Chapter 2: Computers: The Machines Behind Computing

TRUE/FALSE

1. An object code must be translated into source code in order for a computer to be able to read and execute.

Answer: False
Chapter Learning Outcome: 2.1: Define a computer system, and describe its components.
Topic: Defining a Computer
BUSPROG: Technology
Bloom's: Remember
Difficulty Level: Easy
Page: 24
Feedback: A source code must be translated into object code—consisting of 0s and 1s, which can be understood by a computer.

2. The hardware components of a computer system consist of programs written in computer languages.

Answer: False
Chapter Learning Outcome: 2.1: Define a computer system, and describe its components.
Topic: Defining a Computer
BUSPROG: Technology
Bloom's: Remember
Difficulty Level: Easy
Page: 24
Feedback: It is the software components of a computer system that consist of programs written in computer languages.

3. Both the arithmetic logic unit (ALU) and the control unit are part of the Basic Input/Output System.

Answer: False
Chapter Learning Outcome: 2.1: Define a computer system, and describe its components.
Topic: Defining a Computer
BUSPROG: Technology
Bloom's: Remember
Difficulty Level: Easy
Page: 25
Feedback: The arithmetic logic unit (ALU) and the control unit are part of the central processing unit (CPU). A Basic Input/Output System is located on the motherboard.

4. A bus can be internal or external.

Answer: True
Chapter Learning Outcome: 2.1: Define a computer system, and describe its components.
Topic: Defining a Computer
BUSPROG: Technology
Bloom's: Remember
Difficulty Level: Easy
Page: 25
Feedback: A bus is a link between devices connected to the computer. It can be parallel or serial, internal (local) or external.

5. A computer with a 32-bit processor can perform calculations with larger numbers and be more efficient with smaller numbers than a 64-bit system.

Answer: False
Chapter Learning Outcome: 2.1: Define a computer system, and describe its components.
Topic: Defining a Computer
BUSPROG: Technology
Bloom's: Remember
Difficulty Level: Easy
Page: 25
Feedback: A computer with a 64-bit processor can perform calculations with larger numbers and be more efficient with smaller numbers; it also has better overall performance than a 32-bit system.

6. A serial port is a communication interface through which information is transferred one bit at a time.

Answer: True
Chapter Learning Outcome: 2.1: Define a computer system, and describe its components.
Topic: Defining a Computer
BUSPROG: Technology
Bloom's: Remember
Difficulty Level: Easy
Page: 26
Feedback: A serial port is a communication interface through which information is transferred one bit at a time. It is located on the motherboard of a computer.

7. Very-large-scale integration (VLSI) circuits were introduced in the fifth-generation computers.
Answer: False
Chapter Learning Outcome: 2.2: Discuss the history of computer hardware and software.
Topic: The History of Computer Hardware and Software
BUSPROG: Technology
Bloom's: Remember
Difficulty Level: Easy
Page: 26
Feedback: Very-large-scale integration circuits were introduced in the fourth-generation computers, which continued several trends that further improved speed and ease of use.

8. ENIAC is an example of a first-generation computer.

Answer: True
Chapter Learning Outcome: 2.2: Discuss the history of computer hardware and software.
Topic: The History of Computer Hardware and Software
BUSPROG: Technology
Bloom's: Remember
Difficulty Level: Easy
Page: 26
Feedback: ENIAC is a first-generation computer that used vacuum tube technology.

9. A byte is a single value of 0 or 1.

Answer: False
Chapter Learning Outcome: 2.3: Explain the factors distinguishing the computing power of computers.
Topic: The Power of Computers

BUSPROG: Technology
Bloom's: Remember
Difficulty Level: Easy
Page: 28
Feedback: 1 bit is a single value of 0 or 1, whereas 1 byte is formed by 8 bits.

10. A petabyte is 2^{30} bytes.

Answer: False
Chapter Learning Outcome: 2.3: Explain the factors distinguishing the computing power of computers.
Topic: The Power of Computers
BUSPROG: Technology
Bloom's: Remember
Difficulty Level: Easy
Page: 28
Feedback: A petabyte is 2^{50} bytes, whereas a gigabyte is 2^{30} bytes.

11. An Extended ASCII data code allows representation of 1024 characters.

Answer: False
Chapter Learning Outcome: 2.3: Explain the factors distinguishing the computing power of computers.
Topic: The Power of Computers
BUSPROG: Technology
Bloom's: Remember
Difficulty Level: Easy
Page: 28
Feedback: Extended ASCII code is an 8-bit code that also allows representation of 256 characters.

12. The split keyboard has been developed for better ergonomics.

Answer: True
Chapter Learning Outcome: 2.5: Discuss the types of input, output, and memory devices.
Topic: Input, Output, and Memory Devices
BUSPROG: Technology
Bloom's: Remember
Difficulty Level: Easy
Page: 29
Feedback: Several modifications have been made to improve the ease of using keyboards. Some keyboards, such as the split keyboard, have been developed for better ergonomics.

13. Light pen is an output device.

Answer: False
Chapter Learning Outcome: 2.5: Discuss the types of input, output, and memory devices.
Topic: Input, Output, and Memory Devices
BUSPROG: Technology
Bloom's: Remember
Difficulty Level: Easy
Page: 29
Feedback: A light pen is an input device particularly useful for engineers and graphic designers who need to make modifications to technical drawings.

14. Trackballs are ideal for notebook computers because they occupy less space than a mouse.

Answer: True
Chapter Learning Outcome: 2.5: Discuss the types of input, output, and memory devices.
Topic: Input, Output, and Memory Devices
BUSPROG: Technology
Bloom's: Remember
Difficulty Level: Easy
Page: 29
Feedback: Trackballs occupy less space than a mouse, so they are ideal for notebook computers.

15. A disadvantage of trackball is that positioning is sometimes less precise than with a mouse.

Answer: True
Chapter Learning Outcome: 2.5: Discuss the types of input, output, and memory devices.
Topic: Input, Output, and Memory Devices
BUSPROG: Technology
Bloom's: Remember
Difficulty Level: Easy
Page: 29
Feedback: Trackballs occupy less space than a mouse, so they are ideal for notebook computers. However, positioning with a trackball is sometimes less precise than with a mouse.

