Name: _____   Date: _____

Debug the Digital Maze: Algorithms for 8th Grade Solvers

Calculate time complexity and apply divide-and-conquer strategies used by software engineers to optimize search systems and network routing.

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1. When designing a system for a logistics company to find the shortest delivery route between twenty cities, which algorithmic approach is most effective for breaking the large map into smaller sections?

    A.   Linear sequence

    B.   Problem decomposition

    C.   Hard-coding paths

    D.   Data encapsulation

2. A search algorithm that checks every single item in an unsorted list one by one is considered more efficient than a search that eliminates half the data at each step.

    A.   True

    B.   False

3. In the context of algorithm efficiency, the measure of how the running time or memory usage increases as the input size grows is known as _____.

    A.   Time Complexity

    B.   Variable Assignment

    C.   Syntax Validation

    D.   Code Documentation

4. If an engineer is 'dry running' a new sorting algorithm by hand with a small sample set of data before writing code, which stage of problem-solving are they practicing?

    A.   Hardware integration

    B.   UI/UX design

    C.   Algorithm verification

    D.   Marketing analysis

5. A social media platform needs to recommend friends. They use an algorithm that looks at 'friends of friends.' If the algorithm fails to stop and loops forever, what is likely missing?

    A.   A base case or termination condition

    B.   A faster internet connection

    C.   More user data

    D.   Higher screen resolution

6. Heuristics are 'rules of thumb' that help find a 'good enough' solution to a problem quickly when an exact optimal solution would take too much time to calculate.

    A.   True

    B. False

7. When a programmer finds a logical error that causes a weather app to report 'Sunny' during a blizzard, the process of finding and fixing this error is called _____.

    A. Compiling
    B. Debugging
    C. Encrypted
    D. Streaming

8. You are building a game where an NPC (non-player character) must find the player in a 3D building. Which concept are you using when you define the specific steps the NPC takes to turn corners and open doors?

    A. Database indexing
    B. Algorithm design
    C. Pixel shading
    D. Social engineering

9. Pseudocode is a high-level description of an algorithm that uses the structural conventions of programming languages but is intended for human reading rather than machine execution.

    A. True
    B. False

10. An algorithm that solves a problem by breaking it into identical sub-problems and calling itself to solve them is using a technique called _____.

    A. Binary Conversion
    B. Recursion
    C. Concatentation
    D. Multi-tasking