

EEE: 103

Computer Programming

L1: Algorithm & Flowchart

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What is a Variable?

- ▶ A variable is a storage container in memory to hold data
- ▶ Humans store information in their brain/memory
- ▶ Similarly, programs need variables to store data
- ▶ Example: To calculate area of rectangle - length, width (inputs), area (result)
- ▶ Variables are named storage locations in memory
- ▶ For storing input/output use variables

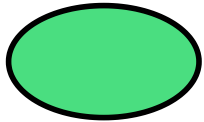
What is an Algorithm?

- ▶ An algorithm is a step-by-step procedure to solve a problem
- ▶ Characteristics: Definite, Finite, Input, Output, Effective
- ▶ Think of it like a recipe - clear instructions to achieve a goal
- ▶ Written in simple, human-readable language
- ▶ Independent of any programming language
- ▶ Each step is numbered for clarity

What is a Flowchart?

- ▶ A flowchart is a pictorial/graphical representation of an algorithm
- ▶ Uses standard symbols to represent different operations
- ▶ Shows the flow of control from one step to another
- ▶ Makes the logic easier to understand and communicate
- ▶ Proper spacing and straight arrows are important
- ▶ Algorithm = Written Steps | Flowchart = Visual Diagram

Flowchart Symbols



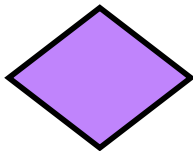
Oval (Terminal)
Start and End of flowchart



Parallelogram (I/O)
Input and Output operations



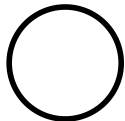
Rectangle (Process)
Process / Computation



Diamond (Decision)
Decision (Yes/No condition)



Arrow
Flow direction of logic



Circle (Connector)
Connect multiple paths



Off-Page Connector
Connect flowchart on different pages

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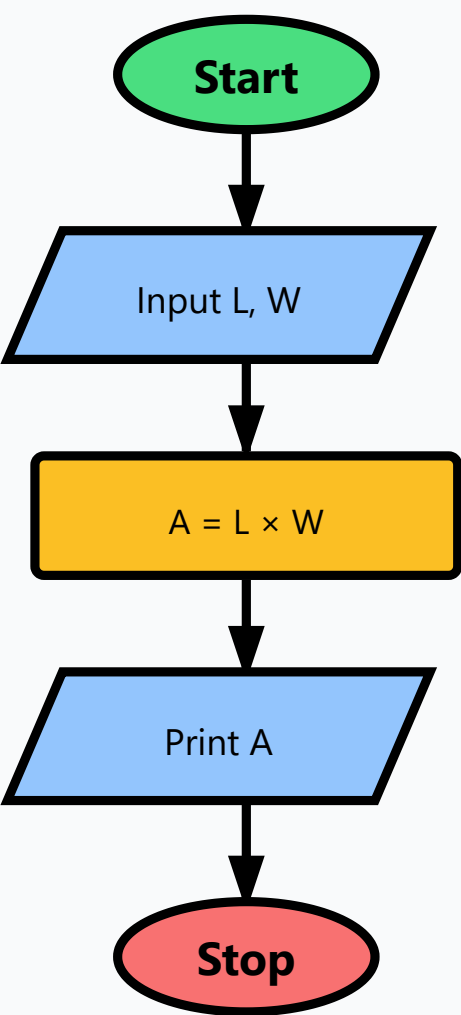


Example 1: Area of Rectangle

Algorithm

- Step 1: Start
- Step 2: Declare variables: L, W, A
- Step 3: Input L, W
- Step 4: Compute $A = L \times W$
- Step 5: Print A
- Step 6: Stop

