Hardware Domain 3.0: PC Preventive Maintenance, Safety, and Environmental Issues

Objective 3.1: Identify the various types of preventive maintenance measures, products, and procedures and when and how to use them.

1. When an external modem uses the COM2 port, no other device should use the ______ port.
   - a. COM1
   - b. LPT1
   - c. COM4
   - d. LPT2

2. The best protection against data loss caused by power failure is ________.
   - a. a surge suppressor
   - b. a tape backup
   - c. a UPS
   - d. a RAID system

3. Which of the following is not a function of an uninterruptible power supply?
   - a. Providing a high level of protection from sags and spikes
   - b. Long-term battery backup
   - c. Monitoring the power input line and switching to the output of the batteries whenever a loss in power is detected
   - d. Keeping the batteries online so that there is no switching done when the power drops
4. The electric power goes out in your town. What kind of device do you need to have installed in order to protect your system from spike damage when the power comes back on?
   - a. Power strip
   - b. Power suppressor
   - c. Switchable power supply
   - d. UPS

5. Which of the following devices should not be plugged directly into a UPS?
   - a. A modem
   - b. A monitor
   - c. A dot-matrix printer
   - d. A laser printer

6. A voltage surge is measured in _______.
   - a. seconds
   - b. nanoseconds
   - c. microseconds
   - d. milliseconds

7. A short overvoltage occurrence (nanoseconds) is called a _______.
   - a. spike
   - b. surge
   - c. brownout
   - d. sag

8. When a slight power line interruption occurs, which device will help the most?
   - a. A UPS
   - b. A surge suppressor
   - c. A separate AC outlet for the monitor
   - d. A shorter power cable

9. Cooling fans should be mounted on all ICs operating at clock speeds above _______.
   - a. 33MHz
   - b. 66MHz
   - c. 100MHz
   - d. 400MHz
10. A _______ is used to protect computer equipment from power-line variations or power outages.
   - a. preliminary ESD
   - b. surge protector
   - c. USPS
   - d. UPS

11. A _______ is used to protect computer equipment from very small overvoltage occurrences.
   - a. USPS
   - b. UPS
   - c. surge suppressor
   - d. preliminary ESD

12. A _______ is an undervoltage condition that lasts for a very short period of time.
   - a. spike
   - b. sag
   - c. surge
   - d. brownout

13. A _______ is an undervoltage condition that lasts for an extended period of time.
   - a. brownout
   - b. voltage sag
   - c. surge
   - d. spike

14. How can you prevent images from being burned into the screen of a video display monitor if it is not set up to blank itself after a period of no activity?
   - a. Run an application that will continually change the screen display.
   - b. Use the Device Manager utility to set up a turn-off time for the display.
   - c. Install a screensaver that will continuously change the display on the screen.
   - d. Access the CMOS Setup utility and set the monitor to sleep after a given amount of inactive time.
15. What is the best method of recovering quickly from operator errors and hard disk drive failures?
   • a. Install a RAID disk system.
   • b. Periodically back up the hard drive on another media.
   • c. Install a tape drive to hold the system's important data.
   • d. Place all important data on rewritable CD-ROMs or DVDs.

16. For security purposes in a client/server network, where should backup copies be stored? (Select all that apply.)
   • a. In a locked file cabinet next to the server
   • b. In a safe outside of the building
   • c. In a drawer near the server
   • d. On a shelf in the server closet

17. What is the first thing you should do if your trackball mouse responds erratically when you move it across the screen?
   • a. Replace the mouse.
   • b. Check for IRQ conflicts.
   • c. Clean the mouse.
   • d. Plug the mouse in on another COM port.

