

# Algorithms

## Learning Objective:

- Understand algorithm
- Learn how to solve problems with the help of algorithm

## Introduction:

In the world of computer, you have to solve various problems using the flow chart. Algorithm helps to solve any well-defined computational problem through systematic process. You can also use this method in your daily life to solve even the complex problem and can get some definite answer. You must learn how to organize every step to simplify any computational issue to implement that program. Flowchart is the next step of any algorithm that that represent the whole process through diagram.

## Algorithm:

Algorithm is a simple yet effective method to articulate any function into a finite list of instructions from starting to end step-by-step. It helps to compute a set of instructions that starts from an initial input and ends to an output.

Let's take an example. Assume one has to go from one's house to railway station. How will one go?



**Step 1: Start**

**Step 2: Call a cab**

**Step 3: Board the cab from home**

**Step 4: Complete the total distance through cab**

**Step 5: Stop the cab at the railway station**

**Step 6: Pay to the cab**

**Step 6: Step to the railway platform**

**Step 7: Stop**

Algorithm is divided into three categories depends on the execution:

**Sequence Statement:** This is a series structure where all programs are finished systematic i.e. one after another.

***Example: Write an algorithm to print, "Help me"***

Step 1: Start

Step 2: Print 'Help me'

Step 3: Stop

*Example 2: Write an Algorithm to find Perimeter of the rectangle*

**Step 1: Start**

**Step 2: Take length and breadth of the sides of rectangular and stored them as L and B respectively**

**Step 3: Add L and B and store it**

**Step 4: Multiply the addition of L and B by 2 and store in the Perimeter**

**Step 5: Stop**

Here, in the both examples, all the step are followed or executed after completing before step. This is sequence statement.

**Selective Statement:** Selective statement is done based on certain condition. If the particular condition is true, the compiler will perform the said task otherwise perform another set of task.

*For Example: write an Algorithm to check whether Sahil is eligible to apply for a driving license.If hehas attained the age of driving, or not, i.e. 18 years.*



**Step 1: Start**

**Step 2: Take age and store it in age**

**Step 3: Check the age value, if age  $\geq$  18 years, go to step 4 else go to step 5**

**Step 4: Print “Eligible to apply for driving license”**

**Step 5: Print “ Below age for applying of driving license”**

**Step 5: Stop**

*Example: Write an Algorithm to check whether a one-digit number is odd or even*

**Step 1: Start**

**Step 2: Choose any one-digit number and store it in n**

**Step 3: Check n value, if  $n=0,2,4,6,8$  go to step 4 else step 5**

**Step 4: Print “even number”**

**Step 5: Print “odd number”**

**Step 6: Stop**

In both the examples, steps were depend on the condition and based on that only the next step has been executed. This is Selective Statement.

**Looping Statement or Iterative:**As name suggests, in this kind of program, some particular statements are implemented repeatedly based on certain conditional test.

*For example: Write an algorithm to print natural numbers upto n.*

This is very simple and one needs to understand that a natural number is always equal to or bigger than 1 and to write a natural number in a consequence, one has to add 1 every time for the increment of that natural number. Let's do it through Algorithm.

**Step 1: Start**

**Step 2: Take any number and store it in n**

**Step 3: Store 1 in k**

**Step 4: Check k value, if  $k \leq n$  then go to step 5 else step 8**

**Step 5: Print k**

**Step 6: Increment k value by 1**

**Step 7: Go to step 4**

**Step 8: Stop**

In this example, every time when a number  $k \leq n$ , it get incremented by 1 and the go to loop at step 4 and the loop continues till it reach to the number n.

**MCQ:**



### **What is Algorithm?**

- Systematic processing
- Random process
- Computational process
- Complex process.

### **What is loop?**

- Writing algorithm on a systematic way only
- Writing algorithm is a sequenced and conditional ways
- Writing a random sequence based on conditions
- Writing a repetitive systematic sequence based on conditions

### **How an algorithm is helpful in daily life?**

- Helps to solve complex issues
- Helps to solve complex issues with an input and certain output
- Help to solve complex issues in a random manner
- Useless in real life

### **What is Selective statement?**

- Writing a solution of computational problem in sequential way through algorithm
- Writing a daily routine in the diary regarding school program
- Writing algorithm based on conditions
- Writing complex solutions with the help of loop.

### **Sequence Algorithm:**

Jack has an assignment to make a Sequence Statement Algorithm to calculate the volume of a square. She is confused as how to do it. Help Jack and draw a suitable diagram for her.

**Step 1: Start**

**Step 2: Take length of a one side of a square and store it in L**

**Step 3: Multiply L by 4 and store it in volume**

**Step 4: Stop**

All sides of square are always equal and the formula of the volume of the square is

Volume (square) =  $4XL$ .

### **Selective Algorithm**

**Activity 2: Jim is a smart boy but don't know the traffic rules and meaning of traffic light. Help her to understand the meaning of the two important traffic light color, viz: Green, and Red**



**Step 1: Start**

**Step 2: Check the color of light and store in it color**

**Step 3: Check, if color=red, go to Step 4 else step 5**

**Step 4: Print “Stop”**

**Step 5: Print “Move”**

**Step 6: Stop**

Here, if the color of light is red, that means stop and if green that means move.

## **Iteration Statement:**

**Activity 3: David wants to make a looping statement that helps her to write all the even numbers until 20. Help her to make her assignments**

**Step 1: Start**

**Step 2: Take 20 and store it in n**

**Step 3: Take 1 and store in l**

**Step 4: Check l value, if  $l \leq 2$  and  $l \geq n$  then go to step 5 else step 8**

**Step 5: Print "l"**

**Step 6: Increment l value by 2**

**Step 7: Go to Step 4**

**Step 8: Print "Stop"**

**Step 9: Stop**

Here the number must start from 2 as 2 is the smallest natural even number and then need increment of 2 till 20 as every even number must be divided completely by 2.

