Algorithm

1stDefinition:

Sequence of steps that can be taken to solve a problem

2ndDefinition:

The step by step series of activities performed in a sequence to solve a problem

Better Definition:

A precise sequence of a limited number of unambiguous, executable steps that terminates in the form of a solution

Algorithm

- Algorithm is a step-by-step procedure, which defines a set of instructions to be executed in a certain order to get the desired output. Algorithms are generally created independent of underlying languages, i.e. an algorithm can be implemented in more than one programming language.

- From the data structure point of view, following are some important categories of algorithms −

- **Search − Algorithm to search an item in a data structure.**

- **Sort − Algorithm to sort items in a certain order.**

- **Insert − Algorithm to insert item in a data structure.**

- **Update − Algorithm to update an existing item in a data structure.**

- **Delete − Algorithm to delete an existing item from a data structure.**

Characteristics of an Algorithm

- An algorithm should have the following characteristics −
- **Unambiguous − Algorithm should be clear and unambiguous. Each of its steps**(or phases), and their inputs/outputs should be clear and must lead to only one meaning.
- **Input − An algorithm should have 0 or more well-defined inputs.**
- **Output − An algorithm should have 1 or more well-defined outputs, and should** match the desired output.
- **Finiteness − Algorithms must terminate after a finite number of steps.**
- **Feasibility − Should be feasible with the available resources.**
- **Independent − An algorithm should have step-by-step directions , which should** be independent of any programming code.

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Advantages of Algorithm

- It is a step-by-step repetition of a solution to a given problem which is very easy to understand.
- Its easy to first develop an algorithm, then convert it into a flowchart &then into a computer program.
- Its is easy to debug as every step is got its own logical sequence.

Disadvantages of algorithm.

- Writing algorithm takes a long time.
- An Algorithm is not a computer program, it is rather a concept of how a program should be.

Example of Algorithm

- Let's try to learn algorithm-writing by using an example.
- **Problem− Design an algorithm to add two numbers**
- **Step 1 − START**
- **Step 2 − declare three integers a, b & c**
- **Step 3 − define values of a & b**
- **Step 4 − add values of a & b**
- **Step 5 − store output of step 4 to c**
- **Step 6 − print c**
- **Step 7 − STOP**

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- Algorithms tell the programmers how to code the program. Alternatively, the algorithm can be written as –

- **Step 1 − START ADD**
- **Step 2 − get values of a & b**
- **Step 3 − c ← a + b**
- **Step 4 − display c**
- **Step 5 − STOP**

Flowchart

- A flowchart is a picture (graphical representation) of the problem solving process.
- A flowchart gives a step-by-step procedure for solution of a problem.
- **Elements of a flowchart:**
- Various geometrical shaped boxes represent the steps of the solution.
- The boxes are connected by directional arrows to show the flow of the solution.
- **Uses of a flowchart:**
- To specify the method of solving a problem.
- To plan the sequence of a computer program.
- Communicate ideas, solutions.
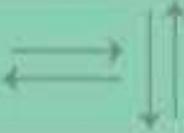
Advantages Of Using FLOWCHARTS

1.Communication: Flowcharts are better way of communicating the logic of a system to all concerned or involved.

2.Effective analysis: With the help of flowchart, problem can be analyzed in more effective way therefore reducing cost and wastage of time.

3.Proper documentation: Program flowcharts serve as a good program documentation, which is needed for various purposes, making things more efficient.

4.Efficient Coding: The flowcharts act as a guide or blueprint during the systems analysis and program development phase.

5.Proper Debugging: The flowchart helps in debugging process.

6.Efficient Program Maintenance: The maintenance of operating program becomes easy with the help of flowcharts, it help the programmer to put efforts more efficiently on that part

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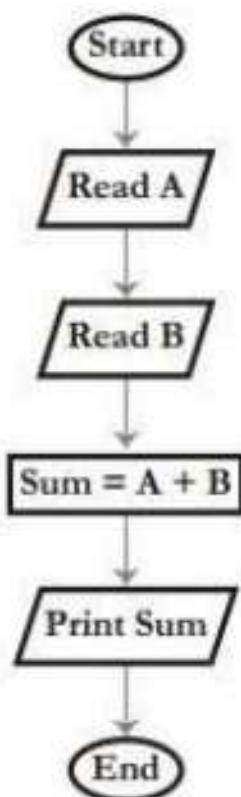
Disadvantages Of Using FLOWCHARTS:

 1. Complex logic: Sometimes, the program logic is quite complicated. In that case, flowchart becomes complex and clumsy. This will become a pain for the user, resulting in a waste of time and money trying to correct the problem.