16. Inkjet printers produce characters by projecting electrically charged droplets of ink onto paper that create an image.
Answer: True
Chapter Learning Outcome: 2.5: Discuss the types of input, output, and memory devices.
Topic: Input, Output, and Memory Devices
BUSPROG: Technology
Bloom's: Remember
Difficulty Level: Easy
Page: 30
Feedback: Inkjet printers produce characters by projecting onto paper electrically charged droplets of ink that create an image. Inkjet printers are suitable for home users who have limited text and photo printing needs.

17. Data can be read from and written to random access memory (RAM).

Answer: True
Chapter Learning Outcome: 2.5: Discuss the types of input, output, and memory devices.
Topic: Input, Output, and Memory Devices
BUSPROG: Technology
Bloom's: Remember
Difficulty Level: Easy
Page: 31
Feedback: Volatile memory is called random access memory (RAM), although you could think of it as "read-write memory." In other words, data can be read from and written to RAM.

18. The contents of programmable read-only memory (PROM) can be erased and reprogrammed.

Answer: False
Chapter Learning Outcome: 2.5: Discuss the types of input, output, and memory devices.
Topic: Input, Output, and Memory Devices

BUSPROG: Technology
Bloom's: Remember
Difficulty Level: Easy
Page: 31
Feedback: The contents of programmable read-only memory (PROM) cannot be erased, whereas erasable programmable read-only memory, which is similar to PROM, can be erased and reprogrammed.

19. A magnetic disk is a type of secondary memory device.

Answer: True
Chapter Learning Outcome: 2.5: Discuss the types of input, output, and memory devices.
Topic: Input, Output, and Memory Devices
BUSPROG: Technology
Bloom's: Remember
Difficulty Level: Easy
Page: 31
Feedback: A magnetic disk is a secondary storage device. It is made of Mylar or metal and is used for random-access processing.

20. A magnetic tape stores data randomly.

Answer: False
Chapter Learning Outcome: 2.5: Discuss the types of input, output, and memory devices.
Topic: Input, Output, and Memory Devices
BUSPROG: Technology
Bloom's: Remember
Difficulty Level: Easy
Page: 31
Feedback: Magnetic tape, made of a plastic material, resembles a cassette tape and stores data sequentially.

21. An advantage of a write once, read many (WORM) disc is that it can be easily duplicated.

Answer: False
Chapter Learning Outcome: 2.5: Discuss the types of input, output, and memory devices.
Topic: Input, Output, and Memory Devices
BUSPROG: Technology
Bloom's: Remember
Difficulty Level: Easy
Page: 32
Feedback: A major drawback is that a WORM disc cannot be duplicated. It is used mainly to store information that must be kept permanently but not altered.

22. Flash memory is used in memory cards for storing and transferring data between computers and other devices.

Answer: True
Chapter Learning Outcome: 2.5: Discuss the types of input, output, and memory devices.
Topic: Input, Output, and Memory Devices
BUSPROG: Technology
Bloom's: Remember
Difficulty Level: Easy
Page: 32

Feedback: Flash memory is nonvolatile memory that can be electronically erased and reprogrammed. It is used mostly in memory cards and USB flash drives for storing and transferring data between computers and other devices.

23. A redundant array of independent disks (RAID) system is a collection of disk drives used for fault tolerance and improved performance.

Answer: True
Chapter Learning Outcome: 2.5: Discuss the types of input, output, and memory devices.
Topic: Input, Output, and Memory Devices
BUSPROG: Technology
Bloom's: Remember
Difficulty Level: Easy
Page: 32
Feedback: A redundant array of independent disks (RAID) system is a collection of disk drives used for fault tolerance and improved performance, and is typically found in large network systems.

24. A storage area network (SAN) is essentially a network-connected computer dedicated to providing file-based data storage services to other network devices.

Answer: False
Chapter Learning Outcome: 2.5: Discuss the types of input, output, and memory devices.
Topic: Input, Output, and Memory Devices
BUSPROG: Technology
Bloom's: Remember
Difficulty Level: Easy
Page: 33
Feedback: A storage area network (SAN) is a dedicated high-speed network consisting of both hardware and software used to connect and manage shared storage devices, such as disk arrays, tape libraries, and optical storage devices.

25. Network-attached storage (NAS) increases management costs and is fault prone.

Answer: False
Chapter Learning Outcome: 2.5: Discuss the types of input, output, and memory devices.
Topic: Input, Output, and Memory Devices
BUSPROG: Technology
Bloom's: Remember
Difficulty Level: Easy
Page: 33
Feedback: NAS is popular for Web servers and e-mail servers because it lowers management costs and helps make these servers more fault tolerant.

26. A network-attached storage (NAS) system offers only storage; a storage area network (SAN) offers both storage and file services.

Answer: False
Chapter Learning Outcome: 2.5: Discuss the types of input, output, and memory devices.
Topic: Input, Output, and Memory Devices
BUSPROG: Technology
Bloom's: Remember
Difficulty Level: Easy
Page: 33

Feedback: A SAN offers only storage; a NAS system offers both storage and file services.

27. In a network-attached storage (NAS), as the number of users increase, the performance increases.

Answer: False
Chapter Learning Outcome: 2.5: Discuss the types of input, output, and memory devices.
Topic: Input, Output, and Memory Devices
BUSPROG: Technology
Bloom's: Remember
Difficulty Level: Easy
Page: 33
Feedback: The biggest issue with NAS is that, as the number of users increases, its performance deteriorates.

28. A server is a set of programs for controlling and managing computer hardware and software.

Answer: False
Chapter Learning Outcome: 2.6: Explain how computers are classified.
Topic: Classes of Computers
BUSPROG: Technology
Bloom's: Remember
Difficulty Level: Easy
Page: 35
Feedback: A server is a computer and all the software for managing network resources and offering services to a network.

