What is an Algorithm?

Worksheet

An algorithm is a step-by-step procedure for solving a problem or completing a task in a finite number of clearly defined instructions. A good algorithm is correct, finite, and efficient.

Questions

1. Which best defines an algorithm?

A) Any computer program
B) A finite sequence of steps to solve a problem
C) A programming language
D) A type of computer hardware

2. Why must an algorithm be finite?

A) So it uses less memory
B) So it eventually terminates with an answer
C) So it can be written in Python
D) So it uses fewer variables

3. Which of these is NOT a property of a well-designed algorithm?

A) Correctness
B) Finiteness
C) Randomness
D) Efficiency

4. What is pseudocode used for?

A) Compiling a program
B) Describing an algorithm in plain, structured language before coding it
C) Testing hardware speed
D) Encrypting data

5. Trace the 'find the maximum' algorithm on [4, 9, 2, 7].

6. Use linear search to find 7 in [5, 3, 7, 1, 9].

7. One pass of bubble sort on [5, 1, 4].

8. Define: What is an algorithm?

9. Define: What makes an algorithm 'good'?

10. Define: Name two ways to represent an algorithm.

Answer Key

1. B) A finite sequence of steps to solve a problem - An algorithm is a finite, well-defined sequence of steps - it's independent of any specific language or machine.

2. B) So it eventually terminates with an answer - If an algorithm never stops, it never produces a result - finiteness (termination) is a core requirement.

3. C) Randomness - Good algorithms are deterministic and predictable; unwanted randomness undermines correctness.

4. B) Describing an algorithm in plain, structured language before coding it - Pseudocode is a language-independent way to plan and communicate an algorithm before implementation.

5. max = 4 (first element) Compare 9 > 4 max = 9 Compare 2 > 9? No max stays 9 Compare 7 > 9? No max stays 9 Result: max = 9

6. Check index 0: 5 7 Check index 1: 3 7 Check index 2: 7 = 7 found! Result: index 2

7. Compare 5 and 1: 5 > 1 swap [1, 5, 4] Compare 5 and 4: 5 > 4 swap [1, 4, 5] End of pass, list is more sorted: [1, 4, 5]

8. A finite, well-defined sequence of steps that solves a problem or completes a task.

9. It is correct (always gives the right answer), finite (terminates), and efficient (uses reasonable time/memory).

10. Pseudocode and flowcharts (also plain English steps or real code).