adapter

TECH TIP

How to identify an adapter's function

Tracing the cable attached to an adapter or looking at the device connected to an adapter can help identify the adapter's function.

The following are the generic steps for installing adapters:

Step 1. Always follow the manufacturer's installation directions. Use an antistatic wrist strap when handling adapters. Electrostatic discharge (ESD) can damage electronic parts. (See Chapter 5, "Disassembly and Power," for more details on ESD.)

Step 2. Be sure the computer is powered off and unplugged.

Step 3. Remove any brackets from the case or plastic covers from the rear of the computer that may prevent adapter installation. Install the adapter in a free expansion slot and reattach any securing hardware.

Step 4. Attach any internal device cables that connect to the adapter, as well as any cables that go to an external port on the adapter.

Step 5. Attach any internal or external devices to the opposite ends of the cable, if necessary.

Step 6. Power on any external devices connected to the adapter, if applicable.

Step 7. Reattach the computer power cord and power on the computer.

Step 8. Load any application software or device drivers needed for the devices attached to the adapter.

Step 9. Test the device connected to the adapter.

See Figure 1.19 for an illustration of a motherboard, expansion slots, memory, and an adapter in an expansion slot.

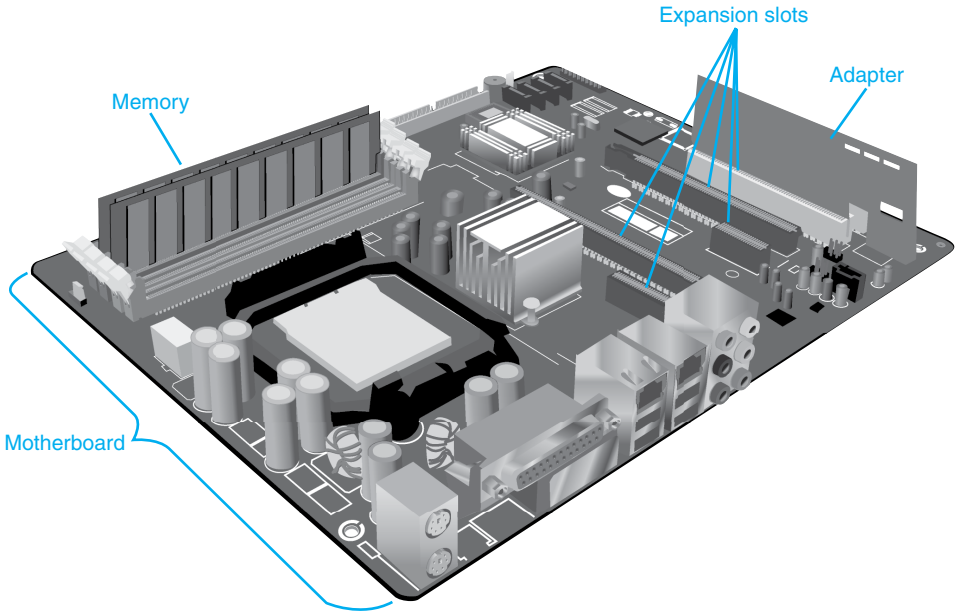


FIGURE 1.19 Motherboard with expansion slots and an adapter

Mice and Keyboards

Input devices, such as the mouse and keyboard, attach to the motherboard. The most common type of **mouse** is an optical mouse, which has optical sensors that detect the direction in which the mouse moves. It uses reflections from light-emitting diodes (LEDs) from almost any surface to detect the mouse location. Mice commonly can be adjusted for sensitivity—how far you have to move the mouse to move the cursor on the screen a desired amount. Figure 1.20 shows the bottom of an optical mouse.

A **keyboard** is an input device that connects to a port on the motherboard or attaches wirelessly. Features users look for in a keyboard include a separate numeric keypad for those who have to input numbers frequently, adjustable tilt legs, and spill resistance. Figure 1.21 shows the type of keyboard and mouse that are commonly used with a tower, desktop, or all-in-one computer.

