

Algorithm characteristics

1. **It should have finite number of steps**. No one can be expected to execute infinite number of steps.
2. The steps must be in order and simple
3. **Each step should be defined clearly stated i.e. without un-ambiguity (without doubtfulness)**
4. Must include all required information
5. Should exhibit at least one output

| Algorithm | Flowchart | Program |
|---|--|--|
| An algorithm is defined as <u>sequence of steps to solve a problem (task)</u> . | <u>A flowchart is pictorial (graphical) representation of an algorithm.</u> | Set of instructions. Instruction is a command to the computer to do some task. |
| Algorithm can also be defined as a plan to solve a problem and represents its logic. | A picture is worth of 1000 words. We can understand more from picture than words. | Implementation of Algorithm or flowchart |

Different algorithms have different performance characteristics to solve the same problem. Some algorithms are fast. Some are slow. Some occupy more memory space. Some occupy less memory space. Some are complex and some algorithms are simple.

Logically algorithm, flowchart and program are the same.

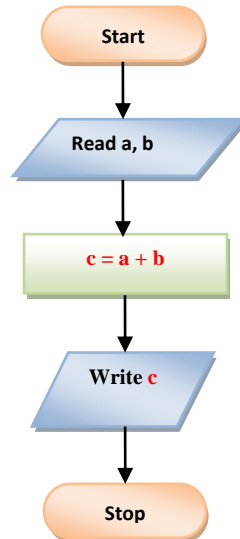
Examples of Algorithms and Flowcharts (with Java code)

1. To find sum of two numbers

Algorithm

1. Start
2. Read a, b
3. $c = a + b$
4. Print or display c
5. Stop

Flowchart



Program

```
// Program to find sum of two numbers
import java.util.Scanner;

public class Add{
    public static void main(String [] args){

        Scanner Ob1 = new Scanner(System.in);

        System.out.println("Enter value of a: ");
        int a = Ob1.nextInt();

        System.out.println("Enter value of b: ");
        int b = Ob1.nextInt();

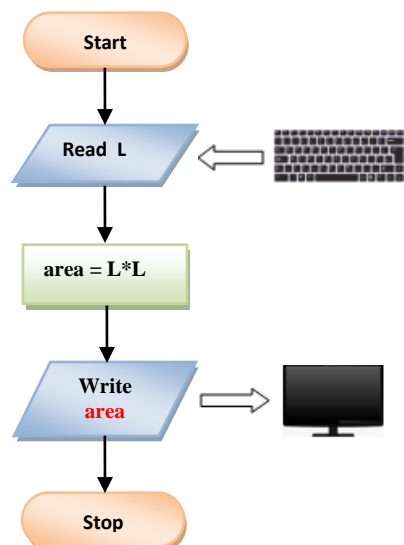
        int c = a+b;
        System.out.println("Sum of given two numbers is: " +c);
    }
}
```

2. Finding Area of the square

Algorithm

1. Start
2. Read length, L
3. $area = L * L$
4. Print or display $area$
5. Stop

Flowchart



Program

```
// Program to find area of a square
import java.util.Scanner;

public class AreaSquare{
    public static void main(String [] args){

        Scanner Ob1 = new Scanner(System.in);

        System.out.println("Enter length of square L: ");
        int L = Ob1.nextInt();

        int area = L*L;

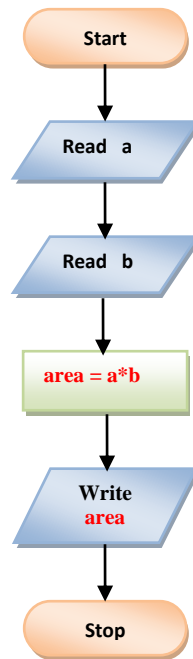
        System.out.println("Area of square is: " +area);
    }
}
```

