CompTIA A Guide to IT Technical Support 10th edition Andrews Solutions Manual

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Solutions for Chapter 1: Taking a Computer Apart and Putting It Back Together

A+ Guide to IT Technical Support (Comprehensive, 10th Edition), ISBN 978-0357108291

[EOC A HD] Thinking Critically

1. You purchase a new desktop computer that does not have wireless capability, and then you decide that you want to use a wireless connection to the Internet. What are the two least expensive ways (*choose two*) to upgrade your system to wireless?
   a. Trade in the computer for another computer that has wireless installed.
   b. Purchase a second computer that has wireless capability.
   c. Purchase a wireless expansion card and install it in your system.
   d. Purchase a USB wireless adapter and connect it to the computer by way of a USB port.

Answers:

c. Purchase a wireless expansion card and install it in your system.

d. Purchase a USB wireless adapter and connect it to the computer by way of a USB port.

2. What type of computer is likely to use SO-DIMMs, have an internal power supply, and use a desktop processor socket?

Answer: An all-in-one computer.

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3. When troubleshooting a computer hardware problem, which tool might help with each of the following problems?

   a. You suspect the network port on a computer is not functioning.

   b. The system fails at the beginning of the boot and nothing appears on the screen.

   c. A hard drive is not working and you suspect the Molex power connector from the power supply might be the source of the problem.

Answers:

a. Loopback plug

b. POST diagnostic card

c. Multimeter

4. You disassemble and reassemble a desktop computer. When you first turn it on, you see no lights and hear no sounds. Nothing appears on the monitor screen. What is the most likely cause of the problem? Explain your answer.

   a. A memory module is not seated properly in a memory slot.

   b. You forgot to plug in the monitor's external power cord.

   c. A wire in the case is obstructing a fan.

   d. Power cords to the motherboard are not connected.

Answer: d. Power cords to the motherboard are not connected. All the other answers would still cause the system to start the boot, even though it might fail. If the motherboard is not getting power, it will not start the boot.

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5. You are looking to buy a laptop on a budget that requires you to service and repair the laptop yourself, and you want to save money by not purchasing an extended service agreement beyond the first year. To limit your search, what should you consider when choosing manufacturers? Which manufacturers would you choose and why?

Answer: You want to be able to maintain and repair the laptop on your own after the warranty expires. You will need access to documentation and new parts. Consider that two manufacturers, Lenovo and Dell, provide their service manuals online free of charge. They also provide documentation about how their laptops are disassembled and options to purchase proprietary parts without first being an authorized service center.

6. A four-year-old laptop will not boot and presents error messages on screen. You have verified with the laptop technical support that these error messages indicate the motherboard has failed and needs replacing. What is the order of steps you should take to prepare for the repair?

    a. Ask yourself if replacing the motherboard will cost more than purchasing a new laptop.

    b. Find a replacement motherboard.

    c. Find the service manual to show you how to replace the motherboard.

    d. Ask yourself if the laptop is still under warranty.

Answers: The correct order of steps to take is d., a., c., and b.

7. Why are laptops usually more expensive than desktop computers with comparable power and features?

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Answer: Laptops use compact hard drives that can withstand movement even during operation, and small memory modules and CPUs that require less voltage than regular components. In general, it costs more to make similar components that take up less space and require less power.

8. When a laptop internal device fails, what three options can you use to deal with the problem?

Answers:

Return the laptop to a service center for repair.

Substitute an external component for the internal component.

Replace the internal component.

9. A friend was just promoted to a new job that requires part-time travel, and he has also been promised a new laptop after his first month with the company. He needs an easy way to disconnect and reconnect all his peripheral devices to his old laptop. Devices include two external monitors (one HDMI, one DVI), a USB wireless mouse, USB wireless keyboard, Ethernet network, USB printer, headphones, and microphone. He has a budget of $100. What kind of device would best suit his needs? Why? Research online to find a recommendation for a device that will work best for him. What is your recommendation and why?

