

Year 4 Computing: Mastering Algorithms

Learning objective: To demonstrate understanding of algorithms, debugging, and logical sequencing.

Read each question carefully. Use your knowledge of computational thinking to provide clear, logical answers. Remember to check your work for clarity and precision.

Kit the fox is designing a new robotic assistant to help tidy the woodland library. To make the robot work, Kit must write a precise set of instructions to ensure the books are placed on the correct shelves without causing any accidents.

Word bank: algorithm · sequence · debug · input · output · loop · logical error · program

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

2. Kit's robot is meant to pick up a book, but it keeps bumping into the shelf instead. What is the process of finding and fixing this mistake called? (1 mark)

3. Write a simple algorithm consisting of four steps to help a friend make a sandwich. Ensure your steps are in the correct sequence. (4 marks)

4. Explain the difference between a logical error and a syntax error. Give an example of a logical error in a daily routine. (3 marks)

5. Kit wants the robot to move forward 5 steps, 10 times. Instead of writing the instruction 10 times, what programming concept could Kit use to make the algorithm more efficient? (2 marks)

6. Compare and contrast an algorithm written for a computer versus a set of instructions written for a human. Why must a computer's instructions be more specific? (3 marks)

7. Justify why it is important to test an algorithm multiple times before it is considered 'finished'. What might happen if an algorithm is not tested properly? (5 marks)

Draw: Draw a flowchart that shows the steps a robot would take to decide whether to pick up a book or a piece of litter from the floor.



Extension challenge: Imagine you are designing a game where a character must navigate a maze. Write a complex algorithm including at least one 'if/then' statement and one 'loop'. Explain why your algorithm is the most efficient solution for the character to reach the exit. Total: /25