Flowchart



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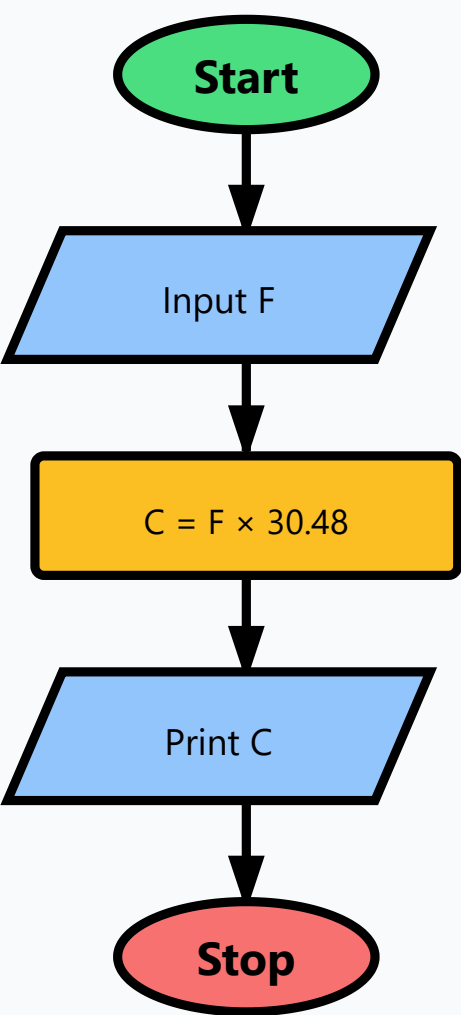


Example 2: Convert Feet to Centimeters

Algorithm

- Step 1: Start
- Step 2: Declare variables: F, C
- Step 3: Input F
- Step 4: Compute $C = F \times 30.48$
- Step 5: Print C
- Step 6: Stop

Flowchart



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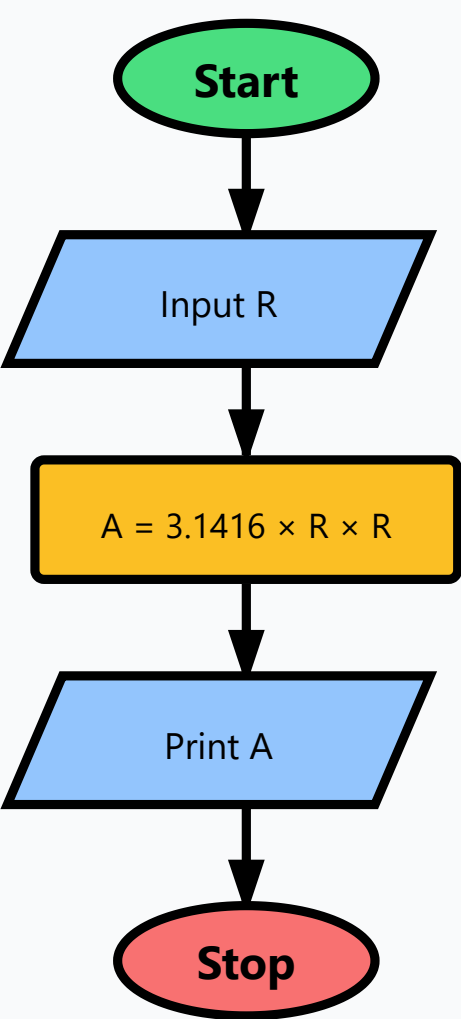


Example 3: Area of Circle

Algorithm

- Step 1: Start
- Step 2: Declare variables: R, A
- Step 3: Input R
- Step 4: Compute $A = 3.1416 \times R \times R$
- Step 5: Print A
- Step 6: Stop

