NCO-Style · Original Practice Content

Class 4 | Cyber Olympiad

40 Questions · With Answer Key
Syllabax Olympiad Series
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Instructions: Each question has one correct answer. Choose the best option (A/B/C/D). Answer key is provided at the end. This paper is for practice only — not an official exam paper. Recommended time: **45 minutes**.

Q1. What is the time complexity of binary search?

A. O(n)
B. O(n log n)
C. O(log n)
D. $O(n^2)$

Q2. In Python, which of these correctly opens a file for reading?

A. open('file.txt', 'w')
B. open('file.txt', 'a')
C. open('file.txt', 'r')
D. open('file.txt', 'x')

Q3. What does 'OOP' stand for?

A. Object-Oriented Programming
B. Open Online Protocol
C. Ordered Operations Processing
D. Optional Output Parameter

Q4. In object-oriented programming, 'inheritance' means:

A. a class runs inside another class
B. one class inherits properties and methods from a parent class
C. two objects share the same memory
D. a function calls itself

Q5. What is the output of: print(2 ** 8) in Python?

A. 16
B. 28
C. 128
D. 256

Q6. In a linked list, each node contains:

A. only data
B. only a pointer to the next node
C. data and a pointer to the next node
D. data and two pointers to other nodes

Q7. What is a 'stack' data structure?

A. data stored in a circle

B. FIFO (First In First Out) structure

C. LIFO (Last In First Out) structure

D. data sorted alphabetically

Q8. What is a 'queue' data structure?

A. LIFO (Last In First Out) structure

B. FIFO (First In First Out) structure

C. unordered data storage

D. a tree with two branches

Q9. In Python, what does 'list.append(x)' do?

A. removes x from the list

B. sorts the list

C. inserts x at position 0

D. adds x to the END of the list

Q10. The OSI model has how many layers?

A. 4

B. 5

C. 7

D. 9

Q11. In Python, what is the output of: print(type(3.14))?

A.

B.

C.

D.

Q12. A 'hash table' provides average-case time complexity for search of:

A. O(n)

B. O(log n)

C. O(1)

D. $O(n^2)$

Q13. What is 'recursion' in programming?

A. a loop that runs 100 times

B. a function that calls itself

C. data stored in a tree

D. an error in the code

Q14. In SQL, which command retrieves data from a table?

A. INSERT

B. DELETE

C. UPDATE

D. SELECT

Q15. What does 'encapsulation' mean in OOP?

A. copying a class

B. breaking a class into smaller functions

C. bundling data and methods together, and restricting direct access to internal details

D. calling a function from another class

Q16. In Python, what is a 'dictionary'?

A. a list of words

B. an ordered list of items

C. a key-value pair data structure

D. a type of loop

Q17. What is the result of 0b1010 + 0b0110 in binary (expressed in decimal)?

A. 14

B. 16

C. 12

D. 18

Q18. In networking, IP stands for:

A. Internet Protocol

B. Internal Program

C. Interface Port

D. Input Process

Q19. Which sorting algorithm has worst-case time complexity O(n log n)?

A. bubble sort

B. insertion sort

C. selection sort

D. merge sort

Q20. In Python, 'try-except' is used for:

A. creating loops

B. handling exceptions/errors gracefully

C. defining classes

D. opening files

Q21. What does 'polymorphism' mean in OOP?

A. a class having many parent classes

B. objects of different classes responding to the same method call differently

C. storing multiple data types in one list

D. two programs running simultaneously

Q22. What is the purpose of a 'Virtual Private Network' (VPN)?

A. speed up Internet connection

B. store data in the cloud

C. create an encrypted, private tunnel over the Internet for secure communication

D. manage domain names

Q23. In binary, what is 11111111 + 00000001?

A. 11111110

B. 100000000

C. 11111111

D. 100000001

Q24. Which of the following correctly describes a 'tree' data structure?