29. A personal computer can perform a variety of tasks by using application software, which can be commercial software or software developed in house.

Answer: True
Chapter Learning Outcome: 2.7: Describe the two major types of software.
Topic: What is Software?
BUSPROG: Technology
Bloom's: Remember
Difficulty Level: Easy
Page: 36
Feedback: A personal computer can perform a variety of tasks by using application software, which can be commercial software or software developed in house.

30. Sometimes, fourth-generation languages (4GLs) are called procedural languages.

Answer: False
Chapter Learning Outcome: 2.8: List the generations of computer languages.
Topic: Computer Languages
BUSPROG: Technology
Bloom's: Remember
Difficulty Level: Easy
Page: 39
Feedback: Sometimes 4GLs are called nonprocedural languages, which means you do not need to follow rigorous command syntax to use them.

MULTIPLE CHOICE

1. A(n) _____ is a step-by-step direction for performing a specific task, which is written in a language the computer can understand.

a. array
b. server
c. cache
d. program

Answer: D
Chapter Learning Outcome: 2.1: Define a computer system, and describe its components.
Topic: Defining a Computer
BUSPROG: Technology
Bloom's: Remember
Difficulty Level: Easy
Page: 24
Feedback: A program is a step-by-step direction for performing a specific task, written in a language the computer can understand.

2. A _____ is a peripheral device for recording, storing, and retrieving information.

a. disk drive
b. motherboard
c. control unit
d. multiprocessor

Answer: A
Chapter Learning Outcome: 2.1: Define a computer system, and describe its components.
Topic: Defining a Computer
BUSPROG: Technology
Bloom's: Remember
Difficulty Level: Easy
Page: 25
Feedback: A disk drive is a peripheral device for recording, storing, and retrieving information.

3. A(n) _____ is an interface between a computer and a printer that enables the computer to transfer multiple bits of information to the printer simultaneously.

a. parallel port
b. serial port
c. expansion slot
d. control unit

Answer: A
Chapter Learning Outcome: 2.1: Define a computer system, and describe its components.
Topic: Defining a Computer
BUSPROG: Technology
Bloom's: Remember
Difficulty Level: Easy
Page: 26
Feedback: A parallel port is an interface between a computer and a printer that enables the computer to transfer multiple bits of information to the printer simultaneously.

4. Beginning in the 1940s, first-generation computers used _____.

a. transistors
b. vacuum tube technology
c. integrated circuits
d. laser technology

Answer: B
Chapter Learning Outcome: 2.2: Discuss the history of computer hardware and software.
Topic: The History of Computer Hardware and Software
BUSPROG: Technology
Bloom's: Remember
Difficulty Level: Easy
Page: 26
Feedback: Beginning in the 1940s, first-generation computers used vacuum tube technology. They were

bulky and unreliable, generated excessive heat, and were difficult to program.

5. Transistors were the major technology used during the _____ generation of computers.
a. first
b. second
c. third
d. fourth

Answer: B
Chapter Learning Outcome: 2.2: Discuss the history of computer hardware and software.
Topic: The History of Computer Hardware and Software
BUSPROG: Technology
Bloom's: Remember
Difficulty Level: Easy
Page: 26
Feedback: Second-generation computers used transistors and were faster, more reliable, and easier to program and maintain.

6. Remote data entry and telecommunications were introduced during the _____ generation of computers.
a. second
b. third
c. fourth
d. fifth

Answer: B
Chapter Learning Outcome: 2.2: Discuss the history of computer hardware and software.
Topic: The History of Computer Hardware and Software
BUSPROG: Technology
Bloom's: Remember
Difficulty Level: Easy
Page: 26
Feedback: Remote data entry and telecommunications were introduced during the third generation. Third-generation computers operated on integrated circuits, which enabled computers to be even smaller, faster, more reliable, and more sophisticated.

7. One of the disadvantages of silicon is that:
a. it cannot be used for mass production of silicon devices.
b. it cannot emit light.
c. it is very soft and fragile.
d. it is very expensive.

Answer: B
Chapter Learning Outcome: 2.2: Discuss the history of computer hardware and software.
Topic: The History of Computer Hardware and Software
BUSPROG: Technology
Bloom's: understand
Difficulty Level: Moderate
Page: 26
Feedback: Because silicon cannot emit light and has speed limitations, computer designers have concentrated on technology using gallium arsenide, in which electrons move almost five times faster than in silicon.

8. An advantage of silicon over gallium arsenide is that:
a. it is less fragile than gallium arsenide.
b. it survives much higher doses of radiation than gallium arsenide.
c. it withstands higher temperatures than gallium arsenide.
d. it emits light, whereas gallium arsenide does not.

Answer: A
Chapter Learning Outcome: 2.2: Discuss the history of computer hardware and software.

Topic: The History of Computer Hardware and Software
BUSPROG: Technology
Bloom's: understand
Difficulty Level: Moderate
Page: 26
Feedback: Gallium arsenide is softer and more fragile than silicon.

9. _____ is 1/1,000,000,000,000 of a second.
a. Millisecond
b. Microsecond
c. Nanosecond
d. Picosecond

Answer: D
Chapter Learning Outcome: 2.3: Explain the factors distinguishing the computing power of computers.
Topic: The Power of Computers
BUSPROG: Technology
Bloom's: Remember
Difficulty Level: Easy
Page: 28
Feedback: Picosecond is 1/1,000,000,000,000 of a second.

10. In the context of the power of computers, _____ means saving data in computer memory.
a. speed
b. accuracy
c. retrieval
d. storage

Answer: D
Chapter Learning Outcome: 2.3: Explain the factors distinguishing the computing power of computers.
Topic: The Power of Computers
BUSPROG: Technology
Bloom's: Remember
Difficulty Level: Easy
Page: 28
Feedback: Computers draw their power from three factors that far exceed human capacities: speed, accuracy, and storage and retrieval capabilities. Storage means saving data in computer memory, and retrieval means accessing data from memory.

