Year 5 Computing: Mastering Algorithms and Debugging

Learning objective: To assess understanding of sequence, repetition (loops), variables, and logical debugging within coding environments.

Read each question carefully. Use your knowledge of computational thinking to provide clear, logical answers. For coding scenarios, ensure your sequences are precise.

Kit the fox is building a digital game where a character must collect golden acorns. Kit needs to ensure the character moves in a precise sequence, uses a loop to repeat the collection process, and stores the score in a variable. However, Kit has noticed that sometimes the character walks through walls instead of stopping, and the score does not always update correctly.

Word bank: Algorithm · Variable · Loop · Bug · Debug · Sequence · Input · Logic · Syntax

1. Define the term 'algorithm' in your own words. Why is the order of instructions critical when writing one for a computer? (2 marks)

2. Kit wants the character to move forward 10 steps, five times in a row. Explain how using a 'loop' is more efficient than writing the move command five times. (2 marks)

3. The character in Kit's game is walking through walls. Explain the step-by-step process you would use to 'debug' this specific error. (3 marks)

4. What is the purpose of a 'variable' in a computer game? Give an example of how a variable would be used in a game involving currency (£). (3 marks)

5. Compare and contrast a 'selection' (an 'if/then' statement) with a 'loop'. When would a programmer choose to use one over the other? (4 marks)

6. Kit is designing a shop in the game where items cost £2.50. Write a snippet of pseudocode or explain the logic required to check if a player has enough money to purchase an item, and what should happen if they do not. (3 marks)

7. Extended Response: Imagine you are designing a complex navigation game for a robot. Justify why breaking a large problem into smaller 'sub-routines' or 'functions' makes your code more professional and easier to maintain. Use specific examples to support your argument. (8 marks)

Draw: Draw a flowchart that represents a simple decision-making process for a robot. The robot must decide whether to turn left or right based on whether it detects an obstacle in front of it.

Extension challenge: Total: /25. Extension Task: What might happen if a variable was not 'reset' at the start of a new game level? Discuss the consequences for the player's experience and suggest how a programmer might fix this issue.