18. Which of the following storage media would not be adversely affected by RFI interference leaking from an old monitor?
   • a. A floppy disk
   • b. A removable hard disk drive
   • c. A backup DAT tape
   • d. A CD-ROM disc

19. Which of the following is an acceptable method of cleaning oxide buildups from adapter board contacts?
   • a. A wet rag
   • b. Warm soapy water
   • c. Electrical contact cleaner spray
   • d. A nylon cloth

20. A problem that can occur in areas of high humidity is ________.
   • a. leaks around PCB chips
   • b. loose chips on the motherboard
   • c. electrostatic discharge between components
   • d. an overheated CPU
21. Which solution can be used for antistatic cleaning?
   - a. A water and fabric softener solution
   - b. A water and ammonia solution
   - c. A water and bleach solution
   - d. A hydrogen tetrachloride solution

22. Which item is best suited for general cleaning of monitors?
   - a. An antistatic spray
   - b. A common flower mister
   - c. A glass cleaner
   - d. A damp cloth

23. How should you clean a trackball mouse?
   - a. Use a damp cloth to clean buildup from the rollers.
   - b. Use a cotton swab to clean buildup from the rollers.
   - c. Use an X-Acto knife to clean buildup from the rollers.
   - d. Use a pencil eraser to clean buildup from the rollers.

24. Which peripheral item is most subject to problems created by environmental dust?
   - a. Printer
   - b. Floppy disk drive
   - c. Mouse
   - d. Keyboard

25. What product is recommended for manual cleaning of floppy disk drives and tape drive R/W heads?
   - a. Soft cloths
   - b. Cotton swabs
   - c. A pencil eraser
   - d. Foam swabs

26. Which of the following are common sources of heat buildup that can be found around a PC installation? (Select all that apply.)
   - a. Direct sunlight
   - b. Location of heaters
   - c. Excess body heat
   - d. Papers piled on equipment
27. What precautions should be taken when storing backup copies of the system's disk drives?
   - a. All personnel should have access to the backups.
   - b. Only the network administrator should have access to the backups.
   - c. All backups should be cleaned regularly.
   - d. All backups should be tested regularly.

28. Which of the following can lead to problems with excess heat buildup?
   - a. Open HVAC ducts
   - b. Closed computer cases
   - c. Closed window shades
   - d. High humidity

29. At what point does heat buildup become a problem for most PCs?
   - a. Room temperatures above 85°F
   - b. Room temperatures above 90°F
   - c. Room temperatures above 95°F
   - d. Room temperatures above 100°F

30. What is the main reason to use a static-free vacuum?
   - a. It is small and portable and enables you to get in between the keyboard keys and other small spaces.
   - b. It is grounded so ESD does not occur.
   - c. It generates less ESD than a normal vacuum.
   - d. It has a spinning brush to pick up all the lint.

31. What two effects do leaving off expansion slot covers after an upgrade have on the operation of the system?
   - a. It permits dust to accumulate in the system unit.
   - b. It disrupts airflow patterns inside the case.
   - c. It diminishes the ground potential of the system.
   - d. It has no discernible effect on the system.

32. ______ is/are unlikely to lead to equipment failure.
   - a. Dust buildup
   - b. Periodic system upgrades
   - c. Temperature extremes
   - d. Rough handling
33. What should you do if you suspect corrosion might cause a problem with an adapter card?
   a. Apply a fabric softener and water solution to the contacts.
   b. Brush its contacts with a small paintbrush.
   c. Wipe its contacts gently with a damp cloth.
   d. Rub its contacts very gently with a soft pencil eraser.

34. How can you remove dust from the inside of the case?
   a. Apply a fabric softener and water solution.
   b. Rub gently with a dry towel.
   c. Wipe gently with a damp cloth.
   d. Use a small paintbrush.

35. What should be done after cleaning the exterior of computer components?
   a. Apply a fabric softener and water solution to their exteriors.
   b. Rub them with a dry towel.
   c. Wipe them with a damp cloth.
   d. Use a small paintbrush to remove dust from their interiors.

36. What type of cleaning solution should be used on the exterior of computer components?
   a. Window cleaner
   b. Soap and water
   c. Bleach and water
   d. Do not clean them

37. What is the best type of cleaning tool for use on the exterior of computer components?
   a. Damp cloth
   b. Vacuum cleaner
   c. Brush
   d. Antistatic spray

Objective 3.2: Identify various safety measures and procedures and when and how to use them.

