AP Computer Science Principles

Unit 1 Practice Exam: Digital Information

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Practice Assessment · 30 Questions ·

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Name: _____ Period: _____ Date: _____

DIRECTIONS: This practice exam has 30 multiple-choice questions covering Unit 1: Digital Information. Select the *single* best answer unless a question says "Select two."

1. How many distinct values can a single bit represent?

(A) 256
(B) 2
(C) 8
(D) 4

2. A computer stores the byte `01000010`. This same byte could represent a number, a letter, or part of an image. Which statement best explains why?

(A) Only numbers can be stored as bytes
(B) The meaning of a bit pattern depends on the context in which it is used
(C) Each byte has exactly one correct interpretation
(D) The operating system always decides what a byte means before it is stored

3. Which of the following correctly lists storage units from *smallest* to *largest*?

(A) Bit, byte, kilobyte
(B) Byte, bit, kilobyte
(C) Bit, kilobyte, byte
(D) Kilobyte, byte, bit

4. A programmer stores a student's grade, name, and profile photo in three separate variables. At the lowest level, all three are represented as:

(A) Pixels only
(B) Sequences of bits
(C) Decimal numbers only
(D) Analog signals

5. What is the decimal value of the binary number `11001`?

(A) `25`
(B) `27`
(C) `19`
(D) `22`

6. What is the decimal value of the binary number `1010`?

(A) `5`
(B) `12`
(C) `10`
(D) `8`

7. What is the binary representation of the decimal number `13`?

(A) `1010`
(B) `1101`
(C) `1011`
(D) `1110`

8. What is the binary representation of the decimal number `30`?

(A) `10110`
(B) `11011`
(C) `11100`
(D) `11110`

9. How many *different* values can be represented with 5 bits?

(A) `5`
(B) `25`
(C) `32`
(D) `16`

10. A binary counter currently reads `1001 1111`. After adding 1, the counter displays:

(A) `1110 0000`
(B) `1001 1110`
(C) `1010 0000`
(D) `1010 1111`

11. A 4-bit unsigned integer can store values from 0 to 15. A program tries to store the value 18 in this variable. What happens?

(A) An overflow error, because 18 exceeds the range of 4 bits
(B) The system automatically switches to 8 bits
(C) A round-off error
(D) The value wraps to 0 with no error

12. A scientist's calculation produces the value $\frac{1}{3} = 0.333333\ldots$ but the computer stores `0.333`. This is an example of:

(A) A syntax error
(B) An overflow error
(C) A round-off error
(D) Lossy compression

13. Which *two* statements about number representation errors are true?

(Select two answers.)

(A) Overflow errors occur when a value exceeds the range of the fixed number of bits
(B) Using more bits eliminates all possible errors
(C) Round-off errors only occur with whole numbers
(D) Round-off errors occur when a value cannot be stored exactly due to limited precision

14. In ASCII, the character `A` is encoded as 65, `B` as 66, and so on. What number encodes the character `G`?

(A) `71`
(B) `70`
(C) `7`
(D) `72`

15. A web page displays text in both English and Japanese. Which encoding standard allows both to be represented in the same document?

(A) ASCII only
(B) Binary only
(C) Unicode
(D) RGB

16. At the lowest level, a character stored in a computer is represented as:

(A) A pixel
(B) Exactly one bit
(C) A single analog wave
(D) A group of bits following an encoding standard

17. A grayscale image uses 8 bits per pixel. How many shades of gray can each pixel display?

(A) `8`
(B) `16`
(C) `2`
(D) `256`

18. In the RGB color model, the value `(255, 0, 0)` represents:

(A) Blue
(B) Black
(C) Green
(D) Red

19. Increasing the number of bits used per pixel in an image will:

(A) Have no effect on quality or size
(B) Make the image smaller in dimensions
(C) Decrease the file size
(D) Allow more colors to be represented, but increase the file size

20. Which of the following is an example of *digital* data?

(A) The continuously changing air pressure of a spoken word
(B) Ocean waves on a beach
(C) A text message stored as a sequence of characters
(D) The smooth rise in temperature during the day

21. A microphone captures sound. To store this sound on a computer, the analog signal must be:

(A) Sampled at regular intervals and converted to a sequence of bits
(B) Compressed with lossy compression first
(C) Printed on paper
(D) Converted to RGB values

22. A studio records audio at 44,100 samples per second. If they switch to 22,050 samples per second, the recording will:

(A) Use fewer bits but be a less accurate approximation of the original sound
(B) Use more bits and sound better
(C) No longer be digital
(D) Sound identical

23. A digital photo of a sunset can never perfectly capture the original scene because:

(A) Pixels do not exist in digital images
(B) A digital representation is an approximation of the analog original; some detail is always lost
(C) Cameras cannot detect the color orange
(D) Digital images can only be black and white

24. A teacher has a 50 MB slide deck and needs to email it, but the attachment limit is 25 MB. Of the following choices, the best solution is to:

(A) Delete the file
(B) Convert the file to analog
(C) Increase the attachment limit
(D) Compress the file to reduce its size

25. A hospital stores patient medical records digitally. Which compression type should be used?

(A) No compression, because medical files cannot be compressed
(B) Lossless, because the records must be reconstructed exactly
(C) Lossy, because smaller files are always better
(D) Either type, since both reconstruct data exactly

26. Which statement about *lossy* compression is true?

(A) It is only used for text files
(B) It always produces larger files than lossless compression
(C) Some information is permanently discarded and cannot be recovered
(D) The original file can always be restored exactly

27. A song stored as an uncompressed WAV file is 40 MB. The same song as an MP3 is 4 MB. Which best explains the difference?

(A) WAV files contain extra silence
(B) MP3 uses lossy compression, discarding audio data that is less perceptible to human ears
(C) The two formats store completely different songs
(D) MP3 stores the song in analog format

28. Which *two* statements about data compression are true?

(Select two answers.)

(A) The amount of compression depends on the data's redundancy and the algorithm used
(B) Compression always results in a loss of information
(C) Lossless compression allows the original data to be perfectly reconstructed
(D) Compressed files are always larger than the originals

29. A student writes and publishes a blog post. The blog post is:

(A) The intellectual property of the student who created it
(B) Automatically owned by the website hosting the blog
(C) Free for anyone to copy without attribution
(D) Not protected because it is digital

30. A *Creative Commons* license differs from traditional copyright because it:

(A) Removes all rights from the creator
(B) Makes the work completely private
(C) Only applies to music
(D) Allows the creator to specify how others may share, use, and build upon the work