

Kit's Logic Lab: Mastering Algorithms

Learning objective: To understand how to design, write, and debug programs by using logical reasoning and sequence.

Read each question carefully. Use your knowledge of algorithms, loops, and debugging to solve these computing challenges. Remember: a program is only as good as the instructions you give it!

Word bank: Algorithm · Debug · Sequence · Loop · Variable · Input · Output · Syntax

1. Kit the fox is writing an algorithm for a robot to make a jam sandwich. The robot has stopped working because the instructions are not in the correct order. Re-order these steps: (1) Spread jam on bread, (2) Get bread from the cupboard, (3) Put two slices together, (4) Open the jam jar. Explain why the order of these steps is critical for a successful program. (3 marks)

2. Define the term 'debug' in your own words. If Kit's computer program keeps crashing every time he tries to save a file, what process should he follow to find and fix the error? (2 marks)

3. Look at this piece of pseudocode: 'Repeat 4 times: [Move forward 10 steps, Turn right 90 degrees]'. What shape will this algorithm create? Justify your answer by describing the pattern of movement. (2 marks)

4. Compare and contrast a 'sequence' and a 'loop'. Why might a programmer choose to use a loop instead of writing out individual instructions multiple times? (3 marks)

5. If you were programming a digital game where a character collects coins worth £0.50 each, how would you use a 'variable' to keep track of the player's total score? (2 marks)

6. What might happen if a computer program contains a syntax error? Explain the potential impact on the 'output' of the program. (2 marks)

Draw: Draw a flowchart that shows the logic for a simple task, such as brushing your teeth or getting ready for school. Use diamond shapes for decisions (Yes/No) and rectangles for actions.



Extension challenge: Design a 'Greater Depth' challenge: Write a short algorithm using loops for a character to navigate a grid from (0,0) to (5,5) while avoiding obstacles. Explain why your chosen path is the most efficient.