1. What is the cause of chip creep?
   a. Cyclic variations in temperature
   b. Excess humidity
   c. Repeated power surge
   d. Electromagnetic interference
2. When working around electrical equipment including computers, what type of fire extinguisher should be on hand?
   - a. Class A
   - b. Class B
   - c. Class C
   - d. Class D

3. What surge-suppressor rating describes how quickly its protective circuitry can react to changes in the incoming line and limit the amount of change that passes through?
   - a. Clamping voltage
   - b. Clamping speed
   - c. Filter value
   - d. Surge limiting

4. The best method of limiting EMI in a PC system is to
   - a. wear a wrist strap to protect the system from EMI discharges
   - b. properly ground the system using a three-wire power cable
   - c. route signal cables and power cables together to cancel induced electrical noise
   - d. remove any unused back-panel slot covers to permit EMI to vent from the system unit

5. Damaging Electrostatic Discharge is most likely to occur when
   - a. working around rubber mats
   - b. using test instruments on a system
   - c. the humidity is low
   - d. you accidentally get too close to the power supply unit while it is operating

6. The most effective grounding system for a microcomputer is
   - a. an ESD wrist or ankle strap
   - b. the safety ground plug at a commercial AC receptacle
   - c. the ground plane of the system board
   - d. the chassis ground provided by the brass standoff(s)

7. When would it be inappropriate to use an ESD wrist strap?
   - a. While working on hard disk drives
   - b. While working on system boards
   - c. While working on CRT video monitors
   - d. While working on printers
8. In terms of maintenance issues, how are the effects of ESD and EMI different?
   - a. EMI is not destructive, whereas ESD can be very destructive.
   - b. ESD is not destructive, whereas EMI can be very destructive.
   - c. EMI improves system efficiency, whereas ESD can be very destructive.
   - d. ESD improves system efficiency, whereas EMI can be very destructive.

9. What type of equipment should be used to minimize the chances of ESD during normal computer maintenance work?
   - a. Surge protector
   - b. Terrycloth towel
   - c. Wrist strap
   - d. Screwdriver

10. _______ is the gradual deterioration of the electrical connection between the pins of an IC and its socket.
    - a. Degradation
    - b. Chip creep
    - c. Rust
    - d. Tarnish

11. In addition to wearing a wrist grounding strap, what other precaution can you take to prevent ESD discharges?
    - a. Remove dust from the equipment and workplace using compressed air.
    - b. Install a dehumidifier.
    - c. Use Styrofoam sheets on the workbench surface.
    - d. Install static-free carpet in the work area.

12. ESD is most likely to occur when _______.
    - a. you unplug a power supply unit
    - b. the relative humidity is above 50%
    - c. the relative humidity is below 50%
    - d. you touch the power supply unit while it is operating

13. Which voltage level is more dangerous—110V AC at 5 amps, or 25,000V DC at 5 microamperes?
    - a. 25,000V is much more dangerous than 110V.
    - b. Neither is particularly dangerous.
    - c. Both are extremely dangerous.
    - d. 5 amps is much more dangerous than 5 microamperes.
14. Which UPS rating describes how long it can supply power to a given load?
   - a. Volt-ampere rating
   - b. Wattage rating
   - c. Ampere-hour rating
   - d. Clamping-voltage rating

15. What are the voltage levels commonly found in a CRT?
   - a. 250,000V
   - b. 250V
   - c. 25,000V
   - d. 25V

16. The local weather report indicates that an electrical storm with severe winds is likely to occur in your area overnight. What reasonable precautions should you take to protect your computers?
   - a. Monitor the computers until the storm passes.
   - b. Plug the computers into a surge protector.
   - c. Turn off the computers.
   - d. Unplug the computers.