FIGURE 1.20 Optical mouse

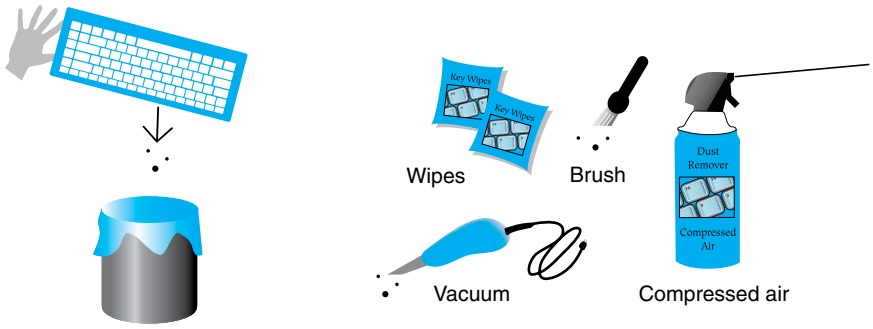
FIGURE 1.21 Keyboard and mouse

Mouse and Keyboard Preventive Maintenance

Mouse cleaning kits are available in computer stores, but normal household supplies also work. Use the following procedures to clean an optical mouse:

- Wipe the bottom with a damp, lint-free cloth.
- Use compressed air to clean the optical sensors.

Keyboards also need to be cleaned periodically. Figure 1.22 shows keyboard-cleaning techniques.



1. Turn keyboard upside down and gently shake out debris

2. Clean the keyboard (several options shown)

FIGURE 1.22 Keyboard cleaning techniques

Keyboard/Mouse Troubleshooting

One of the easiest ways to determine whether a keyboard is working is to press the Caps Lock or Num Lock key and watch to see if the keyboard light illuminates. Sometimes an application setting may be causing what appears to be a keyboard problem. Use another application to see if the keyboard is the problem. Keyboards can have LED lights that indicate particular functions. Table 1.3 lists the most common ones. Note that different vendors label the lights in various ways.

TABLE 1.3 Common keyboard lights

Associated toggle key	Keyboard light	Description
Num Lock	Number lock (NUM LOCK)	Toggles the 10-key pad between digits 0 through 9 and various functions, such as HOME, PG UP, PG DOWN, END, and various arrow keys.
Caps Lock	Capital letters lock (CAPS LOCK)	Toggles between all uppercase and lowercase letters.
Scroll Lock	Scroll lock	A rarely used key used to prevent scrolling and use of the arrow keys to progress through information displayed.

TECH TIP

One key doesn't work

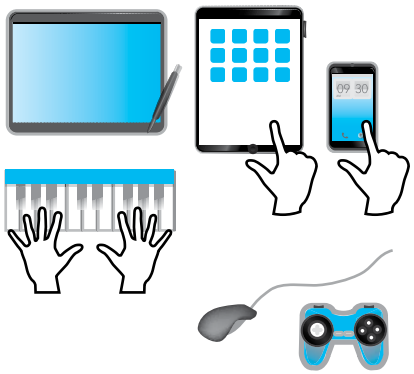
If a particular key is not working properly, remove the key cap. A small, flat-tipped screwdriver can assist with this. After removing the key cap, use compressed air around the sticky or malfunctioning key.

If coffee or another liquid spills into a PC keyboard, all is not lost. Quickly unplug the keyboard and turn it upside down to prevent further damage. Use paper towels to absorb as much liquid as you can. Afterward, the keyboard can be disassembled and/or scrubbed with lint-free swabs or cloths. However, PC keyboards and mice are normally considered throw-away technology. It is cheaper to get a new one than to spend a lot of time trying to repair it.

Common Peripherals

Many devices connect to a computer to provide input, such as a mouse, drawing pad, or keyboard, or output, such as a display. Some devices can be both input and output devices, such as smart TVs, Musical Instrument Digital Interface- (MIDI-) enabled devices (which are electronic musical devices), touch screens, or printers. In the case of a printer, data is sent from a computer to the printer, and the printer can send data (information), such as an out-of-ink message, back to the computer. Figure 1.23 shows some common input and output devices.

