

Question 1: Which searching algorithm requires the array to be sorted before it can be used efficiently?

- a) Linear search
- b) Binary search
- c) Breadth-first search
- d) Hash lookup

Question 2: A student's web form sends empty values to the server intermittently. Which two checks are the most useful first?

- a) Verify client-side validation and confirm server reads request body correctly
- b) Rewrite server in a different language immediately
- c) Disable the browser's JavaScript permanently
- d) Replace HTML `<form>` with images

Question 3: Which data structure uses LIFO (last-in, first-out) access?

- a) Queue
- b) Stack
- c) Binary tree
- d) Hash table

Question 4: In cryptography, which property ensures that only the intended recipient can read the message?

- a) Availability
- b) Confidentiality (usually via encryption)
- c) Non-repudiation
- d) Indexing

Question 5: Which HTML element is semantically correct for the main heading of a page?

- a) `<main>`
- b) `<h1>`
- c) `<div class="title">`
- d) `<span>`

Question 6: In supervised machine learning, which dataset split is commonly used to evaluate final model generalization?

- a) Training set only
- b) Validation set only
- c) Test set (held-out data)
- d) The whole data without split

Question 7: Which SQL statement changes existing rows in a table?

- a) CREATE TABLE
- b) UPDATE table_name SET column = value WHERE condition;
- c) DROP TABLE
- d) SELECT * FROM table_name;

Question 8: You must find the shortest path in a weighted graph with non-negative edge weights. Which algorithm is most appropriate?

- a) Depth-first search (DFS)
- b) Dijkstra's algorithm
- c) Binary search
- d) Bubble sort

Question 9: Which JavaScript method adds a new element to the end of an array?

- a) pop()
- b) push()
- c) shift()
- d) slice()

Question 10: Which complexity class describes an algorithm whose running time is proportional to $n \cdot \log n$?

- a) $O(n)$
- b) $O(n^2)$
- c) $O(n \log n)$
- d) $O(\log n)$

Question 11: A school requires strong passwords. Which policy best balances security and usability?

- a) Require long passphrases, allow memorable dictionary phrases, and enable rate-limiting + 2FA rather than forcing frequent arbitrary complex resets
- b) Force daily password changes with many special characters only
- c) Store passwords in plaintext for quick retrieval
- d) Require identical password for all users

Question 12: Which data structure is ideal for implementing a priority queue efficiently?

- a) Unsorted array
- b) Binary heap (min-heap or max-heap)
- c) Linked list on random order
- d) Plain text file

Question 13: What does HTTPS primarily add to HTTP requests?

- a) Faster page rendering
- b) Encryption and integrity using TLS/SSL
- c) Larger images by default
- d) Automatic popups

Question 14: Which SQL clause groups rows to allow aggregation functions like SUM and AVG per group?

- a) WHERE
- b) HAVING
- c) GROUP BY
- d) ORDER BY

Question 15: A model trained on photos of handwritten digits performs poorly on digits written by children because the dataset used young adults' handwriting. Which concept explains this problem?

- a) Over fitting to training noise only
- b) Dataset bias / lack of representative samples
- c) A model always fails on children's handwriting by design
- d) Hyperthreading mismatch

Question 16: In CSS, which property controls the space between lines of text?

- a) letter-spacing
- b) line-height
- c) margin
- d) text-indent

Question 17: Which of the following is a stable sorting algorithm?

- a) Quick sort
- b) Merge sort
- c) Heap sort
- d) Selection sort

Question 18: A website relies on images for buttons with no alt text. Which accessibility issue arises and what is a correct fix?

- a) Screen-reader users cannot understand the button; add meaningful `alt` attributes or use semantic `<button>` with accessible text.
- b) SEO will fail but accessibility is fine.
- c) Remove all images from the site.
- d) Add more colours only.

Question 19: Which data structure allows average-case $O(1)$ insert, delete, and lookup?

- a) Binary search tree
- b) Hash table
- c) Array-based stack
- d) Linear linked list

Question 20: Which cryptographic primitive provides both confidentiality and integrity when used correctly?

- a) Plain hashing alone
- b) Authenticated encryption
- c) Symmetric XOR
- d) Base64 encoding

Question 21: Which HTTP status code indicates "resource not found"?