17. What is the best device for transporting computer equipment?
   - a. A server rack
   - b. The original packaging
   - c. A sturdy carton filled with Styrofoam peanuts
   - d. An antistatic bag

18. Why is it important that the UPS notifies the host system that a power failure has occurred? (Choose all that apply.)
   - a. So that the host computer's operating system can conduct an orderly shutdown of the system
   - b. So that the host computer can tell the operator how much time is available before he must shut down the system
   - c. So that the host computer's management software can notify an administrator that a problem has occurred
   - d. So that the user will stop entering data that might be lost if the power does not come back on before the UPS batteries fail
19. What is the best tool for releasing the charge on a CRT anode?
   ❑ a. Terrycloth towel
   ❑ b. Screwdriver
   ❑ c. Wrist strap
   ❑ d. Your finger

Objective 3.3: Identify environmental protection measures and procedures and when and how to use them.

1. Which of the following are legitimate ways of disposing of chemical solvents and cans?
   ❑ a. If they are not listed on the MSDS sheets, dispose of them in your normal trash-disposal system.
   ❑ b. Open the containers and allow the liquids to evaporate so they can be buried.
   ❑ c. If your local code calls for it, dispose of the items in a Subtitle D dump site.
   ❑ d. Burn them in an acceptable disposal oven.

2. ______ are those substances that can pass through a standard paint filter.
   ❑ a. Color liquids
   ❑ b. Acoustic liquids
   ❑ c. Free liquids
   ❑ d. Geomantic liquids

3. What are all hazardous materials required to have that accompany them when they change hands?
   ❑ a. Disposal bags
   ❑ b. Material Safety Data Sheet (MSDS)
   ❑ c. Red flags
   ❑ d. Mr. Yuk stickers

4. Which of the following types of information are contained in MSDSs? (Select two correct answers.)
   ❑ a. Physical properties of the listed material
   ❑ b. The retail price
   ❑ c. Fire and explosion data
   ❑ d. Local emergency hotline number
5. Which of the following is a nonhazardous, solid-waste dump site that can be used for dumping hardware?
   - a. Subtitle A
   - b. Subtitle B
   - c. Subtitle C
   - d. Subtitle D

6. How should you dispose of a toner cartridge?
   - a. You should obtain the proper toner material, refill the cartridge, and reuse it.
   - b. It should be recycled through the manufacturer.
   - c. It should be incinerated.
   - d. It should be wrapped in plastic and disposed of in a normal garbage receptacle.

7. When disposing of a CRT, you should first _______.
   - a. pack it in its original container and dispose of it in the normal garbage
   - b. discharge the HV anode and dispose of it in the normal garbage pickup
   - c. check applicable local ordinances and dispose of it in accordance with local regulations
   - d. smash the CRT's glass envelope with a hammer and dispose of it in a Subtitle D dump site

8. The correct method to use for disposing of batteries is to _______.
   - a. recycle them
   - b. place them in a designated garbage receptacle
   - c. burn them in an incinerator
   - d. crush them and have them recycled

9. If you purchase a spare battery for a new notebook computer, how should you store the second battery?
   - a. Store it fully charged in a refrigerator.
   - b. Fully charge it and store it at room temperature.
   - c. Fully discharge it and store it at room temperature.
   - d. Fully discharge it and then store it in the refrigerator.
10. What is the recommended method for storing computer equipment?
   - a. Place it in a nonstatic cardboard box.
   - b. Wrap it in aluminum foil.
   - c. Place it in an antistatic bag.
   - d. Wrap it in protective Styrofoam.

11. What technique is used to minimize the effects of EMI in a personal computer system?
   - a. Line filtering
   - b. Grounding
   - c. Using protective wrist straps
   - d. Adding humidity to the environment
Quick Check Answer Key

**Objective 3.1**

1. c
2. c
3. b
4. d
5. d
6. d
7. a
8. b
9. a
10. d
11. c
12. b
13. a
14. c
15. b
16. a, b
17. c
18. d
19. a
20. b
21. a
22. d
23. b
24. d
25. d
26. a, b, d
27. b
28. d
29. a
30. c
31. a, b
32. b
33. d
34. d
35. a
36. b
37. a

**Objective 3.2**

1. a
2. c
3. b
4. b
5. c
6. b
7. c
8. a
9. c
10. c
11. b

**Objective 3.3**

1. c
2. c
3. b
4. a, c
5. d
6. b
7. c
8. a
9. c
10. c
11. b
Answers and Explanations

Objective 3.1

1. c. If two devices are connected to the same IRQ line, a conflict occurs because it is not likely that the interrupt handler software can service both devices. The IRQ3 line works for both COM2 and COM4. When an external modem uses the COM2 port, no other device should use the COM4 port.