2. Alterations and Modifications: If alterations are required the flowchart may require re-drawing completely. This will usually waste valuable time.

3.Reproduction: As the flowchart symbols cannot be typed, reproduction of flowchart becomes a problem.

Flowchart symbols and their purpose
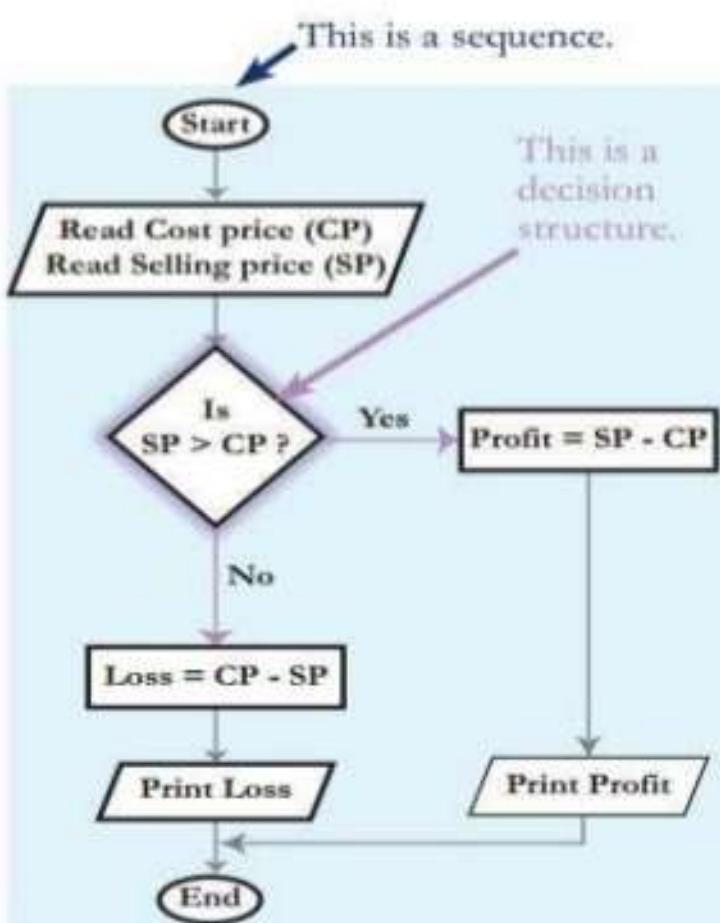
Flowchart symbols	Geometric shape	Purpose
Ellipse		Ellipse is used to indicate the start and end of a flowchart. Start written in the ellipse indicates the beginning of a flowchart. End or Stop or Exit written in the ellipse indicates the end of the flowchart.
Parallelogram		A parallelogram is used to read data (input) or to print data (output).
Rectangle		A rectangle is used to show the processing that takes place in the flowchart.
Diamond	Yes / No	A diamond with two branches is used to show the decision making step in a flowchart. A question is specified in the diamond. The next step in the sequence is based on the answer to the question which is "Yes" or "No".
Arrows		Arrows are used to connect the steps in a flowchart, to show the flow or sequence of the problem solving process

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Start	**Finding sum of 845 and 247**
↓	Start
Read A		
↓	A= 845
Read B	
↓	B= 247
Sum = A + B	
↓	Sum= 845+ 247
Print Sum	
↓	Sum= 1092
End	
	End

This is a sequence.

This is a decision structure.

Start

Read Cost price (CP)
Read Selling price (SP)

Is SP > CP ?

Yes → Profit = SP - CP

No

Loss = CP - SP

Print Loss

Print Profit

End

Finding profit or loss when CP = 325 and SP = 458

Start

Read CP=325
Read SP= 458

Condition:
Is 458 > 325? — Profit= 458-325

Profit= Rs. 133

End

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