3. Finding Area of the rectangle

Algorithm

1. Start
2. Read side length, a
3. Read side length b
4. $area = a*b$
5. Print or display **area**
6. Stop

Flowchart



Program

```
// Program to find area of rectangle
import java.util.Scanner;

public class AreaRectangle{
    public static void main(String [] args){

        Scanner Ob1 = new Scanner(System.in);

        System.out.println("Enter side length a: ");
        int a = Ob1.nextInt();

        System.out.println("Enter side length b: ");
        int b = Ob1.nextInt();

        int area = a*b;

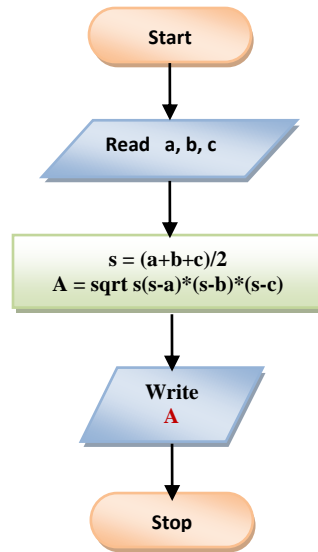
        System.out.println("Area of rectangle is is: " +area);
    }
}
```

4. Area of a triangle where three sides are given

Algorithm

1. Start
2. Read a, b, c
3. $s = (a+b+c)/2$
4. $A = \sqrt{s(s-a)(s-b)(s-c)}$
5. Print or display A
6. Stop

Flowchart



Program

```
// Program to find area of triangle
// Input values a=5, b =8, c =10

import java.util.Scanner;

public class AreaTriangle{
    public static void main(String [] args){

        Scanner Ob1 = new Scanner(System.in);

        System.out.println("Enter side length a: ");
        int a = Ob1.nextInt();

        System.out.println("Enter side length b: ");
        int b = Ob1.nextInt();

        System.out.println("Enter side length c: ");
        int c = Ob1.nextInt();

        float s = (a+b+c)/2;

        double area = Math.sqrt(s*(s-a)*(s-b)*(s-c));

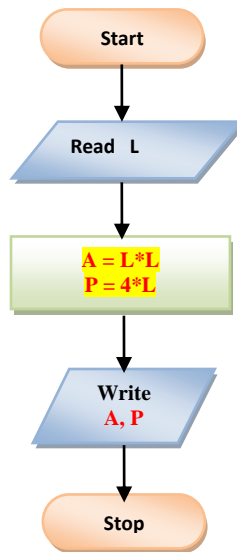
        System.out.println("Area of Triangle is is: " +area);
    }
}
```

5. Find the area & perimeter of a square

Algorithm

1. Start
2. Read length L
3. Area $A = L * L$
4. Perimeter $P = 4 * L$
5. Print or display A,P
6. Stop

Flowchart



Program

```
// Area & Perimeter of a square
import java.util.Scanner;

public class Square{
    public static void main(String [] args){

        Scanner Ob1 = new Scanner(System.in);

        System.out.println("Enter length of square L: ");
        int L = Ob1.nextInt();

        int A = L*L;
        int P = 4*L;

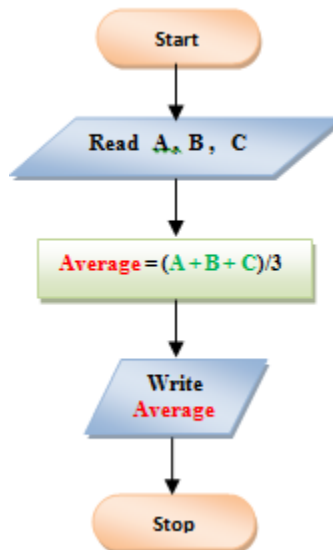
        System.out.println("Area of square = " +A);
        System.out.println("Perimeter of square = " +P);
    }
}
```

6. Calculating the average for 3 numbers

Algorithm

1. Start
2. Read 3 numbers A, B, C
3. Calculate the average by the equation:
 $Average = (A + B + C)/3$
4. Print average
5. Stop

