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Computer Science Grade 10 — Chapter 2

Computational Thinking and Algorithms

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Independent practice MCQs from the supplied Class 10 Computer Science notes pack. Total: 50 questions.

A. Important / Main Topics

1. What is a computing problem?

(A) A problem solved step-by-step through computation
(B) A problem solved by physical labor
(C) A problem that cannot be solved
(D) A mathematical equation only

Correct Answer: A

Explanation: A computing problem is one that is solved step-by-step through computation, taking input and producing output.

2. Which type of problem asks for a 'yes-or-no' answer?

(A) Search Problem
(B) Decision Problem
(C) Counting Problem
(D) Optimization Problem

Correct Answer: B

Explanation: In decision problems, the answer is always yes or no, such as "Is n even?".

3. In counting problems, what is the answer?

(A) Yes or No
(B) A set of values
(C) How many?
(D) A path

Correct Answer: C

Explanation: Counting problems ask for the number of possible solutions or outcomes.

4. Which principle is used when you have to choose between mutually exclusive options?

(A) Multiplication Principle
(B) Permutation
(C) Combination
(D) Addition Principle

Correct Answer: D

Explanation: The Addition Principle is used for mutually exclusive events, where you choose between options ("OR" situation).

5. What is an algorithm?

(A) A step-by-step procedure to solve a problem
(B) A programming language
(C) A type of computer
(D) A data storage device

Correct Answer: A

Explanation: An algorithm is a well-defined, step-by-step procedure or set of rules for solving a specific problem.

6. Which property of an algorithm ensures that it produces at least one output?

(A) Input
(B) Output
(C) Definiteness

(D) Finiteness

Correct Answer: B

Explanation: The output property ensures that the algorithm produces at least one output after calculations.

7. In Boolean logic, what are the two possible values?

(A) 0 and 2
(B) Yes and No
(C) True and False
(D) On and Off only

Correct Answer: C

Explanation: Boolean logic evaluates statements to either true or false (represented as 1 or 0).

8. Which sorting algorithm repeatedly compares adjacent elements and swaps them if they are in the wrong order?

(A) Selection Sort
(B) Merge Sort
(C) Insertion Sort
(D) Bubble Sort

Correct Answer: D

Explanation: Bubble sort steps through the list, compares adjacent elements, and swaps them if they are in the wrong order.

9. Which searching algorithm works on sorted arrays by repeatedly dividing the search interval in half?

(A) Binary Search
(B) Linear Search
(C) Sequential Search
(D) Random Search

Correct Answer: A

Explanation: Binary Search — this correctly answers the question.

10. What is decomposition in computational thinking?

(A) Combining problems
(B) Breaking complex problems into sub-problems
(C) Ignoring details
(D) Writing code

Correct Answer: B

Explanation: Decomposition is the process of breaking down complex problems into smaller, manageable sub-problems.

11. What is abstraction?

(A) Adding more details to a problem
(B) Making a problem complex
(C) Focusing on important information and ignoring irrelevant details
(D) Writing code

Correct Answer: C

Explanation: Focusing on important information and ignoring irrelevant details — this correctly answers the question.

12. What is modular design?

(A) Writing one large program
(B) Using only one module
(C) Avoiding functions
(D) Breaking a system into smaller, independent modules

Correct Answer: D

Explanation: Modular design is the practice of dividing a system into separate, independent modules, each performing a specific task.

13. What is a syntax error?

(A) A mistake in the structure of an expression or statement
(B) A mistake in reasoning
(C) A mistake in calculation
(D) A mistake in logic

Correct Answer: A

Explanation: Syntax errors are mistakes related to the structure of an expression or statement, similar to grammatical errors in writing.

14. What is a logical error?

(A) A mistake in the structure of code
(B) A mistake in reasoning or planning
(C) A mistake in syntax
(D) A mistake in spelling

Correct Answer: B

Explanation: Logical errors are mistakes in reasoning or planning that lead to incorrect conclusions or results.

15. What is a dry run?

(A) Running the code on a computer
(B) Compiling the code
(C) Manually checking the execution of an algorithm
(D) Debugging the code

Correct Answer: C

Explanation: An algorithm dry run means manually checking the execution of an algorithm by providing it with a specific set of inputs.

16. A student wants to buy a new computer. He has to decide among 3 desktop computers and 4 laptop computers. How many total options does he have?

(A) 12
(B) 3
(C) 4
(D) 7

Correct Answer: D

Explanation: 7 — this correctly answers the question.

17. Bilal has 3 Apples, 3 Bananas, and 3 bunches of Cherries. In how many ways can he make a fruit basket by putting one fruit of each kind?