Answer: A port replicator is most likely to best suit his needs because most docking stations are outside his budget, and a port replicator will not require him to purchase a second device once his laptop is upgraded. The recommended port replicator needs to include, at minimum, ports for: 1 × HDMI, 1 × DVI, 3 × USB, 1 × RJ-45, and 2 × audio (audio output and mic).

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10. Your laptop LCD panel is blank when you boot up. You can hear the laptop turn on, and the keyboard backlight is on. You have checked the brightness using the function keys, and that is not the problem. What is an easy next step to determine if the LCD panel has failed? Describe how that next step can also help if the LCD panel has failed, but the replacement components won't arrive for a week and you still need to use your laptop.

Answer: Connect an external monitor to a video port on the laptop. If the screen works, you can use this temporary solution until replacement components arrive.

11. A foreign exchange student brought his desktop computer from his home in Europe to the United States. He brought a power adapter so that the power cord would plug into the power outlet. He tried turning on his computer, but it wouldn't power on. What is likely the problem? What should you warn him about when he returns home at the end of the year?

Answer: The voltage switch needs to be moved from 220 V, which is used in Europe, to 115 V, which is used in the United States. Warn him that when he takes his computer back home, he should move the switch before plugging in his computer. Otherwise, his computer will likely be "fried" because it will be receiving more voltage than the setting allows.

12. You're building a new desktop computer from parts you picked out and purchased. You invested a good deal of money in this computer and want to be sure to protect your investment while you assemble it. What precautions should you take to protect your computer from damage and electrostatic discharge?

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Answer: Remove loose jewelry, wear an ESD strap, don't touch sensitive parts on components, handle them by the edges, and use appropriate tools.

13. Your friend asks for your help because her laptop screen is too dim to read anything. What is the first step you should take to fix the problem?

Answer: Use the function keys to make sure the screen brightness is set high enough.

14. Your boss asks you to give a presentation and you need to use a projector to show a slideshow. What are the steps to display the slideshow on both your laptop and the projector simultaneously?

Answer: Connect the projector using one of the video ports on your laptop. Use the function keys to toggle to the dual screen function for presentation.

15. After troubleshooting a problem, you decide that the wireless card has failed in a laptop. What do you do first before you disassemble the laptop?

Answer: Research teardown instructions specific to this laptop. Resources might include the user manual, manufacturer's website, or online videos.

[EOC A HD] Hands-On Projects

Answers will vary.

[EOC A HD] Real Problems, Real Solutions

Answers will vary.

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Lab Manual for A+ Guide to IT Technical Support **(Comprehensive, 10th Edition), ISBN xxx-xxxxxxxxxx**

[A HD] Lab 1.1 Record Your Work and Make Deliverables

[B HD] *Review Questions*

1. What are the eight categories in the Category view in Control Panel?

Answer: System and Security; Network and Internet; Hardware and Sound; Programs; User Accounts and Family Safety; Appearance and Personalization; Clock, Language, and Region; Ease of Access

2. What are the four file types that can be used to save a snip using the Windows Snipping Tool?

Answer: PNG, GIF, JPG, and MHT

3. What is the purpose of the Win+S keystroke shortcut in Windows 10?

Answer: In Windows 10, the shortcut opens Cortana, the search feature of Windows 10.

4. Search the web for information about the price of Windows 10. How much would it cost to buy your current edition (such as Home, Professional, etc.) of the Windows 10 operating system as an upgrade from Windows 8?

Answer: $69 to $130 for an upgrade, depending on the edition

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[A HD] Lab 1.2 Gather And Record System Information

[B HD] *Review Questions*

1. List two categories available in Control Panel that were not mentioned in the lab:

Answer: Answers may include:

- Hardware and Sound
- Clock, Language, and Region
- Ease of Access

2. (Windows 7 only) Based on the Windows Experience Index, what component of your computer would you upgrade first? Why?

