

Kit's Algorithmic Adventure: Designing Logic

Learning objective: To design, write and debug programs that accomplish specific goals by using sequence, selection, and repetition (loops).

Kit the fox is building a robotic explorer to navigate a forest maze. Your task is to sequence the instructions (an algorithm) to get the robot from the 'Start' to the 'Treasure'. Use the word bank to fill in the missing steps in the sequence. Remember, if you use a loop, write the number of times it should repeat clearly. Finally, justify your logic in the questions section.

Word bank: Move Forward · Turn Left 90° · Turn Right 90° · Repeat · If obstacle detected · Wait · End

1. Write a sequence of commands to move the robot forward 3 squares, turn right, and move forward 2 squares. Use the 'Repeat' command to make your code more efficient. (3 marks)

2. Explain why using a 'Repeat' loop is better than writing the same instruction multiple times in a program. (2 marks)

3. If the robot encounters a stone in its path, what command could you use to make it check for the obstacle before moving? Justify your choice. (3 marks)

4. Compare and contrast a 'Sequence' and a 'Loop'. How do they work together to form a complex program? (4 marks)

5. What might happen if your algorithm contains a 'logical error' (a bug) in the sequence of instructions? (2 marks)

6. 6. Design a short sequence that uses 'Selection' (an 'If' statement) to decide whether the robot should pick up a digital leaf or a digital acorn based on its location. (4 marks)

Draw: Draw a 5x5 grid representing the forest maze. Label the 'Start' square, the 'Treasure' square, and one 'Obstacle'. Draw a dotted line showing the path your programmed robot would take to reach the treasure while avoiding the obstacle.



Extension challenge: Imagine Kit wants to add a feature where the robot says 'Hello!' every time it finds a treasure. Write the pseudocode for this interaction. Then, write a paragraph explaining how you would 'debug' the robot if it started saying 'Hello!' when it was supposed to be moving.