Flowchart



Program

```
// Average of 3 numbers
import java.util.Scanner;

public class Avg3Nums{
    public static void main(String [] args){

        Scanner Ob1 = new Scanner(System.in);

        System.out.println("Enter value of A: ");
        int A = Ob1.nextInt();

        System.out.println("Enter value of B: ");
        int B = Ob1.nextInt();

        System.out.println("Enter value of C: ");
        int C = Ob1.nextInt();

        float Avg = (A+B+C)/3;

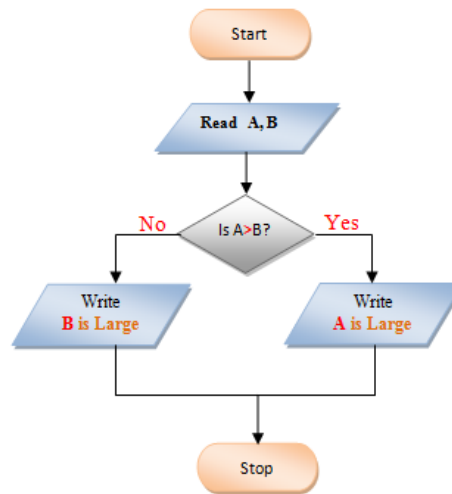
        System.out.println("Average is: " +Avg);
    }
}
```

7. Greatest of two numbers

Algorithm

1. Start
2. Read A,B
3. If $A > B$ then
 Print A is large
 else
 Print B is large
4. Stop

Flowchart



Program

```
// Greatest of two numbers
import java.util.Scanner;

public class XYZ{
    public static void main(String [] args){
        Scanner Ob1 = new Scanner(System.in);

        System.out.println("Enter value of A: ");
        int A = Ob1.nextInt();

        System.out.println("Enter value of B: ");
        int B = Ob1.nextInt();

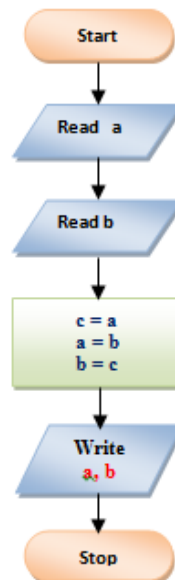
        if (A>B)
            System.out.println("A is Larger ");
        else
            System.out.println("B is Larger ");
    }
}
```

8. Interchange the value of two variables

Algorithm

1. Start
2. Read two values into two variables a, b
3. Declare third variable, c
 $c = a$
 $a = b$
 $b = c$
4. Print or display a, b
5. Stop

Flowchart



Program

```
// Interchange two variables
import java.util.Scanner;

public class Interchange{
    public static void main(String [] args){
        Scanner Ob1 = new Scanner(System.in);

        System.out.println("Enter value of a: ");
        int a = Ob1.nextInt();

        System.out.println("Enter value of b: ");
        int b = Ob1.nextInt();

        int c = a;
        a = b;
        b = c;

        System.out.println("values after swapping: ");
        System.out.println(+a);
        System.out.println(+b);
    }
}
```

9. Calculate simple interest using the expression ($SI = PNR/100$)

Algorithm

1. Start
2. Read P, N, R
3. $SI = (PNR)/100$
4. Print SI
5. Stop

Flowchart



Program

```
// Simple Interest
import java.util.Scanner;

public class SimpleInterest{
    public static void main(String [] args){

        Scanner Ob1 = new Scanner(System.in);

        System.out.println("Enter value of P: ");
        int P = Ob1.nextInt();

        System.out.println("Enter value of N: ");
        int N = Ob1.nextInt();

        System.out.println("Enter value of R: ");
        int R = Ob1.nextInt();

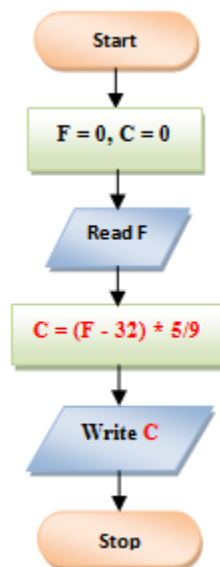
        float SI = (P*N*R)/100;
        System.out.println("Simple Interest is: " +SI);
    }
}
```