11. The word "memory" consists of 48 bits, which is equivalent to _____ bytes.
a. 6
b. 24
c. 64
d. 384

Answer: A
Chapter Learning Outcome: 2.3: Explain the factors distinguishing the computing power of computers.
Topic: The Power of Computers
BUSPROG: Technology
Bloom's: Apply
Difficulty Level: Challenging
Page: 28
Feedback: The word "memory" has 48 bits. Eight bits constitute 1 byte, so 48 bits are the same as 6 bytes.

12. A _____ is the size of a character.
a. nibble
b. bit
c. byte
d. word

Answer: C
Chapter Learning Outcome: 2.3: Explain the factors distinguishing the computing power of computers.
Topic: The Power of Computers

BUSPROG: Technology
Bloom's: Remember
Difficulty Level: Easy
Page: 28
Feedback: A byte is the size of a character. For example, the word "computer" consists of 8 characters or 8 bytes (64 bits).

13. Computers and communication systems use _____ to represent and transfer information between computers and network systems.

a. intranets
b. light pens
c. data codes
d. prototypes

Answer: C
Chapter Learning Outcome: 2.3: Explain the factors distinguishing the computing power of computers.
Topic: The Power of Computers
BUSPROG: Technology
Bloom's: Remember
Difficulty Level: Easy
Page: 28
Feedback: Computers and communication systems use data codes to represent and transfer data between computers and network systems. The most common data code for text files, PC applications, and the Internet is American Standard Code for Information Interchange (ASCII).

14. In a(n) _____ file, each alphabetic, numeric, or special character is represented with a 7-bit binary number.

a. EBCDIC
b. Unicode
c. ASCII
d. extended ASCII

Answer: C
Chapter Learning Outcome: 2.3: Explain the factors distinguishing the computing power of computers.
Topic: The Power of Computers
BUSPROG: Technology
Bloom's: Remember
Difficulty Level: Easy
Page: 28
Feedback: In an ASCII file, each alphabetic, numeric, or special character is represented with a 7-bit binary number (a string of 0s or 1s). Up to 128 (2^7) characters can be defined.

15. Extended ASCII data code allows representation of _____ characters.

a. 1042
b. 265
c. 256
d. 1024

Answer: C
Chapter Learning Outcome: 2.3: Explain the factors distinguishing the computing power of computers.
Topic: The Power of Computers
BUSPROG: Technology
Bloom's: Remember
Difficulty Level: Easy
Page: 28
Feedback: Extended ASCII is an 8-bit code that also allows representation of 256 characters.

16. ASCII defines up to _____ characters.

a. 8
b. 128
c. 258
d. 1024

Answer: B
Chapter Learning Outcome: 2.3: Explain the factors distinguishing the computing power of computers.
Topic: The Power of Computers
BUSPROG: Technology
Bloom's: Remember
Difficulty Level: Easy
Page: 28
Feedback: In an ASCII file, each alphabetic, numeric, or special character is represented with a 7-bit binary number (a string of 0s or 1s). Up to 128 (2^7) characters can be defined.

17. A _____ is a pointing device that moves the cursor on the screen, allowing fast, precise cursor positioning.

a. motherboard
b. keyboard
c. mouse
d. kernel

Answer: C
Chapter Learning Outcome: 2.5: Discuss the types of input, output, and memory devices.
Topic: Input, Output, and Memory Devices
BUSPROG: Technology
Bloom's: Remember
Difficulty Level: Easy
Page: 29
Feedback: Mouse is a pointing device that moves the cursor on the screen, allowing fast, precise cursor positioning. With programs that use graphical interfaces, such as Microsoft Windows or Mac OS, the mouse has become the input device of choice.

18. Which of the following is an input device?

a. Touch screen
b. Cathode ray tube
c. Liquid crystal display
d. Inkjet printer

Answer: A
Chapter Learning Outcome: 2.5: Discuss the types of input, output, and memory devices.
Topic: Input, Output, and Memory Devices
BUSPROG: Technology
Bloom's: Remember
Difficulty Level: Easy
Page: 29
Feedback: Touch screen is a combination of input devices, usually working with menus.

19. _____ is the most common output device for soft copy.

a. Liquid crystal display
b. Inkjet printer
c. Laser printer
d. Touch screen

Answer: A
Chapter Learning Outcome: 2.5: Discuss the types of input, output, and memory devices.
Topic: Input, Output, and Memory Devices
BUSPROG: Technology
Bloom's: Remember
Difficulty Level: Easy
Page: 30
Feedback: The most common output devices for soft copy are cathode ray tube (CRT), plasma display, and liquid crystal display (LCD).

20. _____, which is nonvolatile, holds data when the computer is off or during the course of a program's operation, and it is also used to store large volumes of data for long periods.

a. Random access memory
b. Read-only memory
c. Secondary memory
d. Programmable read-only memory

Answer: C
Chapter Learning Outcome: 2.5: Discuss the types of input, output, and memory devices.
Topic: Input, Output, and Memory Devices
BUSPROG: Technology
Bloom's: Remember
Difficulty Level: Easy
Page: 31
Feedback: Secondary memory devices are nonvolatile and used for storing large volumes of data for long periods. They can also hold data when the computer is off or during the course of a program's operation.

21. The Clipboard's contents are typically stored on ____.

a. read-only memory (ROM)
b. random access memory (RAM)
c. magnetic disks
d. magnetic tapes

Answer: B
Chapter Learning Outcome: 2.5: Discuss the types of input, output, and memory devices.
Topic: Input, Output, and Memory Devices
BUSPROG: Technology
Bloom's: Remember
Difficulty Level: Easy
Page: 31
Difficulty: Some examples of the type of information stored in RAM include open files, the Clipboard's contents, running programs, and so forth.

22. Read-only memory (ROM) is different from random access memory (RAM) in that:

a. it is volatile memory.
b. it is a secondary memory.
c. it is nonvolatile memory.
d. it is a read-write memory.

Answer: C
Chapter Learning Outcome: 2.5: Discuss the types of input, output, and memory devices.
Topic: Input, Output, and Memory Devices
BUSPROG: Technology
Bloom's: understand
Difficulty Level: Moderate
Page: 31
Feedback: Nonvolatile memory is called read-only memory (ROM); data cannot be written to ROM.

