Mastering the Logic of Code

1. An algorithm is a precise set of instructions or a step-by-step process designed to complete a specific task or solve a problem. (2 marks)

Working: N/A

1 mark for mentioning instructions/steps, 1 mark for mentioning it solves a problem or completes a task.

2. The order is important because computers follow instructions in a strict sequence. If you try to update a return date before scanning the book, the computer will not know which book to update. (3 marks)

Look for: Understanding that computers follow a linear sequence and logic depends on the correct order.

Good: The order matters because if you do it wrong, the computer gets confused.

Better: The order is important because computers follow steps in a sequence. If you change the order, the programme won't work correctly.

Best: The order is vital because a computer follows a strict sequence. If you try to update the return date before scanning the book, the system lacks the necessary data to complete the task.

What moves an answer up: Moving from good to best requires explaining the 'why' behind the logic rather than just stating that it won't work.

3. It is a variable because the data inside the 'box' changes depending on who is using the system. Every student has a different name, so the value stored is not fixed. (4 marks)

Look for: Understanding that 'variable' means the value can change or vary.

Good: It is a variable because the name changes for every person.

Better: It is a variable because it acts like a storage box that holds different information for each user, such as 'Amira' or 'Jack'.

Best: It is a variable because the value is not constant; it is a placeholder that stores different data depending on the specific user inputting their name.

What moves an answer up: The best answer uses technical terminology like 'constant' and 'placeholder' to show deeper understanding.

4. The final number will be 5. (3 marks)

Working: 0 + 1 + 1 + 1 + 1 + 1 = 5

1 mark for correct calculation, 2 marks for showing the loop logic.

5. To debug, I would check the logic of the calculation. Since 3 * 4 = 12, but the result was £7, the code is likely using an incorrect operator or a hidden 'discount' variable. I would check the code line by line to find where the error occurred. (8 marks)

Look for: Identifying that the math is wrong (3x4=12) and suggesting a systematic check of the code.

Good: I would look at the code to see why it says £7 instead of £12 and fix the mistake.

Better: I know 3 times 4 is 12, so the code is wrong. I would check the formula to see if it is adding instead of multiplying.

Best: I would debug by testing the code step-by-step. Since 3 multiplied by 4 should be 12, the programme has a logic error. I would inspect the 'Price' variable to ensure it is correctly multiplying the quantity.

What moves an answer up: The best answer identifies the specific mathematical error and proposes a logical testing process.

6. 1. Fill kettle with water. 2. Boil kettle. 3. Place tea bag in mug. 4. Pour boiling water into mug. 5. Remove tea bag and add milk. (5 marks)

Look for: Logical, sequential steps that accomplish the task.

Good: 1. Boil water. 2. Put tea in cup. 3. Pour water. 4. Drink.

Better: 1. Fill the kettle. 2. Boil the water. 3. Put a tea bag in a mug. 4. Pour the water in. 5. Take the bag out.

Best: 1. Fill the kettle with water. 2. Switch on the kettle to boil. 3. Place a tea bag into a clean mug. 4. Pour the boiling water into the mug. 5. Remove the tea bag and add milk if desired.

What moves an answer up: The best answer includes necessary detail and logical flow, making it a functional algorithm.

What a secure answer looks like

A secure answer demonstrates that the student understands that code is a logical, sequential process that requires precision. Encourage students to think of 'debugging' as a detective task.

If your child is stuck

Ask them to imagine they are a robot. If they were a robot, would they know what to do if the instructions were in the wrong order? Use a real-life example like making a sandwich.

Common mistakes to watch for

Students often confuse 'variable' with 'value' (the variable is the box, the value is what is inside) and often forget that computers cannot 'guess' missing steps.