- a) 200
- b) 404
- c) 500
- d) 301

Question 22: A sorting algorithm is expected $O(n \log n)$ but runs quadratic on some inputs. Which cause is the most likely?

- a) Implementation uses a poor pivot selection causing worst-case $O(n^2)$ on sorted inputs
- b) The CPU is underwater
- c) Sorting is impossible faster than $O(n^2)$ always
- d) The algorithm is using mergesort with stable merges

Question 23: Which SQL construct prevents duplicate rows based on a column?

- a) NOT NULL constraint
- b) UNIQUE constraint or PRIMARY KEY
- c) FOREIGN KEY
- d) CHECK

Question 24: In object-oriented programming, which principle restricts direct access to some components and exposes operations through methods?

- a) Inheritance
- b) Encapsulation
- c) Polymorphism only
- d) Compilation

Question 25: Which machine learning task predicts a continuous numeric target?

- a) Classification
- b) Regression
- c) Clustering
- d) Dimensionality reduction

Question 26: A small school network has many devices with default passwords. Which immediate actions reduce risk most effectively?

- a) Replace default passwords with unique strong passwords, enable network segmentation and update device firmware
- b) Turn off the network entirely forever
- c) Publish default passwords publicly for transparency
- d) Remove power from all devices

Question 27: Which algorithm finds shortest paths from one source to all vertices in a graph with possible negative edge weights (but no negative cycles)?

- a) Dijkstra's algorithm
- b) Bellman-Ford algorithm
- c) Kruskal's algorithm
- d) Prim's algorithm

Question 28: Which HTML tag is used to include external JavaScript files?

- a) `<js src="file.js">`
- b) `<script src="file.js"></script>`
- c) `<javascript link="file.js">`
- d) `<include src="file.js">`

Question 29: Which data structure is best for implementing undo functionality (multiple steps back) in an editor?

- a) Queue
- b) Stack
- c) Binary search tree
- d) Priority queue

Question 30: Which loss function is commonly used for binary classification tasks?

- a) Mean Squared Error only
- b) Cross-entropy loss (logistic loss)
- c) Euclidean distance only
- d) Hinge loss only

Question 31: A login form blindly concatenates user input into SQL:

`"SELECT * FROM users WHERE name = '" + username + "';"`

Which change prevents SQL injection?

- a) Use prepared statements / parameterized queries and validate inputs
- b) Replace single quotes with double quotes only on frontend
- c) Limit usernames to 1 character
- d) Use string concatenation faster

Question 32: Which tree traversal visits nodes in left-root-right order (for binary trees)?

- a) Preorder
- b) Inorder
- c) Postorder
- d) Level order

Question 33: In supervised learning, which evaluation metric is most important when false positives are costly?

- a) High recall only
- b) High precision
- c) F1 score only regardless of context
- d) Accuracy only

Question 34: You design a RESTFUL API to return a list of students. Which HTTP method and status code are appropriate for successful retrieval?

- a) POST and 201
- b) GET and 200
- c) DELETE and 204
- d) PUT and 400

Question 35: Which algorithmic technique explores all solutions level by level and is guaranteed to find shortest path in unweighted graphs?

- a) Depth-first search (DFS)
- b) Breadth-first search (BFS)
- c) Greedy best-first search only
- d) Binary search

Question 36: Which SQL clause filters results after grouping (e.g., groups with AVG>50)?

- a) WHERE
- b) HAVING
- c) ORDER BY
- d) FROM

Question 37: Which Python structure is an immutable sequence type?

- a) list
- b) tuple
- c) dict
- d) set

Question 38: A teacher sees a model with 99% training accuracy but 60% test accuracy. Which remedies are sensible?

- a) Use regularization, collect more diverse training data, simplify model architecture, or use cross-validation
- b) Add noise to test set to make it harder
- c) Increase model parameters indefinitely
- d) Delete test set

Question 39: Which HTML attribute is required for responsive images to scale correctly to their container?

- a) width="1000" fixed only
- b) Use CSS
- c) background="true"
- d) resize="yes"

Question 40: Which of these sorts is worst-case $O(n^2)$ but average-case $O(n \log n)$ and commonly fast in practice?

- a) Bubble sort
- b) Quick sort
- c) Selection sort
- d) Merge sort

Question 41: Which key management practice is most important to keep encrypted data secure?