Input Devices



Mouse, Keyboard, Digital Pen, Digital Tablet, Finger, Signature, Pad, Touch Screen, Track Pad, Touchpad, Trackball, Track Stick, Stylus, Barcode Reader, Digitizer, Game Pad/Console, Joystick, Scanner, Camera

Output Devices

Printer, Speakers, Display Devices

FIGURE 1.23 Input and output devices

Table 1.4 lists various peripherals that you will see used and attached to computers today. We will be examining some of these devices in more depth and learn how to configure them in later chapters, but this chapter gives you the basics.

TABLE 1.4 Common peripherals

Peripheral	Description
Printer	An output device that transfers information such as text and graphics from a computer onto paper or other media (see Figure 1.24).
Flatbed scanner	An input device that digitizes words or graphics and can be used as a copier. A scanner (see Figure 1.24) may have an automatic document feeder (**ADF**) that allows one or more documents to be fed into the scanner.
All-in-one printer	A device, sometimes known as a multifunction printer, that has printer, scanner, copier, and sometimes fax capabilities (see Figure 1.24).
Camera/webcam	An input device used to provide live video feed, such as when you participate in a video conference, or capture video images or motion (see Figure 1.25). More information can be found in Chapter 8, "Video and Multimedia Devices."
Microphone	An input device used to capture sound (see Figure 1.25). More information can be found in Chapter 8.
Headset	An input/output device that commonly has a microphone and headphones, as shown in Figure 1.25.

Printer

Scanner

All-in-one printer

FIGURE 1.24 Printer, scanner, and all-in-one printer

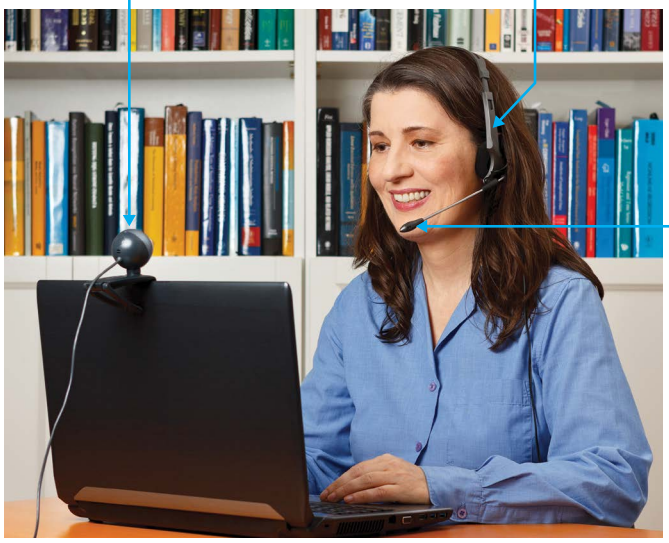


FIGURE 1.25 Camera/webcam, headset, and microphone

1s and 0s

Computers are digital devices. That means they understand 1s and 0s. One 1 or one 0 is known as a **bit**. In actuality, a 1 is simply a voltage level. So, when we type characters into a word processing application, the keyboard translates those characters into voltage levels. Figure 1.26 illustrates this concept. Notice that each letter is represented by a combination of eight 1s and 0s. Each 1 is a voltage level sent to the motherboard (and components on it). Each 0 is simply the absence of a voltage level.

		D	E	A	R	[space]	M	O	M
What we see		01000100	01000101	01000001	01010010	00100000	01001101	01010010	01001101
What a computer sees									

FIGURE 1.26 Binary bits

Technicians need to be able to describe capacities such as hard drive capacities and available drive space. Eight bits grouped together are a **byte**. Figure 1.27 shows a hot dog divided into eight sections (which make a big old "byte").

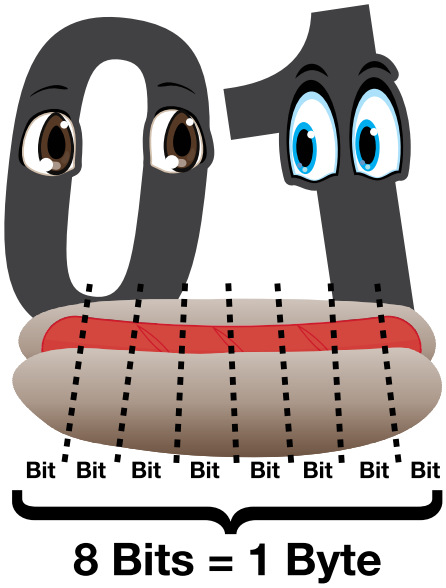


FIGURE 1.27 A byte

Approximately 1,000 bytes is a **kilobyte** (kB), as shown in Figure 1.28. 1 kB is 1,024 bytes to be exact, but industry folks simply round off the number to the nearest thousand for ease of calculation. Approximately 1 million bytes is a **megabyte** (MB), but a true megabyte is 1,048,576 bytes. 540 megabytes is abbreviated as 540 MB, or 540 M. Notice in Figure 1.28 that a megabyte stores a lot more 1s and 0s than a kilobyte.