Answer: Answers may vary based on student experience and might include the processor, RAM, graphics card, or hard drive.

3. Based on what you found while taking inventory of your computer's system, what maintenance does this computer currently need?

Answer: Answers may vary based on student experience and might include a backup, malware scan, OS updates, securing a network, or software updates.

4. Besides the Computer Inventory and Maintenance form, what other documentation should you keep on each computer? How might you store that information?

Answer: Any documentation that came with the computer, any product guides printed from the web, and any receipts from purchases related to the computer should be kept together near the computer itself, perhaps in a manila envelope or notebook.

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5. What differences, if any, are there between a list of components derived from a physical inspection and a list of components derived from Control Panel and System Properties?

Answer: The lists could differ substantially because of such things as BIOS/UEFI upgrades, non-brand-name components, drive partitioning, or components disabled in BIOS/UEFI.

6. Why is it important for IT technicians to keep documentation on computers for which they are responsible?

Answer: Answers may vary depending on student experiences. Documentation can be useful when a computer is lost or stolen, the hard drive has failed, Windows becomes corrupted, or other problems arise. A user might accidentally change a setting or forget a password.

[A HD] Lab 1.3 Identify Computer Parts

[B HD] *Review Questions*

1. How did you decide which expansion card was the video card?

Answer: This answer is dependent on student research and experience. The ports on the rear of an expansion card are generally used to identify the purpose of the card.

2. How did you identify the type of CPU you have?

Answer: This answer is dependent on student research and experience.

3. Does your system have much room for adding new components? What types of expansion slots are available for adding new cards?

Answer: This answer is dependent on student research and experience.

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4. Is there space for upgrading the RAM? If there isn't, what could you do instead to upgrade?

Answer: This answer is dependent on student research and experience. An old smaller module can be replaced by a new module that holds more RAM.

5. Where (specifically) would you go on the Internet to download a PDF of the motherboard manual or system manual? What information would you need to identify which manual to download?

Answer: Answers may vary but will most likely include the manufacturer's website. The motherboard's make and model number are required, although some systems can also be identified by a unique service tag.

[A HD] Lab 1.4 Identify Form Factors

[B HD] *Review Questions*

1. Why is it important that your case and motherboard share a compatible form factor?

Answer: It allows the components to fit together and function properly.

2. When might you want to use a slimline form factor?

Answer: You might want to use it when a thinner profile is required, such as with a media center under a TV.

3. What advantages does ATX have over microATX?

Answer: Answers can include more expansion slots and better heat dissipation.

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4. What are two operating systems that can be installed in systems using a Mini-ITX motherboard?

Answer: Mini-ITX motherboards can support either Microsoft or Linux operating systems.

5. Is it possible to determine the form factor without opening the case?

Answer: Yes, the form factor can usually be determined by the shape of the case.

[A HD] Lab 1.5 Take a Computer Apart and Put It Back Together

[B HD] *Review Questions*

1. When removing the cover, why should you take care to remove only the screws that hold the cover on?

Answer: The power supply retention screws are often accessible from the outside of the case; if they are removed from the power supply, the screws could damage other components by falling on them.

2. How should you rock a card to remove it from its slot? Why is it important to know how to rock a card correctly?

Answer: Rock the card lengthwise. If you rock the wrong way, you could damage the card or slot.

3. What should you do to help you remember which components connect to which cables?

Answer: Take notes, make a sketch, take a photo, attach labels, and so forth.

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4. What marking on a ribbon cable identifies pin 1?

Answer: A colored stripe on one side of the cable identifies pin 1.

5. What component(s) defines the system's form factor?

Answer: Answers may vary and might include the power supply, the backplate, the spacing of the mounts for the motherboard, the size of the motherboard, and the position of the expansion slots in relation to the CPU.

6. What form factor does your computer use?

Answer: The answer is based on the actual system being used.