(A) 27
(B) 9
(C) 3
(D) 12

Correct Answer: A

Explanation: 27 — this correctly answers the question.

18. Which property of an algorithm ensures that it will eventually end after a finite number of steps?

(A) Input
(B) Finiteness
(C) Effectiveness
(D) Generality

Correct Answer: B

Explanation: Finiteness ensures that there is always a finite number of steps in an algorithm before it ends.

19. Which property of an algorithm ensures that it can handle a group of problems rather than just one?

(A) Input
(B) Output

(C) Generality
(D) Finiteness

Correct Answer: C

Explanation: Generality means an algorithm should be able to handle a group of problems rather than simply one particular one.

20. In Boolean logic, what is the result of AND when both terms are true?

(A) False
(B) Undefined
(C) Cannot be determined
(D) True

Correct Answer: D

Explanation: In Boolean logic, the AND operator returns true only when both terms are true.

21. In Boolean logic, what is the result of OR when one term is true and the other is false?

(A) True
(B) False
(C) Undefined
(D) Cannot be determined

Correct Answer: A

Explanation: The OR operator returns true when at least one of the terms is true.

22. Which sorting algorithm divides the list into halves, recursively sorts each half, and then merges them?

(A) Bubble Sort
(B) Merge Sort
(C) Selection Sort
(D) Insertion Sort

Correct Answer: B

Explanation: Merge Sort — this correctly answers the question.

23. Which searching algorithm sequentially checks each element until the target is found?

(A) Binary Search
(B) Merge Search
(C) Linear Search
(D) Quick Search

Correct Answer: C

Explanation: Linear search sequentially checks each element in a list until the target element is found or the end of the list is reached.

24. What is the first step in a dry run?

(A) Observe output
(B) Compare with expected result
(C) Simulate execution
(D) Choose an input

Correct Answer: D

Explanation: The first step in a dry run is to select a specific set of input values to test the algorithm.

25. What is a trace table used for?

(A) To record variable values at each step of an algorithm
(B) To draw diagrams
(C) To write code
(D) To compile code

Correct Answer: A

Explanation: To record variable values at each step of an algorithm — this correctly answers the question.

B. Less Important / Secondary Topics

26. Which of the following is an example of a logical error?

(A) Using + instead of ×
(B) Missing semicolon
(C) Misspelled keyword
(D) Missing closing bracket

Correct Answer: A

Explanation: Using the wrong operator (e.g., + instead of ×) is a logical error because the program runs but produces incorrect results.

27. What is the result of a dry run for the algorithm that finds the largest number in [3, 1, 4, 1, 5, 9, 2, 6]?

(A) 3
(B) 9
(C) 5
(D) 6

Correct Answer: B

Explanation: The algorithm compares each element and updates max when a larger element is found. The largest number in the list is 9.

28. How many numbers from 1 to 100 are divisible by 2 or 3?

(A) 50
(B) 33
(C) 67
(D) 83

Correct Answer: C

Explanation: 67 — this correctly answers the question.

29. What is the primary goal of modular design?

(A) To make the system more complex
(B) To eliminate all functions
(C) To avoid reusability
(D) To break the system into independent, manageable parts

Correct Answer: D

Explanation: Modular design focuses on breaking down a system into smaller, manageable, and interchangeable parts known as modules.

30. What is the role of abstraction in creating generalized solutions?

(A) To identify the essential features of a problem
(B) To add more details
(C) To complicate the problem
(D) To ignore all details

Correct Answer: A

Explanation: Abstraction helps identify the essential features of a problem, which is necessary for creating a generalized solution.

31. Which of the following is NOT a core concept of computational thinking?

(A) Decomposition
(B) Compilation
(C) Pattern Recognition
(D) Abstraction

Correct Answer: B

Explanation: The four core concepts of computational thinking are decomposition, pattern recognition, abstraction, and algorithms.

32. What is the purpose of a Pigeonhole Principle?

(A) To count the number of paths
(B) To sort a list
(C) To determine if at least one container has more than one item
(D) To search for an element

Correct Answer: C

Explanation: The Pigeonhole Principle states that if n+1 objects are placed into n boxes, at least one box contains two or more objects.

33. Which of the following is a step in creating a generalized solution?

(A) Ignore common patterns
(B) Use constants instead of variables
(C) Avoid testing
(D) Extract common patterns

Correct Answer: D

Explanation: Extracting common patterns is a key step in creating generalized solutions.