- a) Store private keys securely
- b) Email keys to all team members for convenience
- c) Commit keys to version control with no access control
- d) Use the same key for everything forever

Question 42: Which data structure supports fast prefix searches?

- a) Trie
- b) Stack
- c) Graph only
- d) Queue

Question 43: Which JavaScript event is best to use to run code after the DOM is fully loaded but before images load?

- a) window.onload
- b) DOMContentLoaded
- c) onclick only
- d) onerror

Question 44: Which machine learning method groups are similar examples without labels?

- a) Supervised classification
- b) Unsupervised clustering
- c) Regression
- d) Reinforcement learning

Question 45: A small organization must ensure database availability after ransomware. Which backup strategy is the best practice?

- a) Maintain regular offline (air-gapped) backups, test restores, and use immutable backup storage with versioning
- b) Only one live copy of the database, no backups
- c) Store backups on the same server as database only
- d) Rely on screenshots of data

Question 46: In relational databases, what does a foreign key enforce?

- a) Uniqueness of values in the same table
- b) Referential integrity by linking to a primary key in another table
- c) Automatic indexing for all columns
- d) Data encryption by default

Question 47: Which sorting algorithm is guaranteed $O(n \log n)$ worst-case and requires extra memory?

- a) Quick sort
- b) Merge sort
- c) Selection sort
- d) Insertion sort

Question 48: A front-end app on siteA.com requests data from api.siteB.com and gets blocked by the browser. What is the reason and the typical server-side fix?

- a) Browser blocks cross-origin requests by default (CORS)
- b) Browser needs a faster CPU
- c) Change client IP address only
- d) Use FTP instead

Question 49: Which of these is a linear data structure?

- a) Binary tree
- b) Linked list
- c) Graph
- d) Hash map

Question 50: Which activation function is commonly used in deep neural networks and helps with vanishing gradient problem compared to sigmoid?

- a) Sigmoid only
- b) ReLU (Rectified Linear Unit)
- c) Step function always
- d) Linear with no nonlinearity

Question 51: A banking system requires that money transfers should be atomic, consistent, isolated, and durable. Which database concept ensures these properties?

- a) BASE
- b) ACID transactions in relational databases
- c) Stateless HTTP only
- d) Flat files

Question 52: Which command deletes all records from a table but keeps the table structure and may be faster than deleting rows one by one?

- a) DROP TABLE table_name;
- b) TRUNCATE TABLE table_name;
- c) DELETE DATABASE;
- d) REMOVE table_name;

Question 53: Which algorithmic strategy uses memorization to convert exponential recursive solutions into polynomial time by caching results?

- a) Greedy algorithms
- b) Dynamic programming
- c) Backtracking only
- d) Brute force

Question 54: Which HTTP status code indicates a permanent redirect?

- a) 302
- b) 301
- c) 404
- d) 500

Question 55: A teacher wants to deploy a handwritten-digit classifier to many student devices with limited CPU. Which approach is more relevant?

- a) Use a small, efficient model (mobile/quantized model) and perform inference on device OR use a lightweight server endpoint
- b) Deploy the largest model available without optimization
- c) Require students to buy supercomputers
- d) Convert model to images and send via mail

Question 56: Which SQL keyword prevents duplicate rows in the result set of a SELECT query?

- a) UNIQUE
- b) DISTINCT
- c) GROUP
- d) ORDER

Question 57: Which graph algorithm finds a minimum spanning tree?

- a) Dijkstra's algorithm
- b) Kruskal's or Prim's algorithm
- c) Floyd–Warshall only
- d) Binary search

Question 58: A web app logs detailed user passwords for debugging. Which principle does this violate and what is the fix?

- a) Violates privacy and security best practices
- b) Logging passwords is best practice for auditing
- c) Share logs with all developers publicly
- d) Store logs in public cloud bucket without authentication

Question 59: Which SQL JOIN returns all rows from the left table and matched rows from the right table, filling NULLs when no match?

- a) INNER JOIN
- b) LEFT OUTER JOIN
- c) RIGHT OUTER JOIN
- d) CROSS JOIN

Question 60: Which metric measures how well a classification model distinguishes between classes?

- a) Mean Absolute Error (MAE)
- b) AUC-ROC (Area Under the Receiver Operating Characteristic curve)
- c) Confusion matrix only without derived metric
- d) Euclidean distance