7. Why would an IT technician ever have to change out a computer's motherboard?

Answer: The motherboard might need replacing if it becomes damaged, such as when a trace on the board or a chip is damaged. Also, the board might need replacing when the CPU is upgraded or additional features are needed. For example, the motherboard could be upgraded to support DDR4 memory.

[A HD] Lab 1.6: Investigate Computer Teardown Procedures

[B HD] *Review Questions*

1. What are three notable characteristics of the system shown in the first video you selected? For example, was this an older or newer system? How can you tell? Who is the manufacturer of the system, the case, and/or the components? What drives or other optional components were included in the system?

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Answer: Answers will vary, depending on student experience.

2. What tools did the technician use in each video? What additional tools would you recommend having on hand to take apart and reassemble a computer?

Answer: Answers will vary, depending on student experience. Possible tools include a screwdriver, ESD strap, tweezers, pliers, a multimeter, zip ties, and a flashlight.

3. Which two components of a computer should be treated as "black boxes" and not opened without specialized training?

Answer: The power supply and the monitor

4. What are two methods for keeping track of screws during disassembly so that reassembly goes more smoothly?

Answer: Answers may vary. Two possible answers include:

- Keep screws and spacers in small cups or a tray.
- Tape screws to a piece of paper and label them on the paper.

[A HD] Lab 1.7 Compare Laptops and Desktops

[B HD] *Review Questions*

1. What are the two most important criteria when deciding which computer to buy?

Answer: How the computer will be used and the price

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2. Why do laptop computers cost more than desktop computers?

Answer: Laptop components must be small and weigh less, yet they must have the same power as desktop components. Laptop components must also be durable enough to withstand movement and jostling while the computer is in use.

3. List three reasons why it is easier to upgrade a desktop computer than a laptop computer.

Answer: Answers may vary and might include:

- Because the desktop has more room in the case for expansion
- Because desktop components are not proprietary, as are many laptop components
- Because disassembling a laptop is more difficult than disassembling a desktop computer

4. Other than price, what factors might someone consider when deciding whether to buy a Windows laptop or a macOS laptop?

Answer: Answers may vary and might include:

- Applications software availability
- User experience
- Ease of sharing data files with users of other computers

5. In this lab, was it easier comparing a desktop computer to a laptop, or comparing a Windows laptop to a macOS laptop? Explain your answer.

Answer: Answers will vary depending on student experience.

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Chapter 1

Taking a Computer Apart and Putting It Back Together

At a Glance

Instructor's Manual Table of Contents

- Overview
- Objectives
- Teaching Tips
- Quick Quizzes
- Class Discussion Topics
- Additional Projects
- Additional Resources
- Key Terms

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Lecture Notes

Overview

This chapter serves as an introduction to the basic hardware components in a computer. Students will learn how to identify various hardware components inside desktop computers as well the tools they will need to work inside the case. Later in the text, students will learn how to work inside of a desktop and a laptop computer and how different components are removed or replaced in a case.

Objectives

After completing this chapter, students will be able to:

- Disassemble and reassemble a desktop computer safely while being able to identify various external ports and major components inside a desktop and describe how they connect together and are compatible. You'll be able to identify various tools you will need as a computer hardware technician.
- Disassemble and reassemble a laptop computer safely while being able to identify various external ports and slots and major internal components of a laptop. You will know what special concerns need to be considered when supporting and maintaining laptops.

Teaching Tips

Exploring A Desktop Computer

1. Encourage students that as they work through this chapter, they should follow all the safety precautions found in Appendix A, "Safety Procedures and Environmental Concerns."

Step 1: Planning and Organizing Your Work and Gathering Your Tools

1. Discuss basic tips and best practices in planning and ensuring that work inside a case is performed safely.

2. Define how Electrostatic discharge (ESD), or static electricity, occurs and can damage electrical components in a computer.

3. Demonstrate how to use a ground bracelet or ESD strap to ensure that electrical components are not damaged when worked on.