Approximately 1 billion bytes (1,073,741,824 bytes) is a **gigabyte** (GB), which is shown as 1 GB or 1 G. Approximately 1 trillion bytes (1,099,511,627,776 bytes) is a **terabyte**, which is shown as 1 TB or 1 T. Figure 1.28 shows how storage capacities get larger.

FIGURE 1.28 A kilobyte, megabyte, gigabyte, and terabyte illustrated

When information needs to be expressed exactly, binary prefixes are used. For example, when describing the value 2^{10} (1,024), instead of saying this it is 1 kilobyte, which people tend to think of as approximately 1,000 bytes, the term kibibyte (KiB) is used. When describing the value 2^{20}, or 1,048,576, the term mebibyte (MiB) is used. Table 1.5 shows the terms used with computer storage capacity and binary prefixes when exact measurements are needed.

TABLE 1.5 Storage terms and binary prefixes

Term	Abbreviation	Description
Kilobyte/kibibyte	kB/KiB	~1 thousand bytes/2^{10} bytes
Megabyte/mebibyte	MB/MiB	~1 million bytes/2^{20} bytes
Gigabyte/gibibyte	GB/GiB	~1 billion bytes/2^{30} bytes
Terabyte/tebibyte	TB/TiB	~1 trillion bytes/2^{40} bytes
Petabyte/pebibyte	PB/PiB	~1,000 trillion bytes/2^{50} bytes
Exabyte/exbibyte	EB/EiB	~1 quintillion bytes/2^{60} bytes
Zettabyte/zebibyte	ZB/ZiB	~1,000 exabytes/2^{70} bytes
Yottabyte/yobibyte	YB/YiB	~1 million exabytes/2^{80} bytes

Frequencies are also important measurements in computers because people want to know how fast their computers, processors, memory, and other parts are operating. Frequencies are shown in similar measurements, but instead of bits (b) or bytes (B), speeds are shown in hertz (Hz). A hertz is a measurement of cycles per second. Something that operates at approximately 1 million cycles per second is said to operate at 1 megahertz (1 MHz). For 1 billion cycles per second, the measurement is known as 1 gigahertz, or 1 GHz. Transfer speeds are commonly shown in bits per second, such as gigabits per second, or Gb/s, or bytes per second, such as in megabytes per second, or MB/s. Notice the capital letter B to indicate bytes as compared to the lowercase b to indicate bits. These measurements are used in a lot of IT-related hardware and software.

Safety Notes

Safety is covered in most chapters, especially in Chapter 5, but no book on computer repair can begin without stating that both the technician and the computer can be harmed by poor safety habits. Before beginning any PC service, remove jewelry. To protect yourself and the computer, make sure to power off the computer and remove the power cord when disassembling, installing, or removing hardware or when doing preventive maintenance (cleaning).

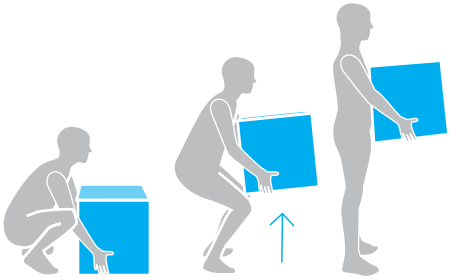
TECH TIP

Some things should be left alone

Never take apart computer parts such as a power supply unless you have had specific training.

Technicians can also be harmed when doing menial tasks such as lifting a computer or heavy laser printer. Lifting is a common requirement listed in IT job advertisements or explained during interviews. Technical jobs frequently specify a maximum lifting requirement of 40 to 50 pounds. Use proper safety precautions, such as those shown in Figure 1.29. The type of equipment you need and things you can do to prevent harm to the computer are covered more explicitly in Chapter 5, on power and disassembly.