2. c. In the case of a complete shutdown, or a significant sag, the best protection from losing programs and data is an uninterruptible power supply (UPS). A UPS is a battery-based system that monitors the incoming power and kicks in when unacceptable variations occur in the power source.

3. b. The primary mission of the UPS is to keep the system running when a power failure occurs. Because it's battery based, it cannot keep the system running indefinitely. For this reason, you should not connect nonessential, power-hungry peripheral devices such as a laser printer to the UPS supply.

4. d. An uninterruptible power supply is an extremely good power-conditioning system. Because it always sits between the commercial power and the computer, it can supply a constant power supply to the system to protect it from spike damage.

5. d. If a UPS is being used to keep a critical system in operation during the power outage, the high current drain of the laser printer would severely reduce the length of time that the UPS could keep the system running.

6. d. Overvoltage conditions are classified as surges when their duration is measured in milliseconds or longer.

7. a. Overvoltage conditions are classified as spikes when their duration is measured in nanoseconds or less.

8. b. A surge suppressor protects the system from damages caused by minor power line interruptions. It passively filters the incoming power signal to smooth out variations.

9. a. A cooling fan should be placed on any IC operating at clock speeds above 33MHz.

10. d. Uninterruptible power supplies are battery-based systems that monitor the incoming power and kick in when unacceptable variations or outages occur in the power source.

11. c. A surge suppressor is used to protect computer equipment from very small overvoltage occurrences by passively filtering the incoming power signal to smooth out variations.
12. b. Sags, an undervoltage condition, can include voltage sags and brownouts. A voltage sag typically lasts only a few milliseconds, but a brownout can last for a protracted period of time. Sags can cause the system to suddenly reboot because it thinks the power has been turned off.

13. a. A brownout is an undervoltage condition and can last for a protracted period of time, which makes it easy to spot.

14. c. If a monitor is to be left on for an extended period of time with the same image on it, this can cause the image to become permanently “burned” into the phosphorous coating. To prevent this from occurring, install a screensaver package to constantly refresh the contents of the display.

15. b. To recover from hardware failures, operator mistakes, and acts of nature, you should make system backups of the hard drive.

16. a, b. (a) Copies of the system backup should be stored in a convenient but secure place. In the case of secure system backups, such as client/server networks, the backup copies should be stored where the network administrators can have access to them, but not the general public (for example, a locked file cabinet). (b) Many companies maintain a copy of their backup away from the main site. This is done for protection in case of disasters such as fire.

17. c. If your trackball mouse responds erratically when you move it across the screen, the first thing you should do is clean the mouse. Use a lint-free swab to clean the X and Y trackball rollers inside the mouse.

18. d. Because the CD-ROM stores data in the form of spots burned into an optical media, the RFI escaping from the monitor would not affect it. However, all of the other storage devices rely on magnetic storage that is susceptible to damage from RFI and other magnetic-field disturbances.

19. c. The oxidation buildup occurring on electrical connectors and contacts reduces the flow of electricity through the connection. Even with proper handling, some corrosion can occur over time. This oxidation can be sanded off with emery cloth, rubbed off with a common pencil eraser or special solvent wipe, or dissolved with an electrical contact cleaner spray. The only acceptable answer offered in this question is the use of contact cleaner.

20. d. High humidity can lead to heat-related problems and failures.

21. a. The application of an antistatic spray or antistatic solution prevents the buildup of static charges on the components of the system. A solution composed of 10 parts water and 1 part common household fabric softener makes an effective and economical antistatic solution.
22. **d.** A damp cloth is the best general-purpose cleaning tool for use with computer equipment, such as a monitor.