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4. Discuss the list of essential tools of a computer hardware technician:
    - An ESD strap
    - Flathead screwdriver
    - Phillips-head or crosshead screwdriver
    - Torx screwdriver set
    - Tweezers
    - Software (recovery CD or DVD)

5. Also discuss the list of tools that might not be essential, but may be convenient to have on hand.

6. Point out the importance of keeping software discs used for troubleshooting inside a hard plastic case to protect them from scratches and dents.

Step 2: Opening the Case

1. Introduce the different kinds of cases typically available, the tower case, the desktop case, an all-in-one case, and a mobile case.

2. Review Table 1-1, which lists ports you might find on a desktop or mobile computer.

3. Describe how a loopback plug can be used to test a network cable or port. Note that USB loopback plugs exist also.

4. Stress the importance of performing backups of critical data on a system prior to working on its components.

5. Give students information on how to properly prepare a computer for maintenance, and provide information on how cases are typically opened.

6. Provide instruction on additional pieces of the case that may need to be removed in order to gain access to internal components.

7. Note that students can clip a ground bracelet onto the side of a metal case to ensure safe handling of components.

Teaching Tip	In really complex systems, taking a picture of the internal parts prior to working inside a case can be helpful in troubleshooting connections later. Smartphone cameras allow for a bit more maneuverability inside of a computer case for this purpose.

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8. Use Figure 1-12 to locate and identify components within a PC, and note where to find the processor, RAM, and power supply. Students should be aware of how to identify a hard drive or disc drive.

9. Define the following internal components and discuss how each is used once they have been identified:
    a. Motherboard, central processing unit (CPU), and cooler (heat sink)
    b. Expansion cards
    c. Memory modules
    d. Hard drives
    e. Power supply

10. Explain how form factors help ensure that components will fit within a computer case, and that power requirements will be met properly.

11. Define the Advanced Technology Extended, or ATX form factor, and demonstrate how to identify the various power connectors common for the ATX form factor:
    a. 4-pin and 8 pin auxiliary connectors
    b. 24-pin or 20+4-pin P1 connector
    c. 6-pin and 8-pin PCIe connectors

12. Explain the microATX (MATX) form factor as a reduced size variation of the ATX form factor, and discuss the differences between these two standards.

Teaching Tip	Many different form factors exist, all with different intended uses. MiniITX motherboards, for example, are designed to be extremely low power, and are typically used in small form factor computers.

Step 3: Removing Expansion Cards

1. Discuss techniques for keeping track of cable connections and placement of parts within a computer case, such as using diagrams.

2. Cover steps required to remove expansion cards from a computer, such as removing screws that hold the card in place. Use Figures 1-28 and 1-29 in your discussion.

Step 4: Removing the Motherboard

1. Detail how to remove a motherboard from a case, and note what cables must be removed, such as the front panel connectors. Explain the role of spacers or standoffs in keeping the motherboard from contacting the metal case and shorting circuits.

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2. Explain that a POST diagnostic card (POST card) can be of help in discovering and reporting computer errors and conflicts that occur after you first turn on a computer.

3. Explain how the BIOS (basic input / output system) and UEFI (Unified Extensible Firmware Interface) stores system settings such as system time and motherboard configuration settings in firmware on the motherboard.

4. Discuss the power-on self-test (POST) process in testing critical hardware components for proper functionality, and explain how a POST card can help a technician determine why a POST test fails.

Step 5: Removing the Power Supply

1. Show how to remove the power supply from a case, noting where screws that hold the power supply in place are typically located.

2. Describe how a power supply tester can be used to help determine if a power supply is providing the proper power to electrical components.

3. Demonstrate how to use a multimeter to test electrical circuits, such as by determining continuity and voltages present.

Step 6: Removing the Drives

1. Point out that a computer might have one or more hard drives, an optical drive, or some other type of drive. Mention that most hard drives and optical drives today use the serial ATA (SATA) standard.

2. Demonstrate how to remove drives from the case, and show the removal of screws that keep drives in place. Point out that some cases have a removable bay for smaller hard drives. Use Figures 1-40 through 1-44 in your discussion.