34. What is the main difference between syntax and logical errors?

(A) Syntax errors prevent the program from running; logical errors do not
(B) Logical errors prevent the program from running; syntax errors do not
(C) Both prevent the program from running
(D) Neither prevents the program from running

Correct Answer: A

Explanation: Syntax errors are caught by the compiler and prevent the program from running. Logical errors allow the program to run but produce incorrect results.

35. What is the result of NOT True in Boolean logic?

(A) True
(B) False
(C) Undefined
(D) Cannot be determined

Correct Answer: B

Explanation: False — this correctly answers the question.

36. In how many ways can you select 3 different fruits from a basket of 7 different fruits? (Order does not matter)

(A) 21
(B) 56
(C) 35
(D) 84

Correct Answer: C

Explanation: “35” is correct: it matches the idea asked in the question (“In how many ways can you select 3 different fruits from a basket of 7 different fruits? (Order does not matter)”), while the other choices do not.

37. In a set of 50 students, 30 have completed a math project, 25 have completed a science project, and 15 have completed both. How many students have completed at least one project?

(A) 35
(B) 45
(C) 50
(D) 40

Correct Answer: D

Explanation: 40 — this correctly answers the question.

38. How many binary strings of length 8 have two bits at the end "00" or begin with a "1" bit?

(A) 160
(B) 128
(C) 64

(D) 192

Correct Answer: A

Explanation: Strings ending in "00": $2^6 = 64$. Strings starting with "1": $2^7 = 128$. Both: $2^5 = 32$. Total: 128 + 64 - 32 = 160.

39. What is the result of the following Boolean expression: A AND B when A = True and B = False?

(A) True
(B) False
(C) Undefined
(D) Cannot be determined

Correct Answer: B

Explanation: The AND operator returns true only when both terms are true. Since B is false, the result is false.

40. Which of the following is an example of an algorithm?

(A) A photograph
(B) A song
(C) A recipe for making tea
(D) A painting

Correct Answer: C

Explanation: A recipe is a step-by-step procedure, which is an example of an algorithm.

41. What is the result of the dry run for the algorithm that finds the largest number in [5, 12, 3, 9, 7]?

(A) 5
(B) 9
(C) 7
(D) 12

Correct Answer: D

Explanation: The algorithm compares each element and updates max. The largest number in the list is 12.

42. Which of the following is a characteristic of a good algorithm?

(A) It is effective and finite
(B) It has infinite steps
(C) It is ambiguous
(D) It ignores input

Correct Answer: A

Explanation: A good algorithm must be effective (simple operations) and finite (must end after a finite number of steps).

43. What is the primary purpose of pattern recognition in computational thinking?

(A) To ignore patterns
(B) To identify similarities and differences in data
(C) To complicate problems
(D) To delete data

Correct Answer: B

Explanation: To identify similarities and differences in data — this correctly answers the question.

44. Which of the following is NOT a benefit of modular design?

(A) Reusability
(B) Maintainability
(C) Increased complexity
(D) Testability

Correct Answer: C

Explanation: Increased complexity — this correctly answers the question.

45. What is the correct order of steps in a dry run?

(A) Simulate → Choose input → Observe → Compare

(B) Observe → Compare → Choose input → Simulate
(C) Compare → Observe → Simulate → Choose input
(D) Choose input → Simulate → Observe → Compare

Correct Answer: D

Explanation: The steps of a dry run are: choose input, simulate execution, observe output, and compare with expected result.

46. What is the result of 111000 - 100110 using 1's complement?

(A) 010010
(B) 010001
(C) 010011
(D) 010100

Correct Answer: A

Explanation: 010010 — this correctly answers the question.

47. Which of the following is a valid property of an algorithm?

(A) Infiniteness
(B) Definiteness
(C) Ambiguity
(D) Complexity

Correct Answer: B

Explanation: Definiteness is a property of algorithms where every step must be clearly and accurately stated.

48. What is the primary difference between a decision problem and a search problem?

(A) Decision finds a value; search gives yes/no
(B) Both give yes/no
(C) Decision gives yes/no; search finds a value
(D) Both find values

Correct Answer: C

Explanation: Decision problems ask for a yes/no answer, while search problems ask for a value or set of values.

49. Which of the following is an example of a logical error in a search engine query?

(A) Misspelled keyword
(B) Missing currency symbol
(C) Missing quotation marks
(D) Including used phones when you meant to exclude them

Correct Answer: D

Explanation: Including used phones when the user meant to exclude them is a logical error in the query's reasoning.

50. What is the result of the binary addition 10010 + 111?

(A) 11001
(B) 11000
(C) 10101
(D) 11100

Correct Answer: A

Explanation: 11001 — this correctly answers the question.