23. **b.** With a trackball mouse, the trackball should be removed and cleaned periodically. Use a lint-free swab to clean the X and Y trackball rollers inside the mouse.

24. **d.** Unlike the floppy disk drive, the mouse, and the printer, the keyboard’s electronic circuitry is open to the atmosphere and should be vacuumed regularly. Dust buildup on the keyboard circuitry can cause its ICs to fail due to overheating.

25. **d.** Manual cleaning of read/write (R/W) heads should be performed with isopropyl alcohol using a foam swab. Cotton swabs can shed fibers that can contaminate the drive and damage portions of its R/W head.

26. **a, b, d.** Sources of heat buildup around the computer and its peripherals include direct sunlight from an outside window, locations of portable heaters in the winter, and papers and books piled up around the equipment.

27. **b.** Copies of the system backup should be stored in a convenient but secure place. In the case of secure system backups, such as client/server networks, the backup copies should be stored where the network administrators can have access to them, but not the general public (for example, a locked file cabinet).

28. **d.** High humidity can lead to heat-related problems.

29. **a.** Microcomputers are designed to run at normal room temperatures. If the ambient temperature rises above about 85°F, heat buildup can become a problem.

30. **c.** A static-free vacuum can be used to remove dust from inside cases and keyboards. Be sure to use a static-free vacuum because normal vacuums are, by their nature, static generators. The static-free vacuum has special grounding to remove the static buildup it generates.

31. **a, b.** (a) The missing cover permits dust to accumulate in the system, forming the insulating blanket that traps heat next to active devices and can cause component overheating. (b) The missing slot cover interrupts the designed airflow patterns inside the case, causing components to overheat due to missing or inadequate airflow.

32. **b.** As with any electronic device, computers are susceptible to failures caused by dust buildup, rough handling, and extremes in temperature.

33. **d.** Oxidation can be removed from adapter card contacts with emery cloth, rubbed off with a common pencil eraser or special solvent wipe, or dissolved with an electrical-contact cleaner spray.
34. **d.** To remove dust from the inside of computer cases, a small paintbrush is handy.

35. **a.** The outer-surface cleaning should be followed by the application of an anti-static spray or antistatic solution to prevent the buildup of static charges on the components of the system.

36. **b.** Outer-surface cleaning can be accomplished with a simple soap-and-water solution, followed by a clear water rinse. Care should be taken to make sure that none of the liquid splashes, or drips, into the inner parts of the system.

37. **a.** Outer-surface cleaning can be accomplished with a simple soap-and-water solution, followed by a clear water rinse. Care should be taken to make sure that none of the liquid splashes, or drips, into the inner parts of the system. A damp cloth is easily the best general-purpose cleaning tool for use with computer equipment.

### Objective 3.2

1. **a.** Normal operating vibrations and temperature cycling can degrade the electrical connections between ICs and sockets over time. This gradual deterioration of electrical contact between chips and sockets is referred to as chip creep.

2. **c.** A Class C fire extinguisher specified for use around electrical equipment should be on hand around computers.

3. **b.** The surge suppressor's clamping speed rating describes how quickly it can react to changes in the incoming power level and act to minimize it.

4. **b.** Proper grounding is the best defense against the disruptive effects of EMI.

5. **c.** ESD is most likely to occur during periods of low humidity. If the relative humidity is below 50%, static charges can accumulate easily. ESD generally does not occur when the humidity is above 50%.

6. **b.** To avoid damaging static-sensitive computer devices, ground yourself by touching the power supply housing with your finger before touching any components inside the system. This technique will only work safely if the power cord is attached to a grounded power outlet. The ground plug on a standard power cable is the best tool for overcoming ESD problems.

7. **c.** Antistatic straps should never be worn while working on higher-voltage components, such as monitors and power supply units.