23. Which of the following is true about magnetic tapes?

a. It is made of metal.
b. It stores data sequentially.
c. It resembles a compact disc.
d. It is a main memory device.

Answer: B
Chapter Learning Outcome: 2.5: Discuss the types of input, output, and memory devices.
Topic: Input, Output, and Memory Devices
BUSPROG: Technology
Bloom's: understand
Difficulty Level: Moderate
Page: 31
Feedback: Magnetic tape, made of a plastic material, resembles a cassette tape and stores data sequentially.

24. A write once, read many (WORM) disc is a common type of _____.
a. magnetic storage
b. optical storage
c. random access memory (RAM)
d. read-only memory (ROM)

Answer: B
Chapter Learning Outcome: 2.5: Discuss the types of input, output, and memory devices.
Topic: Input, Output, and Memory Devices
BUSPROG: Technology
Bloom's: Remember
Difficulty Level: Easy
Page: 32
Feedback: Three common types of optical storage are CD-ROMs, WORM discs, and DVDs. A write once, read many (WORM) disc is also a permanent device.

25. CD-ROMs and DVDs are examples of _____.
a. magnetic tapes
b. magnetic disks
c. optical discs
d. main memory devices

Answer: C
Chapter Learning Outcome: 2.5: Discuss the types of input, output, and memory devices.
Topic: Input, Output, and Memory Devices
BUSPROG: Technology
Bloom's: Remember
Difficulty Level: Easy
Page: 32
Feedback: Three common types of optical storage are CD-ROMs, WORM discs, and DVDs.

26. A _____ allows data to be stored in multiple places to improve a system's reliability.
a. remote access server
b. read-only memory
c. random access memory
d. redundant array of independent disks

Answer: D
Chapter Learning Outcome: 2.5: Discuss the types of input, output, and memory devices.
Topic: Input, Output, and Memory Devices
BUSPROG: Technology
Bloom's: Remember
Difficulty Level: Easy
Page: 32
Feedback: A redundant array of independent disks (RAID) system is a collection of disk drives used for fault tolerance and improved performance, and is typically found in large network systems. Data can be stored in multiple places to improve the system's reliability.

27. _____ storage, which is used for online storage and backup, involves multiple virtual servers that are usually hosted by third parties.
a. Kernel
b. Buffer
c. Cache
d. Cloud

Answer: D
Chapter Learning Outcome: 2.5: Discuss the types of input, output, and memory devices.
Topic: Input, Output, and Memory Devices
BUSPROG: Technology
Bloom's: Remember

Difficulty Level: Easy
Page: 32–33
Feedback: Cloud storage has become a popular option for many organizations and individuals in recent years. Used for online storage and backup, it involves multiple virtual servers that are usually hosted by third parties.

28. _____ allow off-site users to connect to network resources, such as network file storage, printers, and databases.

a. Remote access servers
b. Web servers
c. Application servers
d. Disk servers

Answer: A
Chapter Learning Outcome: 2.6: Explain how computers are classified.
Topic: Classes of Computers
BUSPROG: Technology
Bloom's: Remember
Difficulty Level: Easy
Page: 35
Feedback: Remote access servers (RAS) allow off-site users to connect to network resources, such as network file storage, printers, and databases.

29. Which of the following best defines an operating system?

a. It is a set of programs for controlling and managing computer hardware and software.
b. It is a computer and all the software for managing network resources and offering services to a network.
c. It is a collection of disk drives used for fault tolerance, typically in large network systems.
d. It is the main circuit board containing connectors for attaching additional boards.

Answer: A
Chapter Learning Outcome: 2.7: Describe the two major types of software.
Topic: What Is Software?
BUSPROG: Technology
Bloom's: Remember
Difficulty Level: Easy
Page: 35
Feedback: An operating system (OS) is a set of programs for controlling and managing computer hardware and software.

30. The control programs managing computer hardware and software perform the _____ function to control and prioritize tasks performed by the CPU.

a. application management
b. resource allocation
c. data management
d. job management

Answer: D
Chapter Learning Outcome: 2.7: Describe the two major types of software.
Topic: What Is Software?
BUSPROG: Technology
Bloom's: Remember
Difficulty Level: Easy
Page: 35
Feedback: The control programs managing computer hardware and software perform the job management function to control and prioritize tasks performed by the CPU.

31. The supervisor program in an operating system (OS) is called the ____.

a. kernel
b. metadata
c. applet
d. cache

Answer: A
Chapter Learning Outcome: 2.7: Describe the two major types of software.
Topic: What Is Software?
BUSPROG: Technology
Bloom's: Remember
Difficulty Level: Easy
Page: 36
Feedback: The supervisor program, also known as the kernel, is responsible for controlling all other programs in the OS, such as compilers, interpreters, assemblers, and utilities for performing special tasks.

32. UNIX is a type of _____.
a. storage area network
b. application software
c. remote access server
d. operating system

Answer: D
Chapter Learning Outcome: 2.7: Describe the two major types of software.
Topic: What Is Software?
BUSPROG: Technology
Bloom's: Remember
Difficulty Level: Easy
Page: 36
Feedback: UNIX is a mainframe operating system.

33. _____ computer languages are machine independent and are called high-level languages.
a. First-generation
b. Second-generation
c. Third-generation
d. Fourth-generation

Answer: C
Chapter Learning Outcome: 2.8: List the generations of computer languages.
Topic: Computer Languages
BUSPROG: Technology
Bloom's: Remember
Difficulty Level: Easy
Page: 38
Feedback: Third-generation computer languages are machine independent and are called high-level languages. Three of the most widely used languages are C++, Java, and VB.NET.

34. Java and C++ are _____ languages.
a. assembly
b. high-level
c. machine
d. second-generation computer

Answer: B
Chapter Learning Outcome: 2.8: List the generations of computer languages.
Topic: Computer Languages
BUSPROG: Technology
Bloom's: Remember
Difficulty Level: Easy
Page: 38
Feedback: Three of the most widely used high-level languages are C++, Java, and VB.NET.