Remove jewelry
before working
inside of a computer



- Bend at the knees
- Use your legs to lift
- Use lifting aids when possible
- Ask for assistance when possible

FIGURE 1.29 Safety tips

Chapter Summary

- Many IT roles require detailed knowledge of PC hardware and software.
- Computer technicians should actively listen, have a positive attitude, and use logic when solving problems.
- The CompTIA A+ certification requires two exams: Core 1 (220-1201) and Core 2 (220-1202). Many people break into the IT field with this certification.
- IT staff must be proficient at searching for information on the internet, capturing files, and documenting technical information.
- Computers consist of hardware (the physical parts) and software (the operating system and applications).
- A technician needs to be able to identify important computer parts installed in a computer and as standalone parts: case, keyboard, mouse, motherboard, display, power supply, hard drive, optical drive, adapter, and memory.
- A technician needs to know the purposes of common peripherals used in the industry: printer, flatbed scanner with ADF, camera/webcam, microphone, and headset.
- Mice and keyboards are important input devices. To clean a keyboard, turn it over to remove debris and then use a vacuum, compressed air, and wipes as needed.
- Safety is important when working on a computer. Before working inside a computer, power it down and remove the power cord.
- Use proper lifting techniques when servicing equipment and remove jewelry before working inside a computer.

A+ CERTIFICATION EXAM TIPS

- ✓ Familiarize yourself with the acronyms at the end of the official CompTIA A+ exam objectives document. You can expect the exam to use these acronyms without defining them.
- ✓ Ensure that you are knowledgeable about and proficient with all the terms and technologies listed in the official CompTIA A+ exam objectives. Some students study for a particular exam by going through the objectives one by one and reviewing the material as they go through.
- ✓ Ensure that you can identify the basic parts of a computer and explain the purpose of each one. Ensure that you know the following parts: hard drive, optical drive, power supply, motherboard, and RAM.
- ✓ Become familiar with the following common pieces of hardware before you get to the chapters that go into the details of installing, configuring, and troubleshooting them: printer, flatbed scanner, ADF, display, optical drive, mouse, keyboard, trackpad, drawing pad, camera/webcam, microphone, speakers, and headset.
- ✓ Know the following safety procedures: disconnecting power and using proper lifting techniques.
- ✓ Ensure that you know what open-ended questions are.

Key Terms

active listening skills, adapter, ADF, bit, byte, camera, clarify customer statements, device driver, display, expansion slot, flatbed scanner, gigabyte, hard drive, hardware, headset, keyboard, kilobyte, megabyte, memory, microphone, motherboard, mouse, open-ended question, operating system, optical drive, PC, power supply, printer, RAM, software, terabyte, webcam

Review Questions

1. Match each part to the appropriate description.

____ motherboard	a. Converts AC to DC.
____ RAM	b. Holds the most data.
____ DVD drive	c. Has the most electronics.
____ hard drive	d. Fits in an expansion slot.
____ adapter	e. Contents disappear when power is off.
____ power supply	f. Holds a disc.

2. A technician has been asked to provide support to an administrative assistant who is participating in a video conference session. Which peripheral would be used in the conference more so than in normal daily operational tasks?

[mouse | webcam | all-in-one printer | hard drive]

3. Which of the following are important suggested internet search tips? (Choose two.)

a. Try another search engine if the first one does not provide satisfactory results.

b. Use as many common words—such as the, in, at, or for—as possible.

c. Put quotation marks around two or more words that might be found consecutively in output.

d. Use as few words as possible.

e. Avoid using the name of the equipment manufacturer.