10. Convert temperature from Fahrenheit to Celsius

Algorithm

1. Start
2. Initialize F = 0, C = 0
3. Read F
4. $C = (F-32) * 5/9$
5. Write C
6. Stop

Flowchart



Program

```
// Fahrenheit to Celsius
import java.util.Scanner;

public class FtoC{
    public static void main(String [] args){

        Scanner Ob1 = new Scanner(System.in);

        System.out.println("Enter Fahrenheit value F: ");
        int F = Ob1.nextInt();

        float C = (F-32)*5/9;

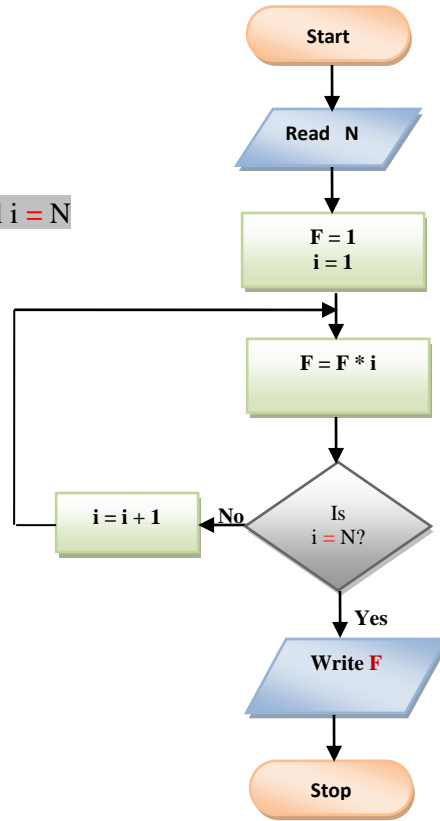
        System.out.println("Temp in Celsius is: " +C);
    }
}
```

11. Draw a flowchart for computing factorial N, where $N! = 1 * 2 * 3 * \dots * N$

Algorithm

1. Start
2. Read N
3. Initialize F = 1, i = 1
4. $F = F * i$
5. Increment i by 1
6. Repeat step 4 & 5 until i = N
7. Print F
8. Stop

Flowchart



Program

```

// Factorial of number
import java.util.Scanner;

public class Factorial{
    public static void main(String [] args){

        Scanner Ob1 = new Scanner(System.in);

        System.out.println("Enter value of N: ");
        int N = Ob1.nextInt();

        int F = 1;
        for(int i = 1; i <= N; i++){
            F = F * i;
        }

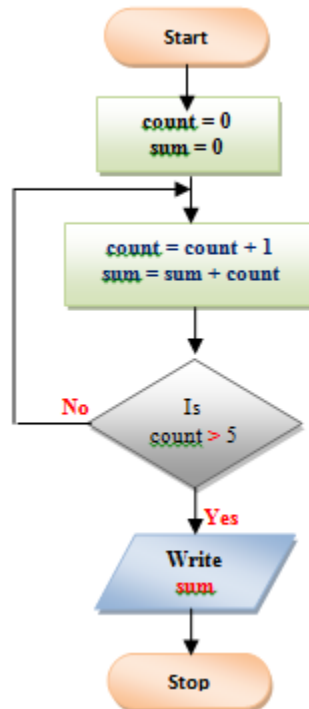
        System.out.println("Factorial of N is: " + F);
    }
}
    
```

12. Find the Sum of First 5 Natural Numbers

Algorithm

1. Start
2. Initialize count = 0, sum = 0
3. $count = count + 1$
4. $sum = sum + count$
5. Repeat steps 3,4 until count > 5
6. Print sum
7. Stop

Flowchart



Program

```

// Sum of First 5 Natural Numbers
import java.util.Scanner;

public class Sum5{
    public static void main(String [] args){

        int sum = 0;

        for(int count = 1; count <= 5; count++){
            sum = sum + count;
        }

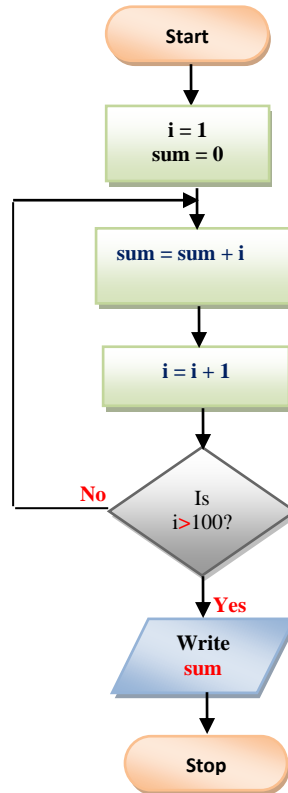
        System.out.println("Sum is: " + sum);
    }
}
    
```


13. Calculating sum of integers 1 to 100

Algorithm

1. Start
2. Initialize count $i = 1$, $sum = 0$
3. $sum = sum + i$
4. Increment i by 1
5. Repeat steps 3 & 4 until $i > 100$
6. Print sum
7. Stop