35. Which of the following computer languages is the easiest to use?
a. Assembly language
c. Fourth-generation language

b. First-generation language
d. Machine language
Answer: C
Chapter Learning Outcome: 2.8: List the generations of computer languages.
Topic: Computer Languages
BUSPROG: Technology
Bloom's: Remember
Difficulty Level: Easy
Page: 38
Feedback: Fourth-generation languages (4GLs) are the easiest computer languages to use. The commands are powerful and easy to learn, even for people with little computer training.

COMPLETION

1. A(n) _____ is a machine that accepts data as input, processes data without human intervention by using stored instructions, and outputs information.

Answer: computer
Chapter Learning Outcome: 2.1: Define a computer system, and describe its components.
Topic: Defining a Computer
BUSPROG: Technology
Bloom's: Remember
Difficulty Level: Easy
Page: 24
Feedback: A computer is a machine that accepts data as input, processes data without human intervention by using stored instructions, and outputs information.

2. The _____ is the heart of a computer.

Answer: central processing unit (CPU)
Chapter Learning Outcome: 2.1: Define a computer system, and describe its components.
Topic: Defining a Computer
BUSPROG: Technology
Bloom's: Remember
Difficulty Level: Easy
Page: 25
Feedback: The central processing unit (CPU) is the heart of a computer. It is divided into two components: the arithmetic logic unit (ALU) and the control unit.

3. The _____ tells the computer what to do, such as instructing the computer which device to read or send output to.

Answer: control unit
Chapter Learning Outcome: 2.1: Define a computer system, and describe its components.
Topic: Defining a Computer
BUSPROG: Technology
Bloom's: Remember
Difficulty Level: Easy
Page: 25
Feedback: The control unit tells the computer what to do, such as instructing the computer which device to read or send output to.

4. A(n) _____ is the enclosure containing a computer's main components.

Answer: central processing unit (CPU) case
computer chassis
tower
Chapter Learning Outcome: 2.1: Define a computer system, and describe its components.
Topic: Defining a Computer
BUSPROG: Technology
Bloom's: Remember
Difficulty Level: Easy
Page: 25
Feedback: A CPU case (also known as a computer chassis or tower) is the enclosure containing the computer's main components.

5. The _____ computers include parallel processing, gallium arsenide chips that run at higher speeds and consume less power than silicon chips, and optical technologies.

Answer: fifth-generation
Chapter Learning Outcome: 2.2: Discuss the history of computer hardware and software.
Topic: The History of Computer Hardware and Software
BUSPROG: Technology
Bloom's: Remember
Difficulty Level: Easy
Page: 26
Feedback: The current fifth-generation computers include parallel processing (computers containing hundreds or thousands of CPUs for rapid data processing), gallium arsenide chips that run at higher speeds and consume less power than silicon chips, and optical technologies.

6. _____ bits equal 1 byte.

Answer: Eight

Chapter Learning Outcome: 2.3: Explain the factors distinguishing the computing power of computers.
Topic: The Power of Computers
BUSPROG: Technology
Bloom's: Remember
Difficulty Level: Easy
Page: 28
Feedback: A bit is a single value of 0 or 1, and 8 bits equal 1 byte. A byte is the size of a character.

7. The most common data code for text files, PC applications, and the Internet is _____, developed by the American National Standards Institute.

Answer: American Standard Code for Information Interchange (ASCII)
Chapter Learning Outcome: 2.3: Explain the factors distinguishing the computing power of computers.
Topic: The Power of Computers
BUSPROG: Technology
Bloom's: Remember
Difficulty Level: Easy
Page: 28
Feedback: The most common data code for text files, PC applications, and the Internet is American Standard Code for Information Interchange (ASCII), developed by the American National Standards Institute.

8. _____ is a light-sensitive stylus connected to the monitor with a cable. When it is placed on an on-screen location, the data in that spot is sent to the computer.

Answer: Light pen
Chapter Learning Outcome: 2.5: Discuss the types of input, output, and memory devices.
Topic: Input, Output, and Memory Devices
BUSPROG: Technology
Bloom's: Remember
Difficulty Level: Easy
Page: 29
Feedback: Light pen is a light-sensitive stylus connected to the monitor with a cable. When it is placed on an on-screen location, the data in that spot is sent to the computer. The data can be characters, lines, or blocks.

9. The most common type of main memory is a semiconductor memory chip made of _____.

Answer: silicon
Chapter Learning Outcome: 2.5: Discuss the types of input, output, and memory devices.
Topic: Input, Output, and Memory Devices
BUSPROG: Technology
Bloom's: Remember
Difficulty Level: Easy
Page: 31
Feedback: The most common type of main memory is a semiconductor memory chip made of silicon. A semiconductor memory device can be volatile or nonvolatile.

10. A(n) _____, made of Mylar or metal, is used for random-access processing.

Answer: magnetic disk
Chapter Learning Outcome: 2.5: Discuss the types of input, output, and memory devices.
Topic: Input, Output, and Memory Devices
BUSPROG: Technology
Bloom's: Remember
Difficulty Level: Easy
Page: 31
Feedback: A magnetic disk, made of Mylar or metal, is used for random-access processing. In other words, data can be accessed in any order, regardless of its order on the surface.

11. _____ use laser beams to access and store data.

Answer: Optical discs
Chapter Learning Outcome: 2.5: Discuss the types of input, output, and memory devices.
Topic: Input, Output, and Memory Devices
BUSPROG: Technology
Bloom's: Remember
Difficulty Level: Easy
Page: 32
Feedback: Optical discs use laser beams to access and store data. Optical technology can store vast amounts of data and is durable.

12. _____ computers are usually compatible with the IBM System/360 line introduced in 1965.

Answer: Mainframe

Chapter Learning Outcome: 2.6: Explain how computers are classified.
Topic: Classes of Computers
BUSPROG: Technology
Bloom's: Remember
Difficulty Level: Easy
Page: 33
Feedback: Mainframe computers are usually compatible with the IBM System/360 line introduced in 1965.