8. **a.** Unlike ESD, which is the most damaging form of electrical interference associated with digital equipment and is destructive, the effects of EMI can be corrected without damage.
9. **c.** Professional service technicians use grounding straps to minimize the chances of ESD during normal computer maintenance work involving MOS devices. These antistatic devices can be placed around the wrists or ankles to ground the technician to the system being worked on. These straps release any static present on the technician’s body, and pass it harmlessly to ground potential.

10. **b.** Normal operating vibrations and temperature cycling can degrade the electrical connections between ICs and sockets over time. This gradual deterioration of electrical contact between chips and sockets is referred to as chip creep. It is a good practice to reseat any socket-mounted devices when handling a printed circuit board.

11. **d.** Of the possible choices provided, installing antistatic carpet is the only option that will help to minimize ESD.

12. **c.** ESD is most likely to occur during periods of low humidity. If the relative humidity is below 50%, static charges can accumulate easily. Anytime the charge reaches about 10,000V, it is likely to discharge to grounded metal parts.

13. **d.** 110V AC at 5 amps is much more dangerous than 25,000V DC at 5 microamperes according to the current-delivering capabilities (5 amps versus 5 microamperes) they create.

14. **c.** The ampere-hour rating of the UPS describes how long it can supply power to a given size electrical load after a failure has occurred.

15. **c.** Extremely high voltage levels (in excess of 25,000V) may be present inside the CRT housing, even up to a year after electrical power has been removed from the unit.

16. **d.** Remove all power cords associated with the computer, and its peripherals, from the power outlet during thunder or lightning storms.

17. **b.** Computer devices should be stored or transported in their original boxes using their original packing foam and protective storage bag because the contours in the packing foam of these devices are not compatible from model to model, or device to device. If the original boxes and packing materials are not available, make sure to use sturdy cartons and cushion the equipment well on all sides before shipping.

18. **a, b, c.** When a disruption occurs, the UPS notifies the host computer so that its operating system can conduct an orderly shutdown of the system without losing data. The management software can also be configured to notify the system users to save and shut down, as well as to email or page an administrator to alert him to the failure.
19. b. While touching only the insulated handle of the screwdriver, slide the blade of the screwdriver under the rubber cup of the anode and make contact with its metal connection. This should bleed off the high voltage charge to ground.

**Objective 3.3**

1. c. Check your local waste management agency before disposing of them. Some landfills will not accept chemical solvents and cans. In this case, these items must be disposed of in a Subtitle-D dump site.

2. c. Free liquids are those substances that can pass through a standard paint filter. If the liquid passes through the filter, it is free liquid and cannot be disposed of in the landfill.

3. b. All hazardous materials are required to have Material Safety Data Sheets (MSDSs) that accompany them when they change hands. They are also required to be on hand in areas where hazardous materials are stored and commonly used.

4. a, c. The MSDS contains information about what the material is, its hazardous ingredients, its physical properties, fire and explosion data, reactive data, spill or leak procedures, and any special protection or precaution information.

5. d. Subtitle D dump sites are nonhazardous, solid-waste dump sites that can handle hardware components.

6. b. Toner cartridges can be refilled and recycled. They can be very messy to refill and often do not function as well as new cartridges do. In many cases, the manufacturer of the product will have a policy of accepting spent cartridges.

7. c. Local regulations concerning acceptable disposal methods for computer-related components should always be checked before disposing of any electronic equipment, such as a CRT.

8. a. The desired method of battery disposal is recycling. It should not be too difficult to find a drop site that will handle recycling batteries and other hazardous materials.

9. c. If the battery is expected to be stored for more than 30 days (as you would expect the replacement for a new computer to be) then you should fully discharge the battery and store it at normal room temperature.

10. c. The best place to store computer equipment is in its original shipping box, surrounded by an antistatic bag wrapped in protective foam. The only correct version of this scenario in this question is the antistatic bag. Without this item, the other options are potentially harmful for digital equipment.
11. **b.** Grounding is an important aspect of limiting electromagnetic interference (not to be confused with destructive ESD). Proper grounding routes induced EMI signals away from logic circuitry and toward ground potential where it is absorbed.