1. Differentiate between storage devices and storage media.
   A storage device is the computer hardware that records and/or retrieves items to and from storage media. A storage medium (media is the plural), also called secondary storage, is the physical material on which a computer keeps data, instructions, and information.

2. Describe why most memory is considered volatile and most storage is considered nonvolatile.
   Items on a storage medium remain intact even when power is removed from the computer. Thus, a storage medium is nonvolatile. Most memory (i.e., RAM), by contrast, holds data and instructions temporarily and thus is volatile.

3. Differentiate between writing and reading, with respect to storage media.
   Writing is the process of transferring data, instructions, and information from memory to a storage medium. Reading is the process of transferring these items from a storage medium into memory.

4. MBps stands for _____, and GBps stands for _____.
   MBps stands for megabytes per second, and GBps stands for gigabytes per second.

5. Define transfer rate. Know which storage media have faster transfer rates.
   Transfer rate is the speed with which data, instructions, and information transfer to and from a device. Transfer rates for storage are stated in KBps (kilobytes per second), MBps (megabytes per second), and GBps (gigabytes per second). Memory (RAM) has the fastest transfer rates. Hard disks have faster transfer rates than tape.

6. Describe a hard disk. Differentiate between a fixed disk and a portable disk.
   A hard disk, also called a hard disk drive or hard drive, is a storage device that store data, instructions, and information. A hard disk that is mounted inside the system unit sometimes is called a fixed disk because it is not portable. With respect to a storage medium, the term portable means you can remove the medium from one computer and carry it to another computer.

7. Describe the purpose of a wiping utility.
   A wiping utility is special utility software that can be used to clean the contents of a hard disk before it leaves possession of the owner.

8. Define the term, backup.
   A backup is a duplicate of a file, program, or disk placed on a separate storage medium that you can use in case the original is lost, damaged, or destroyed.

9. Identify the purpose of disk cache.
   Disk cache, sometimes called a buffer, consists of a memory chip(s) on a hard disk that stores frequently accessed items such as data, instructions, and information.

10. Discuss the purpose of network attached storage devices.
    A network attached storage (NAS) device is a server connected to a network with the sole purpose of providing storage.

11. Differentiate between external hard disks and removable hard disks. Identify their advantages over fixed disks.
    An external hard disk is a separate freestanding hard disk that connects with a cable to a USB port or FireWire port on the system unit or communicates wirelessly. A removable hard disk is a hard disk that you insert and remove from a drive.
    Advantages: transport a large number of files, back up important files or an entire internal hard disk, easily store large audio and video files, secure your data, add storage space to a notebook computer,
and add storage space to a desktop computer without having to open the system unit or connect to a network.

12. Identify devices that contain miniature hard disks.  
   Devices such as portable media players, digital cameras, and smart phones often have internal miniature hard disks, which provide greater storage capacities than flash memory.

13. Identify Windows tools that can improve the performance on a hard disk.  
   Disk Cleanup removes unused files from a hard disk so that the computer does not have to spend time searching through and accessing unneeded files, and Disk Defragmenter reorganizes the data on a hard disk so that the data can be accessed more quickly.

14. Describe the purpose and advantages of solid state drives.  
   A solid state drive (SSD) is a storage device that typically uses flash memory to store data, instructions, and information.  
   Advantages: access times of SSDs is more than 80 times faster than a hard disk; transfer rates of SSDs are faster than comparable hard disks; SSDs generate less heat and consume less power than hard disks; manufacturers claim that SSDs will last more than 50 years.

15. Differentiate among various types of memory cards.  
   CompactFlash (CF) - 512 MB to 100 GB  
   Secure Digital (SD) - 512 MB to 8 GB  
   SDHC - 4 to 32 GB  
   microSD - 1 to 2 GB  
   microSDHC - 4 to 16 GB  
   xD Picture Card - 256 MB to 2 GB  
   Memory Stick PRO Duo - 1 to 16 GB  
   Memory Stick Micro (M2) -1 to 16 GB

16. Describe the function of a card reader/writer.  
   A card reader/writer is a device that reads and writes data, instructions, and information stored on memory cards.

17. Identify advantages and capacities of USB flash drives.  
   USB flash drives are convenient for mobile users because they are small and lightweight enough to be transported on a keychain or in a pocket. Current USB flash drives have data transfer rates of about 12 MBps and storage capacities ranging from 512 MB to 100 GB, with the latter being extremely expensive.

18. Describe the purpose and shapes of ExpressCard modules.  
   ExpressCard modules can be used to add memory, storage, communications, multimedia, and security capabilities to a computer. They are either rectangular or L-shaped.