Flowchart



Program

```
// Sum of integers 1 to 100
import java.util.Scanner;

public class Sum1to100{
    public static void main(String [] args){

        int sum = 0;

        for(int i=1; i<101; i++){
            sum = sum + i;
        }

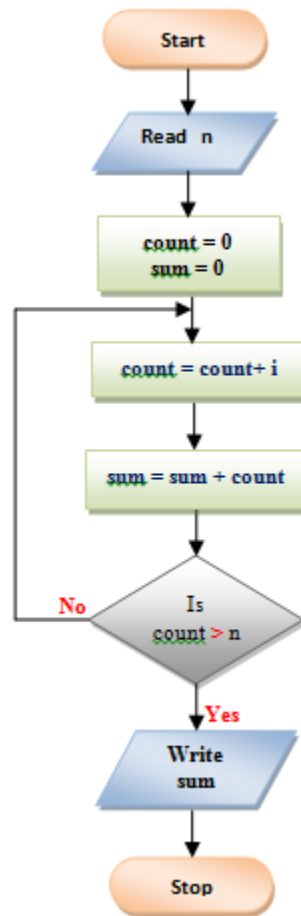
        System.out.println("Sum is: " +sum);
    }
}
```

14. To find the sum of n natural Numbers

Algorithm

1. Start
2. Read n
3. count=0
4. sum=0
5. **count = count + 1**
6. **sum = sum + count**
7. Repeat steps 5 & 6 until
count > n
8. Print sum
9. Stop

Flowchart



Program

```
// sum of n natural Numbers

import java.util.Scanner;

public class SumofN{
    public static void main(String [] args){

        Scanner Ob1 = new Scanner(System.in);
        System.out.println("Enter value of n.");
        int n = Ob1.nextInt();

        int sum = 0;

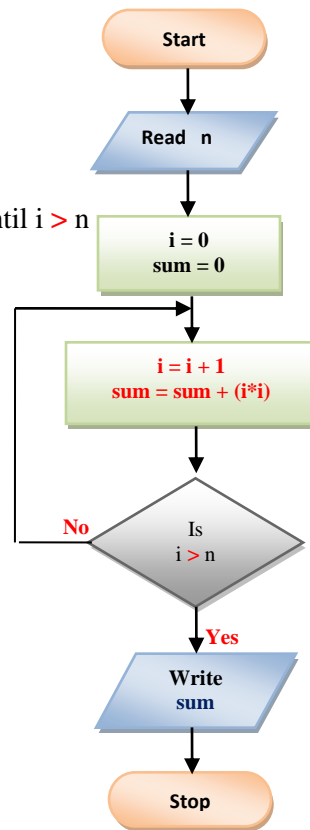
        for(int i=1; i<=n; i++){
            sum = sum + i;
        }
        System.out.println("Sum of integers upto n is:");
        System.out.println("Sum is: " +sum);
    }
}
```

15. Sum of squares of n natural numbers

Algorithm

1. Start
2. Read n
3. $i = 0$, $sum = 0$
4. $i = i + 1$
5. $sum = sum + (i*i)$
6. Repeat steps 4 and 5 until $i > n$
7. Print sum
8. Stop

Flowchart



Program

```
// Sum of squares of n natural numbers
import java.util.Scanner;

public class SumofSquaresofN{
    public static void main(String [] args){

        Scanner Ob1 = new Scanner(System.in);
        System.out.println("Enter value of n:");
        int n = Ob1.nextInt();

        int sum = 0;

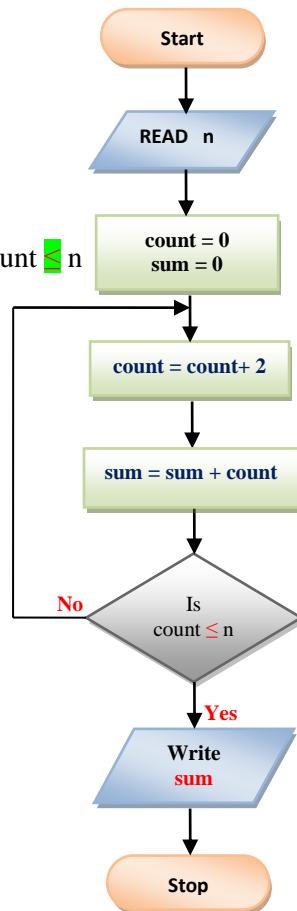
        for(int i=1; i<=n; i++){
            sum = sum + i*i;
        }
        System.out.println("Answer is:" +sum);
    }
}
```