13. _____ servers store computer software, which users can access from their workstations.

Answer: Application
Chapter Learning Outcome: 2.6: Explain how computers are classified.
Topic: Classes of Computers
BUSPROG: Technology
Bloom's: Remember
Difficulty Level: Easy
Page: 35
Feedback: Application servers store computer software, which users can access from their workstations.

14. Microsoft PowerPoint is the most commonly used _____ software.

Answer: presentation
Chapter Learning Outcome: 2.7: Describe the two major types of software.
Topic: What Is Software?
BUSPROG: Technology
Bloom's: Remember
Difficulty Level: Easy
Page: 37
Feedback: Microsoft PowerPoint is the most commonly used presentation software; other examples include Adobe Persuasion and Corel Presentations.

15. _____ software, which is extensively used in architecture and engineering firms, is used for drafting and design and has replaced traditional tools, such as T-squares, triangles, paper, and pencils.

Answer: Computer-aided design (CAD)
Chapter Learning Outcome: 2.7: Describe the two major types of software.
Topic: What Is Software?
BUSPROG: Technology
Bloom's: Remember
Difficulty Level: Easy
Page: 38
Feedback: Computer-aided design (CAD) software is used for drafting and design and has replaced traditional tools, such as T-squares, triangles, paper, and pencils. It is used extensively in architecture and engineering firms.

SHORT ANSWER

1. Provide a general description of how to write a computer program.

Answer: To write a computer program, first a user must know what needs to be done, and then he or she must plan a method to achieve this goal, including selecting the right language for the task. Many computer languages are available; the language the user selects depends on the problem being solved and the type of computer he or she is using.
Chapter Learning Outcome: 2.1: Define a computer system, and describe its components.
Topic: Defining a Computer
BUSPROG: Technology
Bloom's: understand
Difficulty Level: Moderate
Page: 24

2. What is a bus?

Answer: A bus is a link between devices connected to the computer. It can be parallel or serial, internal (local) or external.
Chapter Learning Outcome: 2.1: Define a computer system, and describe its components.
Topic: Defining a Computer
BUSPROG: Technology
Bloom's: Remember
Difficulty Level: Easy
Page: 25

3. Write a short note on single processor and multiprocessor systems.

Answer: Some computers have a single processor; other computers, called *multiprocessors*, contain multiple processors. Multiprocessing is the use of two or more CPUs in a single computer system. Generally, a multiprocessor computer has better performance than a single-processor computer in the same way that a team would have better performance than an individual on a large, time-consuming project.
Chapter Learning Outcome: 2.1: Define a computer system, and describe its components.
Topic: Defining a Computer
BUSPROG: Technology
Bloom's: understand
Difficulty Level: Moderate
Page: 25

4. What is a motherboard?

Answer: A motherboard is the main circuit board containing connectors for attaching additional boards. In addition, it usually contains the CPU, Basic Input/Output System (BIOS), memory, storage, interfaces, serial and parallel ports, expansion slots, and all the controllers for standard peripheral devices, such as the display monitor, disk drive, and keyboard.

Chapter Learning Outcome: 2.1: Define a computer system, and describe its components.
Topic: Defining a Computer
BUSPROG: Technology
Bloom's: understand
Difficulty Level: Easy
Page: 26

5. Describe how computer speed is measured.

Answer: Typically, computer speed is measured as the number of instructions performed during the following fractions of a second:
a. Millisecond: 1/1,000 of a second
b. Microsecond: 1/1,000,000 of a second
c. Nanosecond: 1/1,000,000,000 of a second
d. Picosecond: 1/1,000,000,000,000 of a second

Chapter Learning Outcome: 2.3: Explain the factors distinguishing the computing power of computers.
Topic: The Power of Computers
BUSPROG: Technology
Bloom's: understand
Difficulty Level: Moderate
Page: 27–28

6. Describe a binary system.

Answer: Every character, number, or symbol on the keyboard is represented as a binary number in computer memory. A binary system consists of 0s and 1s, with a 1 representing "on" and a 0 representing "off," similar to a light switch.

Chapter Learning Outcome: 2.3: Explain the factors distinguishing the computing power of computers.
Topic: The Power of Computers
BUSPROG: Technology
Bloom's: Remember
Difficulty Level: Easy
Page: 28

7. Describe touch screens.
Answer: Touch screens, which usually work with menus, are a combination of input devices. Some touch screens rely on light detection to determine which menu item has been selected, and others are pressure sensitive. Touch screens are often easier to use than keyboards, but they might not be as accurate because selections can be misread.

Chapter Learning Outcome: 2.5: Discuss the types of input, output, and memory devices.
Topic: Input, Output, and Memory Devices
BUSPROG: Technology
Bloom's: understand
Difficulty Level: Moderate
Page: 29

8. What are the most common output devices for soft copy?

Answer: The most common output devices for soft copy are cathode ray tube (CRT), plasma display, and liquid crystal display (LCD).

Chapter Learning Outcome: 2.5: Discuss the types of input, output, and memory devices.
Topic: Input, Output, and Memory Devices
BUSPROG: Technology
Bloom's: Remember
Difficulty Level: Easy
Page: 30

9. What are the three main types of secondary memory devices?

Answer: There are three main types of secondary memory devices: magnetic disks, magnetic tape, and optical discs.

Chapter Learning Outcome: 2.5: Discuss the types of input, output, and memory devices.
Topic: Input, Output, and Memory Devices
BUSPROG: Technology
Bloom's: Remember
Difficulty Level: Easy
Page: 31

10. What is the reason for the popularity of memory sticks?

Answer: Memory sticks have become popular because of their small size, high storage capacity, and decreasing cost.

Chapter Learning Outcome: 2.5: Discuss the types of input, output, and memory devices.
Topic: Input, Output, and Memory Devices
BUSPROG: Technology
Bloom's: Remember
Difficulty Level: Easy
Page: 32

11. Explain how redundant array of independent disks (RAID) provides fault tolerance and improved performance.

Answer: With RAID, data can be stored in multiple places to improve the system's reliability. In other words, if one disk in the array fails, data is not lost. In some RAID configurations, sequences of data can be read from multiple disks simultaneously, which improves performance.

