

# Kit's Code-Cracking Challenge: Mastering Debugging

*Learning objective: To understand, identify, and correct errors (bugs) in algorithms and code, and to justify the logic behind debugging decisions.*

Kit the fox has been building a robotic helper to organise his library, but the code has some glitches! Use your knowledge of sequencing and logic to identify the errors and suggest the correct solutions. Read each problem carefully before writing your answer.

Kit's robot, 'The Book-Bot', is supposed to follow a simple routine: 1. Move to the bookshelf. 2. Scan the spine of the book. 3. If the book is a poetry book, place it on the top shelf. 4. If the book is a science book, place it on the middle shelf. 5. Return to the starting position.

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

**1. The Book-Bot is currently trying to place a science book on the top shelf. Explain why this is a 'bug' and what type of error (logical or syntax) this likely is. (2 marks)**

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**2. Kit forgot to include a command for the robot to 'Open Gripper' before placing the book down. Describe the consequence of this missing step in the sequence. (2 marks)**

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**3. If the robot enters an infinite loop while scanning books, what does this mean for the programme? How might you resolve this issue? (2 marks)**

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**4. Compare and contrast a 'syntax error' (like a missing bracket) with a 'logical error' (like the robot going to the wrong shelf). Which one is usually harder to find and why? (3 marks)**

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**5. Justify your answer: If you were to add a new rule for 'History books', where would you insert it into the current algorithm to ensure the robot remains efficient? (3 marks)**

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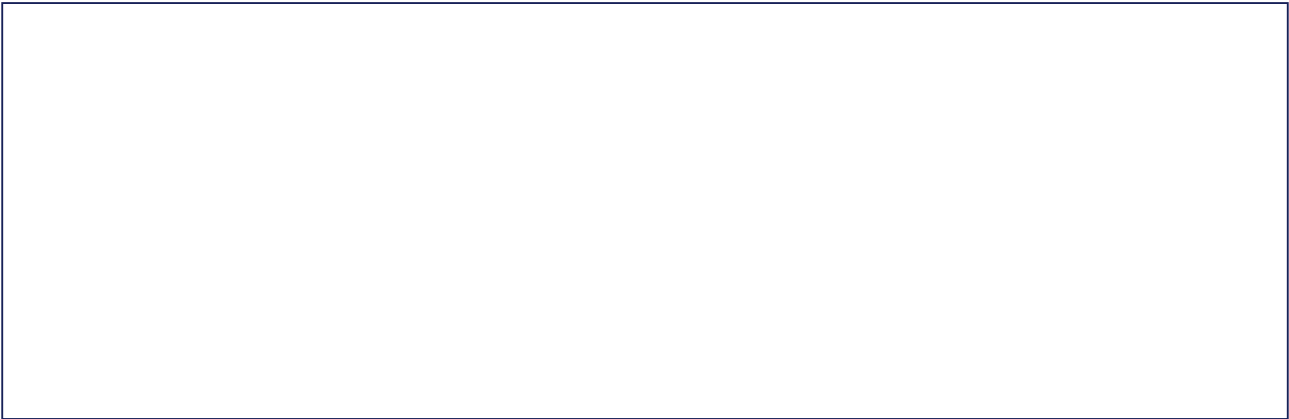
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6. What might happen if Kit decides to speed up the robot's movement but forgets to update the 'Stop' sensor's calibration? Explain the potential impact. (3 marks)

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**Draw:** Draw a flowchart that shows the corrected steps for the Book-Bot, including a decision diamond for checking if the book is poetry or science.



*Extension challenge: Design a 'Debugging Log' template for Kit. Include columns for: 'Description of the Bug', 'The Expected Outcome', 'The Actual Outcome', and 'The Final Fix'. Choose a real-life task (like making a sandwich) and write a 5-step algorithm for it, then intentionally introduce a 'bug' for a partner to find and fix.*