Steps to put a Computer Back Together

1. Explain the optimal order in which components should be installed into the case, starting with power supply, drives, motherboard, and cards. Note that this order may differ depending on the case involved.

2. Show how a motherboard should line up with the IO shield on the back of the case.

3. Discuss what power cables should be connected to the motherboard. Students should be aware that a system will always need the main P1 power connector and most likely will need the 4-pin or 8-pin auxiliary connector for the processor.

4. Elaborate on what additional power requirements a motherboard might have, such as Molex and SATA power connectors.

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5. The front panel connectors and their respective contact points on the motherboard can usually be identified by markings around the pins on the motherboard. List some of the common connectors:
    a. Power SW
    b. HDD LED
    c. Power LED+
    d. Power LED-
    e. Reset SW

6. Motherboard documentation should be discussed as a way of identifying pins and ports on the motherboard.

7. Explain how to connect ports that exist on the front of the PC (such as USB or sound) to the motherboard.

8. Discuss the installation of a video card or other expansion cards, and demonstrate how to ensure that a card is seated correctly.

9. List other devices that need to be connected to a computer, such as the monitor, keyboard, and mouse. Show where these devices plug in.

10. Cover some additional troubleshooting steps to take in the event the computer does not power on or work properly.

Quick Quiz 1

1. A processor, or CPU, typically has a fan along with which of the following mounted on top of it to keep it cool?
    A. Power supply
    B. Heat sink
    C. RAM
    D. Transistor

    Answer: B

2. True or False: The microATX is the most commonly used form factor today.
    Answer: False

3. Which electronic component below has a dual voltage selector switch?
    A. Hard drive
    B. Power supply
    C. RAM
    D. Processor

    Answer: B

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4. Select the power connector that is specified by the ATX Version 2.2 standard, which allows more power to the motherboard for PCI Express (PCIe) devices.
   A. 20 pin P1 connector
   B. 8 pin auxiliary connector
   C. 24+4 pin P1 connector
   D. 20+4 or 24 –pin P1 connector

   Answer: D

5. Which of the following is used to keep the motherboard from contacting the case, preventing a short?
   A. Standoffs
   B. Headers
   C. Retention screws
   D. Case screws

   Answer: A

First Look at Laptop Components

1. Discuss the differences between a laptop or notebook, a netbook, and an all-in-one computer. Note what kind of features one might have over the other, and what hardware is typically included.

2. Discuss the different types of ports that are typically found on most laptops.

3. Explain to students that when a laptop is missing a port or slot you need, you can usually use a USB dongle to provide the port or slot. Discuss some of the examples using Figures 1-57 through 1-60.

Special Keys, Buttons, and Input Devices on a Laptop

1. Discuss what settings are often changeable via the keyboard on a laptop, such as volume, keyboard backlight, screen brightness, dual displays, Bluetooth and/or Wi-Fi, media options, and GPS on/off.

2. The touchpad device should be explained as the laptop's primary pointing device, but explain that some people prefer to use a USB wired or wireless mouse instead of the touchpad.

3. Mention that some laptops have a GPS receiver to calculate its position on the earth. Most of these laptops provide a button or function key to turn the GPS on or off.

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Docking Stations and Port Replicators

1. Discuss how a docking port is used to connect to a docking station that can provide additional interfaces to a laptop.

2. Explain that a port replicator (sometimes called a universal docking station) is a device that provides ports to allow a laptop to easily connect to peripheral devices, such as:
    a. External monitor
    b. Network
    c. Printer
    d. Keyboard and mouse
    e. Speaker

3. If possible, demonstrate how to connect to a docking station or port replicator.

Special Consideration when Supporting Laptops

1. Explain the differences between a laptop a desktop. Note what kind of features one might have over the other, and what hardware is typically included.