Flowchart



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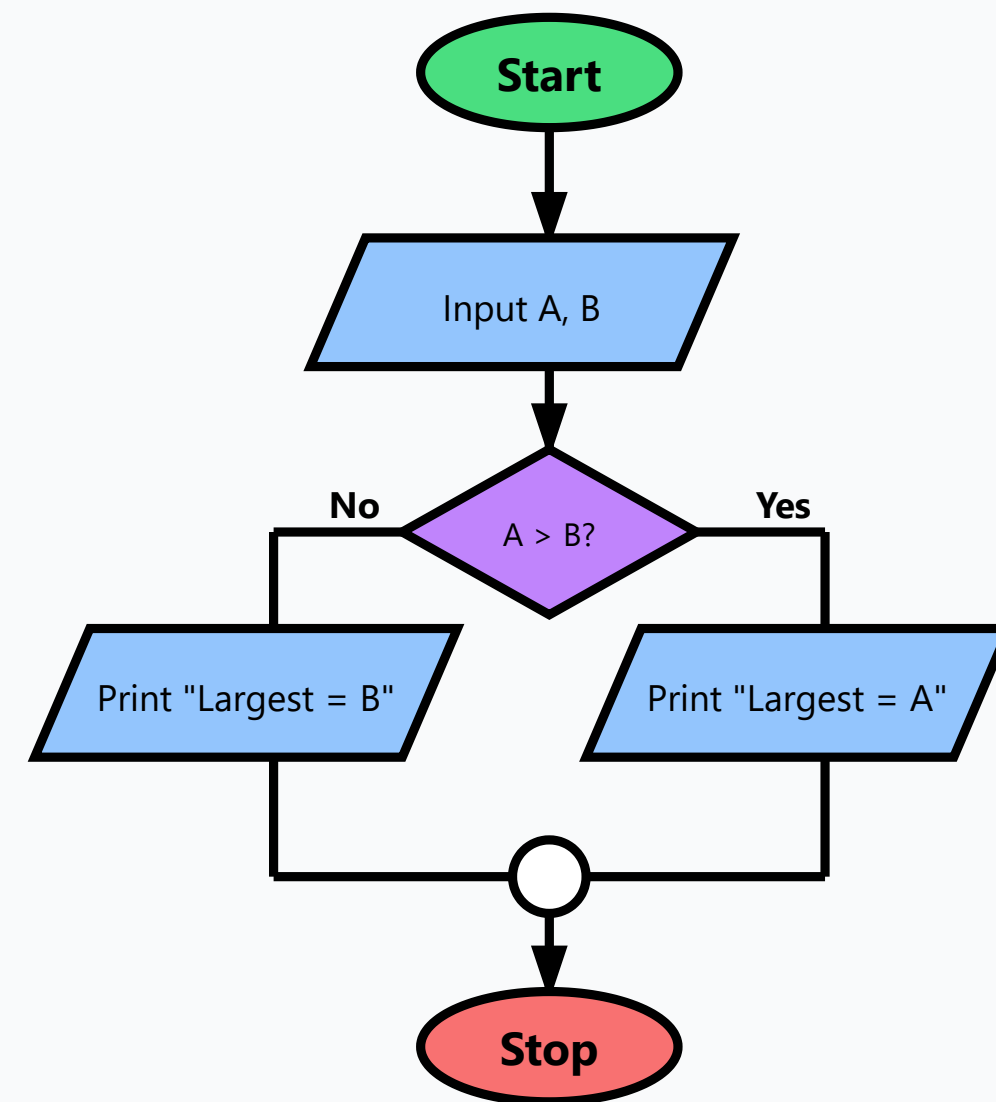


Example 4: Largest of Two Numbers

Algorithm

- Step 1: Start
- Step 2: Declare variables: A, B
- Step 3: Input A, B
- Step 4: If $A > B$ go to Step 5 else go to Step 6
- Step 5: Print "Largest = A", go to Step 7
- Step 6: Print "Largest = B"
- Step 7: Stop

