Name: _____ **Date:** _____

Answer Key: Think You Can Outsmart the Logic? 6th Grade Code Master Challenge

Navigate 10 high-level logic puzzles requiring recursive analysis and sequence evaluation to prove your algorithmic thinking skills.

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1. Scenario: An autonomous drone uses a variable 'altitude'. If the drone must maintain a height between 50m and 100m, which complex conditional logic correctly handles a sudden descent to 45m?

Answer: C) If altitude < 50, increment power until altitude >= 50.

To maintain a range, the program must detect when the value falls below the threshold and apply a corrective action (incrementing power) until the condition is satisfied.

2. Refined functions allow a programmer to update a specific calculation in one location, and that change will automatically apply every time the function is called throughout the program.

Answer: A) True

This is the principle of modularity and maintainability; functions centralize logic so you don't have to manually update repetitive code blocks.

3. If a Smart Home system uses a loop to check 50 different security sensors every second, what is the most likely 'exit condition' for that loop to stop running?

Answer: B) When the variable 'systemActive' becomes False

In persistent systems, loops are usually controlled by a global state variable. If the system is deactivated, the loop condition evaluates to false and the process terminates.

4. Analyze this logic: A digital library sets 'access' to True only if (hasSubscription == True OR dayPass == True) AND (userIsBanned == False). Who can enter?

Answer: B) A guest with a dayPass who is not banned.

This uses Boolean logic: the user must satisfy one 'entry' condition (subscription or pass) AND the 'not banned' condition simultaneously.

5. In a physics simulation, a variable named 'gravity' is set to 9.8. If the programmer changes this to 1.6 to simulate the Moon, why is it better to use a variable than typing '9.8' manually 100 times?

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Answer: B) It prevents 'hard-coding' errors and improves scalability.

Using a variable creates a single point of truth. If you need to change a value used in many calculations, you only change it once, avoiding the risk of missing instances (hard-coding errors).

6. An 'Infinite Loop' is a programming error that occurs when the condition to stop a loop is never met, potentially causing the system to crash.

Answer: A) True

If the termination condition is impossible to reach (e.g., 'while 1 > 0'), the computer will keep executing the task forever, exhausting resources.

7. You are designing a traffic light controller. Which programming concept is BEST for ensuring the light changes from Green to Yellow to Red in a specific, timed sequence?

Answer: D) A loop containing nested conditionals and timers.

Traffic lights require repetition (Loop) to cycle through states, and logic (Conditionals) to determine which light is active based on time elapsed.

8. When a function requires specific information to perform its task—like a 'send_email' function needing an 'address'—that piece of information is called a/an _____.

Answer: C) Parameter

Parameters (or arguments) are values you pass into a function so it can operate on different data without changing the function's internal code.

9. If you are debugging a program where a character moves left even when you press the 'Right' key, which part of the code is most likely broken?

Answer: B) The conditional logic inside the input handler.

Input handling relies on conditionals (If Key == Right). If the behavior is incorrect, the logic mapping the input to the action is flawed.

10. In 6th-grade programming terms, 'nested' code refers to placing one structure (like an 'if' statement) inside another structure (like a 'loop').

Answer: A) True

Nesting allows for complex decision-making, such as checking a condition every time a loop repeats.

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