4. What is the acronym used to describe memory that is commonly found on a motherboard?

_____

5. When lifting a heavy computer, you should squat, bend at the knees, and use your legs to lift. [T | F]

6. How many tests must a person take in order to be A+ certified?

[0 | 1 | 2 | 3 | 4]

7. Is the following question open ended or closed ended? "You say your computer has been running slowly since Monday. Which applications have you installed this week?" [open ended | closed ended]

8. List one example of having a positive attitude.

_____

9. Which of the following devices are common output devices? (Choose all that apply.)

[digital piano | speakers | display | stylus | track stick | barcode reader | printer]

10. People who work with computers might be expected to lift up to how many pounds?

[10 to 20 | 20 to 30 | 30 to 40 | 40 to 50]

11. Which Microsoft Windows application could be used to create a text file?

[Textpad | Notepad | WriteIt | NoteIt]

12. Which Windows tool can be used to make a screenshot?

[Notepad | Bluetooth | Microsoft Edge | Snip & Sketch]

13. Rewrite the following so that it includes an open-ended question.

Technician: Good morning. I have a service log that states you are getting an error message whenever you access a PDF file. Have you done your Acrobat updates lately?

_____

14. List one procedure you would try to fix an erratic optical mouse.

_____

_____

15. Match the capacity to the description.

____ bit	a. 8 bits
____ kilobyte	b. a 1 or a 0
____ megabyte	c. approximately 1,000 bytes
____ byte	d. approximately 1 million bytes
____ gigabyte	e. approximately 1 trillion bytes
____ terabyte	f. approximately 1 billion bytes

16. Match the device to the description. Note that each description will best fit only one answer.

____ flatbed scanner	a. Could have an ADF
____ adapter	b. Used to feed multiple sheets of paper one page at a time
____ ADF	c. Used to capture video
____ power supply	d. Inserts into an expansion slot
____ webcam	e. Converts AC to DC

17. What is a feature of an optical mouse?

a. LED

b. contacts

c. volatility

d. electrical conversion

18. Which device is normally found inside a computer?

[ADF | printer | headset | hard drive]

19. Which device normally can be seen if looking inside a desktop computer with the cover off and when normally looking at the front of a desktop computer?

[hard drive | motherboard | optical drive | RAM]

20. Where can you find the motherboard in a tower computer?

a. inside the power supply

b. on the side of the case

c. below the hard drive

d. beside the RAM

Exercises

Exercise 1.1 Identifying Tower Computer Parts

Objective: To identify various computer parts correctly

Procedure: Identify each computer part in Figure 1.30. Match the part to the number in Figure 1.31.

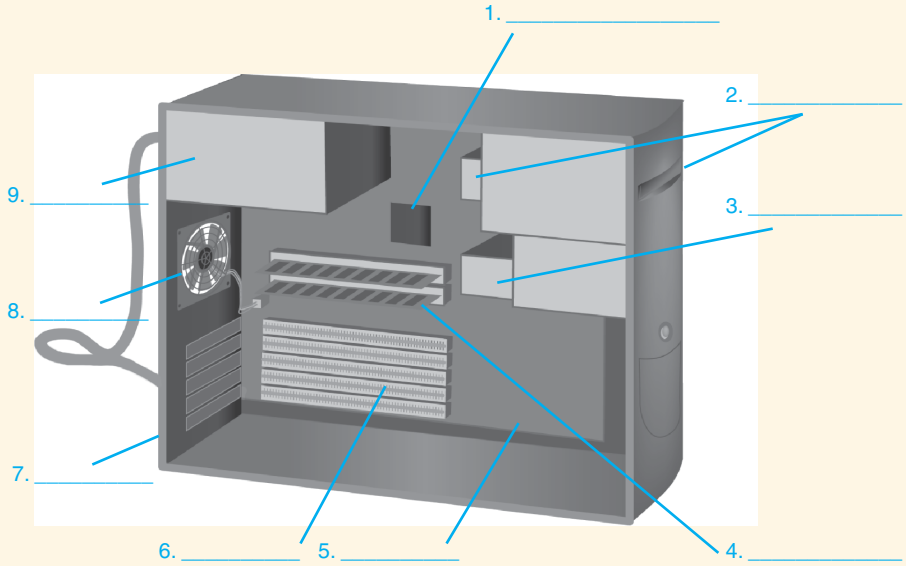


FIGURE 1.30 Tower computer parts identification

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____

FIGURE 1.31 Second tower computer parts identification

1. _____	**a.**	motherboard
2. _____	**b.**	RAM
3. _____	**c.**	power supply
4. _____	**d.**	case fan
5. _____	**e.**	adapter
6. _____	**f.**	optical drive
7. _____	**g.**	case

Exercise 1.2 Identifying Computer Parts

Objective: To identify various computer parts correctly

Procedure: Identify each computer part in Figure 1.32.