2. Discuss the costs of repair for laptops to desktop PCs, and note that components such as memory and processors are smaller and differ from their desktop counterparts.

3. Discuss what options for extended warranties on laptops typically exist, and give information on how to determine if equipment is currently under a warranty.

4. List some support websites for various hardware manufacturers. Students should be shown how to access warranty information via some of these websites. Use Table 1-3 in your discussion.

5. Elaborate on how to use service manuals to aid in disassembly and repair of a laptop, and discuss ways of obtaining service manuals.

6. Explain that some laptops may have additional information in the form of videos or user manuals that may aid in disassembly.

7. Encourage students to always check the Support or FAQ pages of the manufacturer's website for help.

8. Provide information on what tools might be provided by the manufacturer for troubleshooting an issue or replaced part, such as PC-Doctor.

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Working Inside a Laptop Computer

1. List some common tools necessary for disassembly of a laptop computer, such as screwdrivers, spudgers, tweezers, and torx screwdrivers.

2. Review steps to take to discharge static electricity prior to working on the internal components of a laptop.

3. Discuss methods of documenting the areas at which screws are removed or components are unattached from the system, either by note pad or digital camera.

4. Emphasize that the service manual is the best piece of documentation to have for a laptop, and will show where various screws are installed.

5. Note that any applied warranties to laptop equipment could be voided if opened.

6. Remind students not to use force when working with laptop components.

7. Point out that some laptops use ZIF connectors. Demonstrate how to disconnect a cable from a ZIF connector or use Figure 1-76 in your discussion.

8. Disassemble the laptop by removing each field replaceable unit (FRU) in the order given by the service manual for the laptop. Stress the importance of following the steps to remove each component in the right order.

9. Discuss the general tips students should follow when reassembling a laptop:
    - Reassemble the laptop in the reverse order of the way it was disassembled.
    - Tighten, but do not over tighten, all screws.
    - Verify there are no loose parts inside the laptop before installing the battery or AC adapter.

Teaching Tip	Many popular laptops will have disassembly videos on YouTube. Always check online resources first if you can't find a service manual for working on the laptop.

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Exploring Laptop Internal Components

1. Discuss the following components student will likely be instructed to remove when disassembling a laptop:
   - Remove or disable the battery pack
   - Remove the hard drive
   - Remove memory
   - Remove the wireless card
   - Remove the optical drive
   - Crack the case
   - Remove the keyboard bezel
   - Remove the system board
   - Remove the CPU, heat sink, and fan

Exploring Inside an All-in-One Computer

1. Explain that an all-in-one may have some components that are meant for notebook computers and others that are meant for desktops.

2. Demonstrate how students might remove internal components such as the hard drive or optical drive.

3. Stress the importance of having a service manual for working inside of an all-in-one computer, and give a basic overview of how to gain access to the internal components of a typical all-in-one computer.

Maintaining Laptops

1. Stress that laptops and mobile devices usually do not last as long as desktop computers and are subject to more wear and tear. Discuss the guidelines for caring for a laptop or mobile device as outlined in the book.

2. List the cleaning tips that can be used to help maintain a well-used laptop.

Quick Quiz 2

1. Which of the following provides ports to allow a laptop to easily connect to a full-sized monitor, keyboard, and other peripheral devices?
   A. Docking station
   B. Battery pack
   C. Optical drive
   D. All-in-one computer
   Answer: A

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2. What can be used to provide detailed instructions for performing work internally on a specific model of laptop computer?
   Answer: service manual

3. True or False: Because they are smaller and easier to produce, laptop replacement parts cost less than replacement parts for desktop computers.
   Answer: False

4. True or False: Opening the case of a laptop under warranty most likely will void the warranty.
   Answer: True

5. What type of connector requires very little force for insertion?
   A. FRU
   B. ZIF
   C. PCI
   D. IDE
   Answer: B

Class Discussion Topics

1. Many students may have had experience changing out a computer component or even building their own computers. What had to be replaced? If they built their own PC, have them discuss with classmates what parts they had to purchase.