16. To find the sum of all even numbers up to 'n'

Algorithm

1. Start
2. Read n
3. count=0
4. sum=0
5. count = count + 2
6. sum = sum + count
7. Repeat steps 5 & 6 until count \leq n
8. Print sum
9. Stop

Flowchart



Program

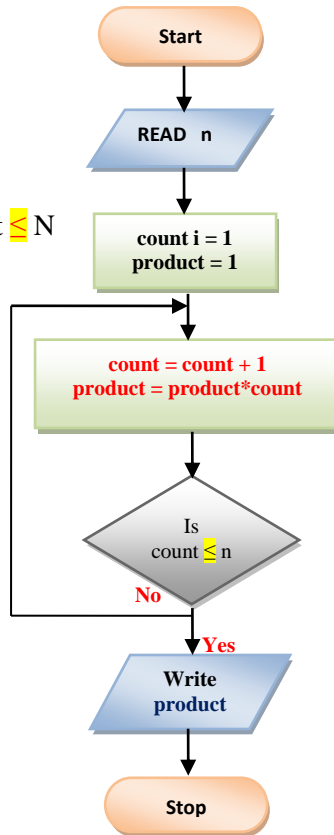
```
// Sum of all even numbers up to 'n'  
import java.util.Scanner;  
  
public class SumofEvenUptoN{  
    public static void main(String [] args){  
  
        Scanner Ob1 = new Scanner(System.in);  
        System.out.println("Enter value of n.");  
        int n = Ob1.nextInt();  
  
        int sum = 0;  
        int count = 0;  
        while(count<=n)  
        {  
            sum = sum + count;  
            count = count +2;  
        }  
  
        System.out.println("Answer is:" +sum);  
    }  
}
```

17. To find Product of numbers up to N

Algorithm

1. Start
2. Read n
3. count i = 1
4. product = 1
5. product=count*product
6. count = count + 1
7. Repeat steps 5,6 until count \leq N
8. Print product
9. Stop

Flowchart



Program

```
// Product of numbers upto N
import java.util.Scanner;

public class ProdofN{
    public static void main(String [] args){

        Scanner Ob1 = new Scanner(System.in);
        System.out.println("Enter value of n:");
        int n = Ob1.nextInt();

        int prod = 1;

        for(int i=1; i<=n; i++){
            prod = prod * i;
        }

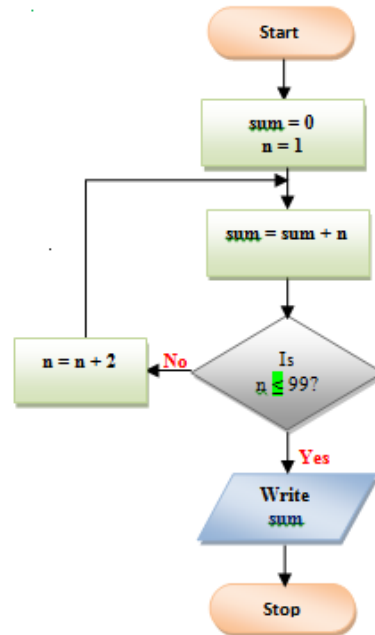
        System.out.println("Product of numbers upto n is:");
        System.out.println(+prod);
    }
}
```

18. Sum of first 50 odd numbers

Algorithm

1. Start
2. $sum=0, n = 1$
3. $sum=sum + n$
4. $n = n + 2$
5. Repeat steps 4 and 5 until $n \leq 99$
6. Print sum
7. Stop

Flowchart



Program

```
// Sum of first 50 odd numbers
import java.util.Scanner;

public class abc{
    public static void main(String [] args){

        int sum = 0;
        int count =1;

        while(count<=99)
        {
            sum = sum + count;
            count = count +2;
        }

        System.out.println("Answer is:" +sum);
    }
}
```