Name: _____ **Date:** _____

Answer Key: Beat the Bot: Mastering 7th Grade Algorithmic Logic

Beyond simple instructions—analyze logic gates and input validation sequences in this rigorous problem-solving challenge for mid-year assessment.

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1. A biologist is designing an algorithm to track bird migrations. If they break the task into 'Identifying Species,' 'Recording GPS Coordinates,' and 'Calculating Flight Speed,' which process are they using?

Answer: B) Problem Decomposition

Problem decomposition is the practice of breaking a complex system or problem into smaller, more manageable sub-tasks.

2. An algorithm that takes 1,000 steps to find a name in a phone book is considered more 'efficient' than one that takes 10 steps for the same list.

Answer: B) False

Efficiency in computer science refers to using the least amount of resources, such as time or steps, to achieve a result.

3. When building an automated thermostat, you write a sequence: IF temperature < 68, THEN turn on heater. This logical structure is known as a _____.

Answer: B) Conditional Statement

Conditional statements (if-then logic) allow algorithms to make decisions based on specific criteria or inputs.

4. A library wants to find a specific book on a shelf where all books are already alphabetized. Which algorithm would be the most efficient for this task?

Answer: C) Binary Search (Dividing the shelf in half)

Binary search is much faster than linear search for sorted data because it eliminates half of the remaining options with every step.

5. During the final phase of creating a transit app, the developer runs the code through a 'test suite' to find and fix errors. This process is called _____.

Answer: C) Debugging

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Debugging is the systematic process of identifying, tracing, and fixing 'bugs' or errors within an algorithm or program.

6. A 'Flowchart' is a visual representation used to map out the steps of an algorithm before any actual coding begins.

Answer: A) True

Flowcharts use standardized symbols to help programmers visualize the logic and flow of a problem-solving sequence.

7. An engineer is designing a self-driving car algorithm. The car must stop if a pedestrian is detected OR if a red light is seen. What type of logic gate is this?

Answer: C) OR gate

An OR gate results in 'True' if at least one of the conditions is met. In this case, either the pedestrian OR the light triggers the stop.

8. If an algorithm for an elevator is written to go up forever and never check for floor requests, it has encountered a(n) _____.

Answer: A) Infinite Loop

An infinite loop occurs when a set of instructions repeats indefinitely because the 'exit condition' is never met.

9. Input validation is the part of an algorithm that ensures the data entered (like an age or date) is sensible and usable before processing it.

Answer: A) True

Input validation prevents errors by checking if the data follows the correct format or range before the rest of the algorithm runs.

10. Which of these is an example of 'Abstraction' in algorithm design?

Answer: C) Focusing on what a 'Send Email' button does rather than the complex server code behind it

Abstraction involves hiding complex details to focus on the essential features, making it easier to solve problems at a higher level.