2. Start a class discussion about issues students have seen with their laptops or laptops used by others. What steps did the student take to resolve the issues when dealing with their own equipment?

Additional Projects

1. Have students review the specifications for their motherboard and determine the maximum amount of RAM that can be installed on the motherboard. Have them list the types and sizes of RAM modules that can be installed.

2. Based on the students' examination of the motherboard disk controller ports and power supply connectors, have students determine the maximum number of disk drives that can be installed on their system. Have them research disk drives to determine the maximum amount of storage they can install on the system.

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Additional Resources

1. Hard Drive Technology
   https://www.backblaze.com/blog/hdd-versus-ssd-whats-the-diff/

2. Hard Disk Drive (HDD) vs Solid State Drive (SSD): What's the Difference?
   https://www.backblaze.com/blog/hdd-versus-ssd-whats-the-diff/

3. How to Disassemble and Rebuild a Desktop Computer
   https://www.crucial.com/usa/en/disassemble-and-rebuild-a-desktop-computer

4. How to Disassemble Any Laptop in Under 20 Minutes – HP DV6000
   https://www.youtube.com/watch?v=Zo8ifRRezsU

5. Repair Manuals for Everything – iFixit
   https://www.ifixit.com/Guide

6. Blog containing links to a number of service manuals for different laptops:
   http://www.tim.id.au/blog/tims-laptop-service-manuals/

7. How to Build a PC
   https://www.wired.com/story/how-to-build-a-pc/

8. Laptop Disassembly Tips
   https://www.crucial.com/usa/en/disassemble-and-rebuild-a-laptop

9. Guide to Connector Technology
   https://www.cablestogo.com/learning/connector-guides

Key Terms

For explanations of key terms, see the Glossary for this text.

- 4-pin 12-V connector
- 8-pin 12-V connector
- 20-pin P1 connector
- 24-pin P1 connector
- airplane mode
- all-in-one computer
- analog
- ATX (Advanced Technology Extended)
- ATX12V power supply
- audio ports
- base station
- BIOS (basic input/output system)

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- Bluetooth
- cellular network
- central processing unit (CPU)
- chassis
- DB9 port
- DB15 port
- DE15 port
- desktop case
- digital
- DIMM (dual inline memory module)
- DisplayPort
- docking port
- docking station
- dual-voltage selector switch
- DVI (Digital Video Interface) port
- electrostatic discharge (ESD)
- Ethernet port
- expansion card
- external SATA (eSATA) port
- firmware
- form factors
- front panel connectors
- front panel header
- GPS (Global Positioning System)
- hard disk drive (HDD)
- hard drive
- HD15 port
- HDMI (High-Definition Multimedia Interface) port
- heat sink
- internal components
- keyboard backlight
- laptop
- loopback plug
- main board
- microATX (mATX)
- microprocessor
- modem port
- Molex connector
- motherboard
- multimeter
- netbook
- network port
- notebook
- optical connector
- PCI Express (PCIe)
- PCIe 6/8-pin connector

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- port replicator
- POST card
- POST diagnostic card
- POST (power-on self test)
- power supply
- power supply tester
- power supply unit (PSU)
- processor
- PS/2 port
- RAM (random access memory)
- RJ-11 port
- RJ-45 port
- SATA power connector
- screen orientation
- serial ATA (SATA)
- serial port
- SO-DIMM (small outline DIMM)
- spacers
- SPDIF (Sony-Philips Digital Interface) sound port
- spudgers
- standoffs
- system board
- Thunderbolt 3 port
- touch pad
- tower case
- UEFI (Unified Extensible Firmware Interface)
- USB (Universal Serial Bus) port
- USB optical drive
- USB to Bluetooth adapter
- USB to RJ-45 dongle
- USB to Wi-Fi dongle
- VGA (Video Graphics Array) port
- video memory
- Wi-Fi (Wireless Fidelity)
- ZIF connectors

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