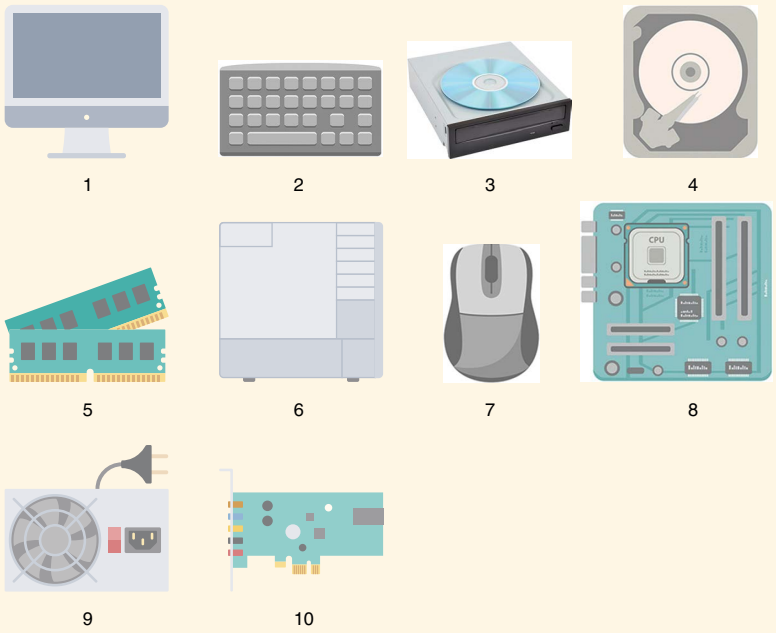


FIGURE 1.32 Computer parts identification

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____

Activities

Internet Discovery

Objective: To obtain specific information from the internet regarding a computer or its associated parts

Parts: Computer with internet access

Procedure: Using the internet, locate technical information about a computer. Answer the following questions based on the retrieved information. Note that you may need to open more than one document in order to answer the questions.

Questions:

1. What is the name of the computer for which you found technical information?

_____

2. How much RAM comes with the computer?'

_____

3. Which URL did you use to find this information?

_____

4. Which search term(s) would you use for the following scenario? An HP Windows 10 computer has a Samsung ML-2160 laser printer attached. This printer supports both wired and wireless printing. The computer that is wired to the printer can print just fine, but no wireless devices in the house can access or even see the printer.

_____

_____

_____

5. Which search term(s) would you use in a search engine to help a friend who has accidentally deleted a file on a Windows 10 computer?

_____

6. Which search terms would you use to find a video that shows you how to add an application to a Windows 10 desktop computer?

_____

Soft Skills

Objective: To enhance and fine-tune a future technician's ability to listen, communicate in both written and oral forms, and support people who use computers in a professional manner

Procedure:

1. In a team environment, list three qualities that are important in a computer technician. Create scenarios that demonstrate these qualities. Share these findings with the class in a clear and concise way.
2. In a team environment, list three qualities that are not good practices for computer technicians. Create scenarios that demonstrate these qualities. Share these findings with the class in a clear and concise way.

Critical Thinking Skills

Objective: To analyze and evaluate information as well as apply learned information to new or different situations

Procedure:

1. Find an advertisement for a computer in a local computer flyer, in a newspaper, in a magazine, in a book, or on the internet. List the components you know in one column and the components you do not know in another column. Select one component you do not know and research that component. On a separate piece of paper, write a description of the component, based on your research, and then share it with at least one other person. Write the name of the person with whom you shared.
2. Why do you think that many computer components are considered "throw-away" technology? List your reasoning. In groups of three or four, share your thoughts. Nominate a spokesperson to share your group reaction in two sentences or less.
3. One device touts a transfer speed of 1 Gb/s, whereas another device advertises 100 MB/s. Compare the two devices' transfer speeds and indicate which one is faster. For a hardware component you have or would like to have, find various products on the internet. Compare the products, paying particular attention to the transfer speed. Document your findings.

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