A. linear list of nodes

B. nodes in a circle

C. hierarchical structure with a root node and child nodes

D. nodes sorted alphabetically

Q25. In Python, list comprehension [x**2 for x in range(4)] produces:

A. [1, 4, 9, 16]

B. [0, 1, 4, 9]

C. [0, 1, 2, 3]

D. [4, 9, 16, 25]

Q26. What is 'two-factor authentication' (2FA)?

A. using two different passwords

B. a security method requiring two forms of identification

C. logging in twice to the same account

D. encrypting data twice

Q27. In the OSI model, the transport layer provides:

A. physical transmission of bits

B. IP routing between networks

C. end-to-end communication, error recovery, and flow control (TCP/UDP)

D. application protocols like HTTP

Q28. What does the 'heap' data structure guarantee about its root?

A. it is the median element

B. it is the smallest (min-heap) or largest (max-heap) element

C. it has no children

D. it is always the most recently added element

Q29. In Python, what is 'list slicing' for mylist = [10, 20, 30, 40, 50]: mylist[1:4] returns?

A. [10, 20, 30]

B. [20, 30, 40, 50]

C. [20, 30, 40]

D. [30, 40, 50]

Q30. What does 'TCP' (Transmission Control Protocol) guarantee that 'UDP' does not?

A. faster transmission

B. lower latency

C. reliable, ordered delivery of packets

D. encryption of data

Q31. In HTML/CSS, what does 'responsive design' mean?

A. the page responds to user clicks instantly

B. the layout adapts to different screen sizes (mobile, tablet, desktop)

C. the server responds to requests faster

D. the page loads with animations

Q32. In Python, what is the output of: print(bool(0))?

A. 0

B. None

C. True

D. False

Q33. In a database, 'normalisation' is the process of:

A. encrypting data for security

B. speeding up queries with indexes

C. organising data to reduce redundancy and improve integrity

D. backing up data

Q34. What is 'big O notation' used for?

A. measuring the exact runtime in seconds

B. measuring memory usage in bytes

C. describing the upper bound of an algorithm's time or space complexity

D. counting the number of lines of code

Q35. In JavaScript, 'document.getElementById("myId")' is used to:

A. create a new HTML element

B. delete an element from the page

C. select an HTML element by its ID attribute

D. apply CSS to all elements

Q36. What is the purpose of a 'decorator' in Python?

A. add visual formatting to output

B. a function that modifies the behaviour of another function

C. create a subclass

D. import external libraries

Q37. What is 'man-in-the-middle' (MITM) attack?

A. an attacker physically breaking into a server room

B. malware that encrypts your files for ransom

C. an attacker intercepting and possibly altering communications between two parties

D. flooding a server with traffic to make it crash

Q38. What does 'IPv6' provide that 'IPv4' does not adequately support?

- **A.** faster Internet speed
- **B.** a much larger address space (128-bit vs 32-bit addresses)
- **C.** wireless connectivity
- **D.** encryption of all traffic

Q39. In Python, 'lambda x: x * 2' defines:

- **A.** a class named lambda
- **B.** a loop that multiplies by 2
- **C.** an anonymous function that doubles its input
- **D.** a recursive function

Q40. What is 'garbage collection' in programming?

- **A.** deleting unused programs
- **B.** automatic reclamation of memory that is no longer in use
- **C.** cleaning up unused CSS styles
- **D.** removing old log files

Answer Key

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Q1: C    Q2: C    Q3: A    Q4: B    Q5: D    Q6: C    Q7: C    Q8: B    Q9: D    Q10: C
Q11: C   Q12: C   Q13: B   Q14: D   Q15: C   Q16: C   Q17: B   Q18: A   Q19: D
Q20: B   Q21: B   Q22: C   Q23: B   Q24: C   Q25: B   Q26: B   Q27: C   Q28: B
Q29: C   Q30: C   Q31: B   Q32: D   Q33: C   Q34: C   Q35: C   Q36: B   Q37: C
Q38: B   Q39: C   Q40: B
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