Flowchart

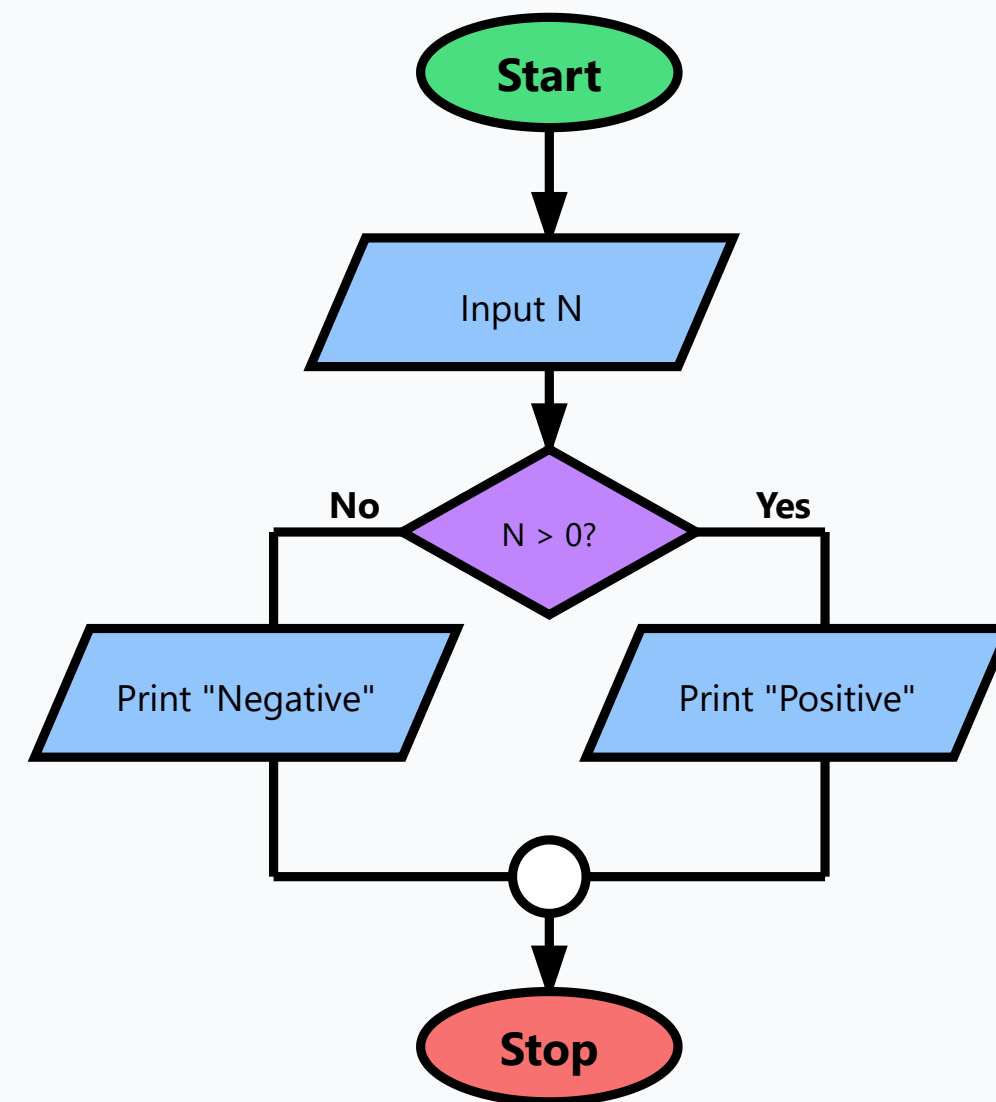


Example 5: Positive or Negative

Algorithm

- 👁 **Step 1:** Start
- 👁 **Step 2:** Declare variable: N
- 👁 **Step 3:** Input N
- 👁 **Step 4:** If $N > 0$ go to Step 5 else go to Step 6
- 👁 **Step 5:** Print "Positive", go to Step 7
- 👁 **Step 6:** Print "Negative"
- 👁 **Step 7:** Stop