Chapter Learning Outcome: 2.5: Discuss the types of input, output, and memory devices.
Topic: Input, Output, and Memory Devices
BUSPROG: Technology
Bloom's: understand
Difficulty Level: Moderate
Page: 32

12. What are fax servers?

Answer: Fax servers contain software and hardware components that enable users to send and receive faxes.

Chapter Learning Outcome: 2.6: Explain how computers are classified.
Topic: Classes of Computers
BUSPROG: Technology
Bloom's: Remember
Difficulty Level: Easy
Page: 35

13. What are print servers?

Answer: Print servers enable users to send print jobs to network printers.

Chapter Learning Outcome: 2.6: Explain how computers are classified.

Topic: Classes of Computers
BUSPROG: Technology
Bloom's: Remember
Difficulty Level: Easy
Page: 35

14. Describe desktop publishing software.

Answer: Desktop publishing software is used to produce professional-quality documents without expensive hardware and software. This software works on a "what-you-see-is-what-you-get" concept, so the high-quality screen display gives a user a good idea of what he or she will see in the printed output.

Chapter Learning Outcome: 2.7: Describe the two major types of software.
Topic: What Is Software?
BUSPROG: Technology
Bloom's: understand
Difficulty Level: Moderate
Page: 37–38

15. What is assembly language?

Answer: Assembly language is the second generation of computer languages. It is a higher-level language than machine language but is also machine dependent. It uses a series of short codes, or mnemonics, to represent data or instructions. For example, ADD and SUBTRACT are typical commands in assembly language. Writing programs in assembly language is easier than in machine language.

Chapter Learning Outcome: 2.8: List the generations of computer languages.
Topic: Computer Languages
BUSPROG: Technology
Bloom's: understand
Difficulty Level: Moderate
Page: 38

ESSAY

1. Describe the use of gallium arsenide as a replacement for silicon.

Answer: Because silicon cannot emit light and has speed limitations, computer designers have concentrated on technology using gallium arsenide, in which electrons move almost five times faster than in silicon. Devices made with this synthetic compound can emit light, withstand higher temperatures, and survive much higher doses of radiation than silicon devices. The major problems with gallium arsenide are difficulties in mass production. This material is softer and more fragile than silicon, so it breaks more easily during slicing and polishing. Because of the high costs and difficulty of production, the military is currently the major user of this technology. However, research continues to eliminate some shortcomings of this technology.

Chapter Learning Outcome: 2.2: Discuss the history of computer hardware and software.
Topic: The History of Computer Hardware and Software
BUSPROG: Technology
Bloom's: understand
Difficulty Level: Moderate
Page: 26

2. Discuss the three basic tasks performed by computers.

Answer: Computers can perform three basic tasks: arithmetic operations, logical operations, and storage and retrieval operations.

Computers can add, subtract, multiply, divide, and raise numbers to a power (exponentiation), as shown in these examples:
A + B (addition) 5 + 7 = 12
A − B (subtraction) 5 − 2 = 3
A * B (multiplication) 5 * 2 = 10
A / B (division) 5 / 2 = 2.5
A ^ B (exponentiation) 5 ^ 2 = 25

Computers can perform comparison operations by comparing two numbers. For example, a computer can compare x to y and determine which number is larger.

Computers can store massive amounts of data in very small spaces and locate a particular item quickly. For example, a person can store the text of more than one million books in a memory device about the size of his or her fist.

Chapter Learning Outcome: 2.4: Summarize computer operations.
Topic: Computer Operations
BUSPROG: Technology
Bloom's: understand
Difficulty Level: Moderate
Page: 28–29

3. What is the most common type of main memory? Describe the purpose of cache RAM.

Answer: The most common type of main memory is a semiconductor memory chip made of silicon. A semiconductor memory device can be volatile or nonvolatile. Volatile memory is called random access memory (RAM), although you could think of it as "read-write memory." In other words, data can be read from and written to RAM. Some examples of the type of information stored in RAM include open files, the Clipboard's contents, running programs, and so forth.

A special type of RAM, called cache RAM, resides on the processor. Because memory access from main RAM storage generally takes several clock cycles (a few nanoseconds), cache RAM stores recently accessed memory so the processor is not waiting for the memory transfer.

Chapter Learning Outcome: 2.5: Discuss the types of input, output, and memory devices.
Topic: Input, Output, and Memory Devices
BUSPROG: Technology
Bloom's: understand
Difficulty Level: Moderate
Page: 31

4. Describe the data management function of an operating system.

Answer: The data management function of an operating system controls data integrity by generating checksums to verify that data has not been corrupted or changed. Briefly, when the OS writes data to storage, it generates a value (the checksum) along with the data. The next time this data is retrieved, the checksum is recalculated and compared with the original checksum. If they match, the integrity is intact. If they do not, the data has been corrupted somehow.

Chapter Learning Outcome: 2.7: Describe the two major types of software.
Topic: What Is Software?
BUSPROG: Technology
Bloom's: understand
Difficulty Level: Moderate
Page: 36

5. Describe fifth-generation languages (5GLs) and some of their features.

Answer: Fifth-generation languages (5GLs) use some of the artificial intelligence technologies, such as knowledge-based systems, natural language processing (NLP), visual programming, and a graphical approach to programming. Codes are automatically generated and designed to make the computer solve a given problem without a programmer or with minimum programming effort. These languages are designed to facilitate natural conversations between a user and the computer. Imagine that the user could ask his or her computer, "What product generated the most sales last year?" The computer, equipped with a voice synthesizer, could respond, "Product X." Dragon NaturallySpeaking Solutions is an example of NLP. Research continues in this field because of the promising results so far.

Chapter Learning Outcome: 2.8: List the generations of computer languages.
Topic: Computer Languages
BUSPROG: Technology
Bloom's: understand
Difficulty Level: Moderate
Page: 39