

Grade 3 Computing: Coding Logic and Algorithms

Learning objective: To assess understanding of algorithms, debugging, and computational thinking using sequence and repetition.

Read each question carefully. Ensure your answers use correct computing terminology. Show your working out for logic puzzles.

Kit the fox is building a digital maze for his friends. He has written a series of instructions to guide a character from the start to the treasure chest. However, Kit has noticed that his character keeps walking into a wall instead of turning. He must analyze his code to find the error and fix it so the character reaches the goal successfully.

Word bank: algorithm · debug · sequence · loop · variable · input · output · syntax

1. Define the term 'algorithm' in your own words. Why is the order of instructions important in a sequence? (2 marks)

2. Kit has written the following code: 'Move Forward, Move Forward, Turn Right, Move Forward'. If the wall is two squares ahead, explain why his code is currently failing and how he might 'debug' it. (3 marks)

3. What is a 'loop' in coding? Provide an example of when a loop would be more efficient than writing the same instruction multiple times. (3 marks)

4. Compare and contrast a 'variable' and a 'constant'. Justify why a game developer would need to use a variable for a player's score. (4 marks)

5. Kit wants to program his character to collect 5 coins. If each coin costs 20p, write an algorithm using a loop that calculates the total cost. Use the variable 'TotalCost'. (4 marks)

6. Explain why computational thinking is useful even when you are not using a computer. Give an example of how you could use an algorithm to solve a real-life problem, such as packing a school bag. (4 marks)

7. Extended Writing: Imagine you are designing a new digital game. Describe your game's objective and outline the primary algorithm a player must follow to succeed. Include how you would use repetition (loops) to make your code more efficient. Total: /25 (5 marks)

Draw: Draw a flow chart showing the logical steps for a character to pick up a key and open a door. Use standard flow chart symbols like rectangles for actions and diamonds for decisions.



Extension challenge: What might happen if a program forgets to include a 'stop' condition in a loop? Predict the outcome and explain how this impacts the performance of a program.