

Kit's Computing Challenge: Designing Efficient Algorithms

Learning objective: To design, write, and debug programs that accomplish specific goals, using logical reasoning to explain how algorithms work.

Use this writing frame to document your algorithmic design process. Ensure you use technical vocabulary to explain the sequence of your instructions and how you would debug any errors.

To create a successful algorithm for my chosen task, I must first break the problem down into small, manageable steps that a computer can follow with absolute precision.

Word bank: sequence · algorithm · decomposition · logical · debug · loop · conditional · iteration · precision · subsequently · consequently · furthermore

1. Decomposition: How have you broken your chosen task down into smaller, logical steps? Start by listing your primary objectives... (3 marks)

2. The Algorithm: Write out your sequence of instructions clearly. Why is the order of these steps vital for the success of your program? (4 marks)

3. Conditional Logic: Identify a point in your algorithm where a decision must be made. Explain the 'if... then... else' logic you have applied. (3 marks)

4. Debugging: Imagine your algorithm fails to execute correctly. What systematic methods would you use to find and correct the error (the 'bug')? (3 marks)

5. Efficiency: Compare your current algorithm with an alternative method. Justify why your chosen sequence is the most efficient solution. (4 marks)

6. Evaluation: What might happen if you changed the sequence of your instructions? Explain the impact this would have on the final output. (3 marks)

Extension challenge: Design a flowchart to represent your algorithm visually. Include 'Decision Diamonds' for your conditional statements and 'Process Rectangles' for your instructions. Then, write a short paragraph explaining how your flowchart helps a programmer visualise the flow of data.