

Computing Assessment: The Art of Debugging

Learning objective: To identify, explain, and correct errors in algorithms and logical sequences.

Read each question carefully. Use the word bank to help you with technical vocabulary. Write your answers clearly in the spaces provided.

Kit the fox is writing a program to help a robotic gardener plant rows of sunflowers. The robot needs to: 1. Move to the flowerbed, 2. Dig a hole, 3. Place a seed, 4. Cover the hole with soil. Kit tests the program, but the robot digs the hole before it reaches the flowerbed! Kit must now look at his code to find the mistake.

Word bank: algorithm · bug · debug · sequence · syntax error · logic error · loop · prediction

1. Define the term 'bug' in the context of computer programming. (1 mark)

2. What is the primary difference between a 'syntax error' and a 'logic error'? (2 marks)

3. Kit's robot moved to the flowerbed but did not stop to dig. It kept moving until it hit the garden fence. Explain why the robot failed to complete its task. (2 marks)

4. If Kit wants the robot to plant 10 sunflowers in a row, suggest one way he could improve his code to make it more efficient rather than writing the same instructions ten times. (2 marks)

5. Look at this sequence: [Start] -> [Walk forward 5 steps] -> [Turn left] -> [Turn right] -> [Water plant]. Identify the unnecessary step that is causing a delay and justify why it should be removed. (3 marks)

6. Explain why it is important for a programmer to test their code in small sections rather than waiting until the entire program is finished. (3 marks)

7. Compare and contrast the process of debugging a computer program with the process of fixing a mistake in a maths calculation. How do the steps taken to find the error differ? (4 marks)

8. Extended Writing: Imagine you have written a complex program that is meant to help a robot tidy a bedroom. Describe your step-by-step process for debugging the code if the robot begins throwing toys into the bin instead of placing them on the shelf. What logic checks would you perform? (8 marks)

Draw: Draw a flowchart that shows the 'Debug Cycle'. Include boxes for 'Detect', 'Locate', 'Fix', and 'Test'.



Extension challenge: Total: /25. Extension: What might happen if a programmer ignores a minor bug in a large system? Justify your answer by discussing the potential long-term consequences for the software.