Name: _____ **Date:** _____

Answer Key: Glitch Hunter: An Advanced 7th Grade Logic Expedition

Recursive patterns, Boolean logic, and scope inheritance — essential tools for architecting sophisticated digital solutions and debugging complex systems.

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1. Imagine you are designing a navigation system for a Mars Rover. You need a structure that continuously checks the battery level and only proceeds with the mission if power is above 15%. If it drops below that, the rover must switch to 'Sleep Mode.' Which programming concept best handles this continuous checking and branching?

Answer: C) A conditional statement inside a loop

To monitor a value constantly and react differently based on its state, you must place a conditional (if/else) inside a loop (while/for) so it re-evaluates at every cycle.

2. In advanced software architecture, utilizing 'Functions' is considered inefficient because it forces the computer to jump to different memory locations, which significantly slows down complex 7th-grade level algorithms.

Answer: B) False

Functions actually increase efficiency through modularity and reusability. While there is a tiny overhead for a function call, the benefit of code organization and memory management far outweighs it.

3. You define a variable named 'playerHealth' inside a specific function called 'StartBattle'. When you try to access 'playerHealth' from a different function called 'EndGame', the program crashes. This is because the variable has a limited _____.

Answer: B) Local Scope

Scope determines where a variable is accessible. A variable declared inside a function is 'local' to that function and cannot be seen by others.

4. Environmental scientists use code to simulate forest growth. If they want to simulate the growth of 1,000 different trees, and for each tree, they must simulate 50 years of growth, what is the most efficient way to structure the logic?

Answer: C) A nested loop (a loop within a loop)

A nested loop is used here: the outer loop iterates through the 1,000 trees, and the inner loop iterates through the 50 years for each tree.

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5. A programmer is writing a script for a smart thermostat. They use the statement: 'IF humidity > 60 AND temp > 75 THEN start_AC()'. The use of 'AND' here is an example of a _____ operator used to combine multiple conditions.

Answer: A) Boolean

Boolean operators (AND, OR, NOT) allow programmers to synthesize complex logic by combining multiple true/false evaluations.

6. An 'Infinite Loop' is a common logic error where the exit condition of a loop is never met, causing the program to run indefinitely until it is force-closed or the system crashes.

Answer: A) True

Loops require a state change that eventually renders the condition false. If the logic never leads to that change, the loop continues forever.

7. In a social media algorithm, you need to calculate the 'Engagement Score' for a post multiple times throughout the day based on different user interactions. Instead of writing the calculation logic 20 different times, you should use a:

Answer: B) Function

Functions allow you to wrap complex logic in a single named block that can be called repeatedly, drastically reducing code redundancy.

8. You are creating a banking app. When a user tries to withdraw money, the system must perform a check: IF balance >= withdrawal_amount. This process of the CPU choosing between two different paths of execution is called _____.

Answer: B) Selection

Selection (or branching) is the programming concept where the computer selects which path of code to follow based on a condition.

9. A 'Variable' in programming can only store numerical values like integers or decimals; storing text or 'Yes/No' values requires a different concept called a 'Function'.

Answer: B) False

Variables can store various data types, including strings (text) and booleans (true/false), not just numbers.

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10. Consider an AI that sorts recycling. It has a list of items. It takes the first item, checks it, moves to the second, checks it, and so on until the box is empty. This 'step-by-step through a list' process is known as:

Answer: B) Iterative Array Processing

Iteration is the process of repeating an action, often used to traverse through a collection of data like an array or list.