19. Describe cloud storage, examples of services provided, and reasons to use cloud storage.  
   Cloud storage is an Internet service that provides storage to computer users. Some provide storage for specific types of files, such as photos or e-mail messages, whereas others store any type of file. Many cloud storage providers offer additional services such as encryption, passwords, Web applications, and Web services.  
   Users subscribe to cloud storage for a variety of reasons: to access files on the Internet from any computer or device that has Internet access; to store large audio, video, and graphics files on the Internet instantaneously; to allow others to access their files on the Internet; to view time-critical data and images immediately while away from the main office or location; to store offsite backups of data; and to provide data center functions, relieving enterprises of this task.
20. Describe the characteristics of optical discs.

An optical disc is a type of storage media that consists of a flat, round, portable disc made of metal, plastic, and lacquer that is written and read by a laser.

21. Identify guidelines for proper care of optical discs.

Never bend a disc; it may break. Do not expose discs to extreme temperatures or humidity. The ideal temperature range for disc storage is 50 to 70 degrees Fahrenheit. Stacking discs, touching the underside of discs, or exposing them to any type of contaminant may scratch a disc. Place an optical disc in its protective case, called a jewel box, when you are finished using it and store in an upright (vertical) position.

22. Explain how to clean an optical disc.

Moisten a nonabrasive cloth with warm water or rubbing alcohol (do not use ammonia-based solutions) and then wipe the disc in straight lines from the center outward. You also can repair scratches on the surface with a specialized disc repair kit.

23. Describe a single-session disc.

With a single-session disc, all items are written on the disc at one time.

24. State the typical storage capacity of a CD. Differentiate among a CD-ROM, a CD-R, and a CD-RW.

A typical CD-ROM holds from 650 MB to 1 GB of data, instructions, and information. A CD-ROM, or compact disc read-only memory, is a type of optical disc that users can read but not write (record) or erase.

A CD-R (compact disc-recordable) is a multisession optical disc on which users can write, but not erase, their own items such as text, graphics, and audio.

A CD-RW (compact disc-rewritable) is an erasable multisession disc you can write on multiple times.

25. Explain why the speed of a CD-ROM drive is significant. Describe how manufacturers measure optical disc speed.

The speed of a CD-ROM drive determines how fast it installs programs and accesses the disc. Original CD-ROM drives were single-speed drives with transfer rates of 150 KBps. Manufacturers measure all optical disc drives relative to this original CD-ROM drive using an X to denote the original transfer rate of 150 KBps.

26. _____ is the process of writing on an optical disc.

Burning is the process of writing on an optical disc.

27. Describe ripping, with respect to CDs.

The process of copying audio and/or video data from a purchased disc and saving it on digital media is called ripping.

28. Explain the purpose of an archive disc or Picture CD.

Many people use archive discs or Picture CDs to preserve their photos. An archive disc stores photos from an online photo center in the jpg file format, usually at a maximum resolution of 7200 pixels per photo. A Picture CD is a single-session CD-ROM that stores digital versions of film using a jpg file format at a lower resolution.

29. State the storage capacities of DVDs. Differentiate among DVD-ROMs, recordable DVDs, and rewritable DVDs.

A DVD-ROM (digital versatile disc-read-only memory or digital video disc-read-only memory) is a high-capacity optical disc on which users can read but not write or erase. DVD capacities range from 4.7 to 17 GB, depending on the number of sides and layers.
Each recordable and rewritable DVDs allow users to write on the disc once and read (play) it many times. Instead of recordable DVDs, however, most users work with rewritable DVDs because these discs can be written on multiple times and also erased.

30. Describe features of Blu-ray Discs and drives.
Blu-ray has a higher capacity and better quality than standard DVDs, especially for high-definition audio and video. A Blu-ray Disc-ROM (BD-ROM) has storage capacities of 100 GB, with expectations of exceeding 200 GB in the future. Current read/write speeds of Blu-ray Discs range from 9 MBps (2X) to 36 Mbps (8X) in the future. Blu-ray Disc (BD) drives and players are backward compatible with DVD and CD formats.

31. Describe tape storage and identify its primary use today.
Tape is a magnetically coated ribbon of plastic capable of storing large amounts of data and information at a low cost. Tape no longer is used as a primary method of storage. Instead, business users utilize tape most often for long-term storage and backup.

32. Identify uses of magnetic stripe cards and smart cards.
Uses of smart cards include storing medical records, vaccination data, and other health care and identification information; tracking information, such as employee attendance or customer purchases; storing a prepaid amount of money, such as for student purchases on campus; and authenticating users, such as for Internet purchases or building access. In addition, a smart card can double as an ID card.

33. Identify uses of microfilm and microfiche.
Microfilm and microfiche use is widespread, with many companies allowing you to search through and view microfilm images online. Libraries use these media to store back issues of newspapers, magazines, and genealogy records. Some large organizations use microfilm and microfiche to archive inactive files. Some banks use them to store transactions and canceled checks. The U.S. Army uses them to store personnel records.

34. Order these media in terms of life expectancy, from shortest to longest: optical discs, solid state drives, magnetic disks, and microfilm.
Magnetic disks, optical discs, solid state drives, microfilm