Name: _____ **Date:** _____

Logic Gates to Modular Growth: 8th Grade Programming Systems

Students move beyond basic syntax to architect complex algorithms. This rigorous diagnostic assesses system-level thinking and functional decomposition for pre-AP preparation.

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1. A weather station uses an array of sensors. To ensure the software is modular and the logic can be updated without rewriting the entire program, which strategy should be implemented?

A. Hard-coding specific sensor values into the main loop
B. Encapsulating data processing into distinct, reusable functions
C. Using a single global variable to store all atmospheric data
D. Restricting the program to sequential execution without branching

2. When designing a banking application, a programmer uses a(n) _____ to check if a user's balance is greater than the withdrawal amount before authorizing a transaction.

A. Iteration
B. Conditional statement
C. String literal
D. Local variable

3. In advanced recursive programming, a function is allowed to call itself as long as a base case is defined to prevent an infinite loop.

A. True
B. False

4. Consider an algorithm that sorts a massive database. If the programmer chooses to use a 'Nested Loop,' what is the likely impact on the program's efficiency as the dataset grows?

A. The execution speed will increase linearly with the data size.
B. The time complexity increases significantly, potentially slowing the system.
C. The program will automatically use less memory to compensate.
D. The logic will become simpler and easier for the CPU to process.

5. A developer is building a simulation of an ecosystem. They use _____ to represent the attributes of different species, such as 'energyLevel' and 'isHungry'.

A. Variables
B. Static text
C. Infinite loops
D. Function calls

6. A 'Boolean' variable is a data type that can hold three distinct values: True, False, and Null.

A. True
B. False

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7. During a code review, you notice a block of code that sends an email alert is repeated five times in different parts of the program. To follow the DRY (Don't Repeat Yourself) principle, you should:

A. Rename the variables in each instance to avoid confusion.
B. Move that logic into a single function and call it where needed.
C. Wrap the entire program in a while loop to handle the alerts.
D. Delete the repeated code and only use the alert once at the start.

8. In a physics simulation, a(n) _____ loop is most appropriate for a process that must continue as long as the object's velocity is greater than zero.

A. For
B. Static
C. While
D. Input

9. Which of the following best describes 'Scope' in programming concepts?

A. The total number of lines of code in a single file.
B. The region of a program where a variable is accessible.
C. The speed at which a function executes on a CPU.
D. The physical hardware limitations of the computer.

10. Logical operators like AND, OR, and NOT are only used in mathematical equations and have no role in controlling program flow.

A. True
B. False