**Name:** _____ **Date:** _____

## Operation Optimization: An 8th Grade Algorithmic Reconnaissance Quiz

Can you streamline a warehouse's routing system or refine a DNA sequence search? Analyze the trade-offs between heuristic approaches and brute-force complexity.

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**1. An autonomous drone is mapping a forest but has limited battery. Instead of calculating every possible path (brute force), it uses a 'Greedy Algorithm' to always move toward the largest open space it sees. What is the primary trade-off of this approach?**

A. It guarantees the shortest possible path but uses more memory.
B. It is computationally faster but may lead to a 'local optimum' instead of the best overall path.
C. It eliminates the need for any sensors or input data.
D. It increases the time complexity to O(n!) making it inefficient for real-time use.

**2. True or False: In the context of algorithm efficiency, an algorithm with O(log n) time complexity will generally perform faster on a large dataset than an algorithm with O(n) complexity.**

A. True
B. False

**3. A logistics company wants to find the shortest delivery route that visits 50 different cities exactly once. This is a classic example of the Traveling Salesperson Problem. Which technique is most useful for managing this high level of complexity?**

A. Linear Search
B. Hardcoding the coordinates
C. Heuristic methods
D. Recursive printing

**4. During the 'Testing and Debugging' phase of a banking app's interest calculator, a developer inputs a string of text where a number should be. This is an example of testing:**

A. Edge cases
B. Invalid inputs and robustness
C. Algorithm decomposition
D. Space complexity

**5. True or False: Decomposition is only useful for writing code and cannot be applied to physical engineering problems like building a bridge.**

A. True
B. False

**6. While designing a search algorithm for a library database, you switch from a process that checks every book one-by-one to one that uses an alphabetized index. This change primarily improves the _____ of the system.**

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A. Visual design
B. Memory capacity
C. Time complexity
D. Decomposition

**7. You are creating an algorithm to moderate comments on a social media site. Which of these represents the most logical 'Problem Decomposition' for this task?**

A. Buy a faster server, hire more staff, and delete all comments.
B. Identify banned keywords, analyze sentiment for aggression, and flag suspicious accounts.
C. Write the entire code in one single function to keep it organized.
D. Focus only on the font size of the comments to ensure they are readable.

**8. True or False: If an algorithm is 'efficient,' it means it will always use the maximum amount of RAM available to finish the task as quickly as possible.**

A. True
B. False

**9. A cybersecurity firm develops an algorithm to detect hacking attempts by looking for patterns of 'failed logins.' To refine the algorithm, they must account for a user just forgetting their password. This refinement is part of:**

A. Logical 'AND' gates
B. Pattern recognition and logic refinement
C. Hardware upgrading
D. Binary conversion

**10. When building an algorithm for a self-driving car to navigate a four-way stop, which consideration is the most critical for evaluating the 'Success Criteria' of the design?**

A. The color of the car's interface.
B. The speed at which the car can accelerate after the stop.
C. The accuracy of detecting the order of arrival of other vehicles.
D. The brand of the camera used on the exterior.