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Algorithm



المادة: أساسيات لغة CPP
المرحلة: الأولى
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Algorithm

An algorithm is a finite sequence of clear and unambiguous steps used to solve a problem.

Each step must be executable and performed in a specific order.



Algorithm Properties

- ***Finiteness:*** *The algorithm must end after a limited number of steps.*
- ***Non-ambiguity:*** *Each step is clear, and the next step is always known.*
- ***Effectiveness:*** *The algorithm solves the problem in a reasonable time.*

Example of ambiguity

“Add a large number.” → What is “large”?

Better:

“If $n > 1,000$ then add 10.”

Computers follow simple instructions

- *A computer algorithm is built from simple operations like:*
- *Read a number*
- *Add one number to another*
- *Output (print) a result*



Read (Input)

Think in small, explicit steps.



Compute

Think in small, explicit steps.



Print (Output)

Think in small, explicit steps.

Example: Find the Average

- **Problem:**

Find the average of several numbers.

- **Steps:**

1. *Start and set $sum = 0$, $count = 0$*
2. *Read a number*
3. *Add the number to sum*
4. *Increase count*
5. *Repeat steps 2–4 for all numbers*
6. *Average = $sum \div count$*
7. *Show the result*





Example: Find Maximum and Minimum

- ***Problem:***

Find the largest and smallest numbers in a list.

- ***Steps:***

1. *Ask how many numbers*
2. *If the count is 0 → stop*
3. *Read the numbers*
4. *Find the biggest number*
5. *Find the smallest number*
6. *Show the result*

Daily Life Problem: Choosing the Fastest Way to University

- ***Problem:***

Every morning, a student wants to go to the university as fast as possible. There are several roads, and each road takes a different time. Ask how many numbers

- ***Goal:***

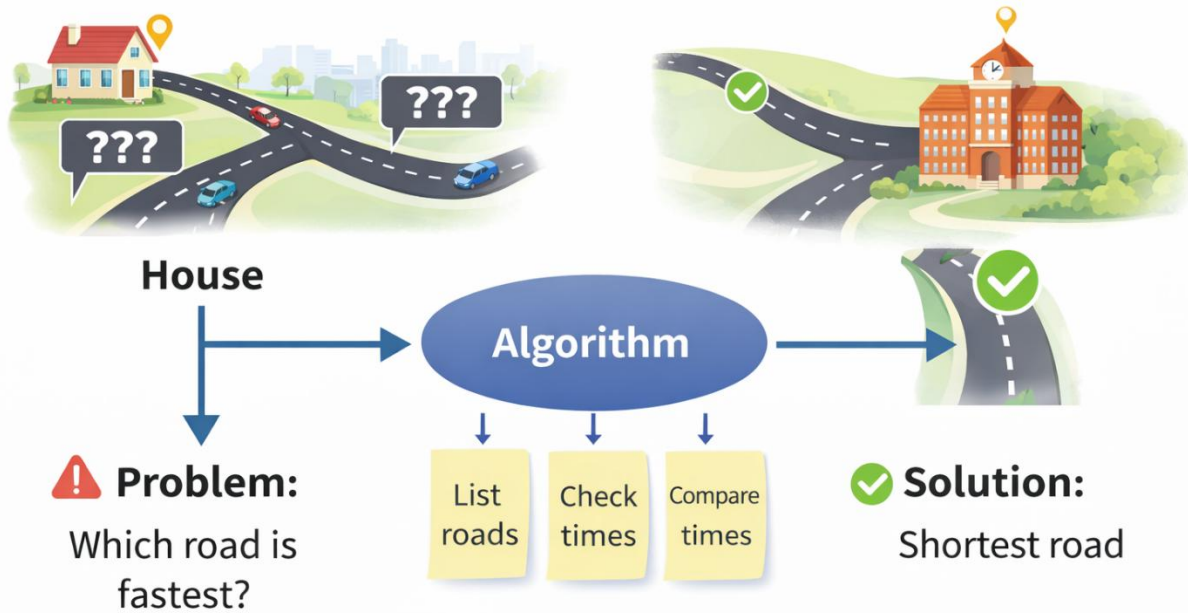
Choose the road that takes the least time.





Solution

1. List all possible roads
2. Check the time for each road
3. Compare the times
4. Choose the road with the shortest time
5. Go to the university



Flowchart

- A flowchart is a diagram that represents a process or algorithm using standard symbols connected with arrows.





Flowchart symbols (common)

	Start / End (Terminator)	Marks the beginning or ending of a process.
	Input / Output	Reads input or displays output.
	Process	An operation or computation step.
	Decision	A question that branches the flow (Yes/No).
	Connector	Connects flow lines (often between pages/areas).