Flowchart

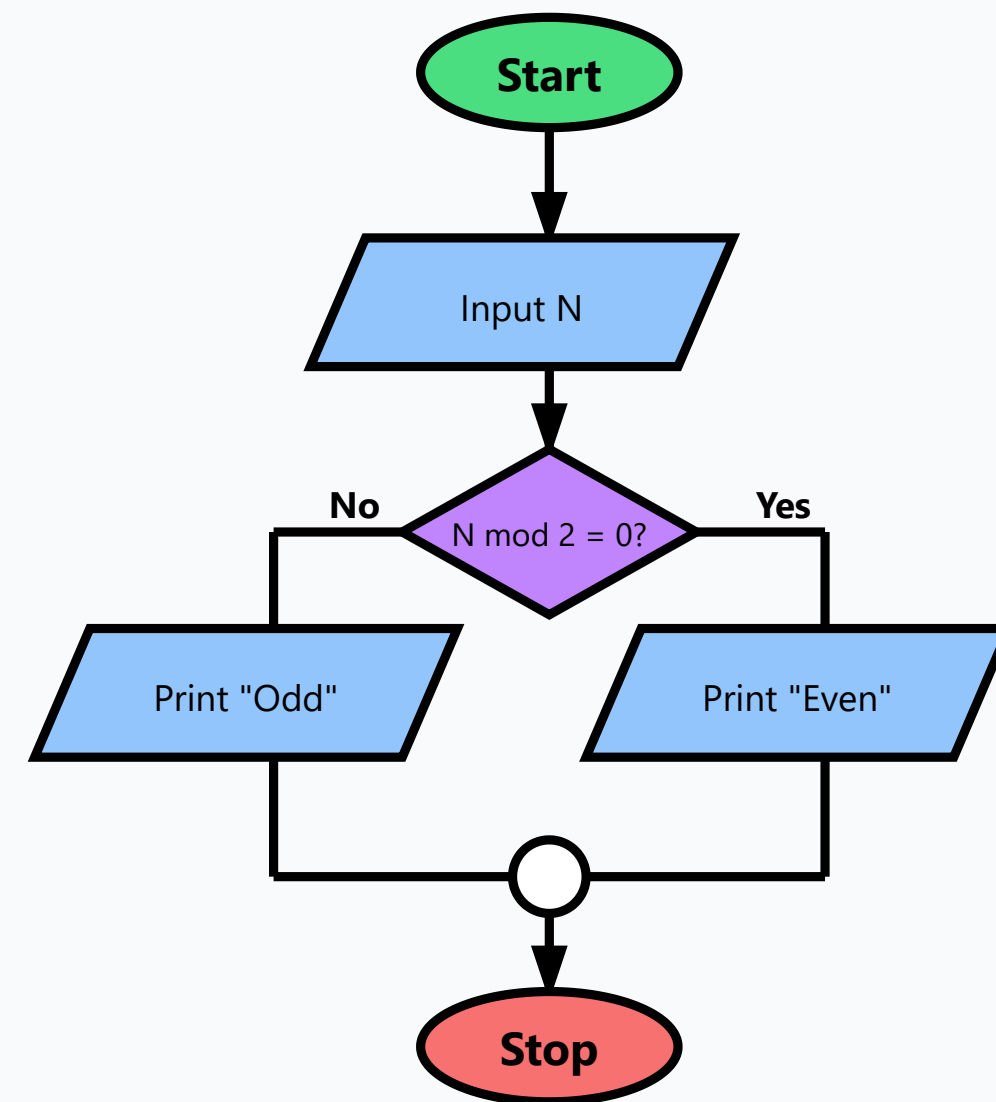


Example 6: Odd or Even

Algorithm

- 👁 **Step 1:** Start
- 👁 **Step 2:** Declare variable: N
- 👁 **Step 3:** Input N
- 👁 **Step 4:** If $N \bmod 2 = 0$ go to Step 5 else go to Step 6
- 👁 **Step 5:** Print "Even", go to Step 7
- 👁 **Step 6:** Print "Odd"
- 👁 **Step 7:** Stop

Flowchart



Example 7: Average of Three Quiz Marks

Start

Declare variables: Q1, Q2, Q3, AVG

Input Q1, Q2, Q3

Compute $AVG = (Q1+Q2+Q3)/3$

```
Print AVG
```

If $AVG < 10$ go to Step 7 else go to Step 8

Print "Needs Improvement", go to Step 9

```
Print "Good Work"
```

Stop

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Thank You

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