

# Computer Fundamentals

## CSE1013

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## Algorithm:

an algorithm is a well defined list of steps for solving a particular problem.

The criteria of an algorithm are:

1. An algorithm takes zero or more input.    Read: A, B
2. It produces at least one output.     $\text{Sum} := A + B$
3. Each instruction must be clear.    add 6 or 7 to x
4. If we trace out the instructions of an algorithm, then for all cases, the algorithm terminates after a finite number of steps.
5. Each instruction must be very basic so that it can be carried out.

## **Space Complexity:**

The space complexity of an algorithm is the amount of memory it needs to run to completion.

## **Time Complexity:**

The time complexity of an algorithm is the amount of time it needs to run to completion.

# Write an algorithm to add two integer number

$$Y=A+B;$$

$$Y=10+11;$$

$$Y=21$$

This algorithm takes two number as input and find the summation of those numbers as output. Suppose the two numbers A , B and sum is used for carrying out the summation of these two numbers.

Step1. Start

Step2. Read : A, B

Step3. Sum := A + B

Step4. Write : sum

Step5. Exit

Step1. Sum := 10 + 11

Step2. Write : sum(21)

Step3. Exit

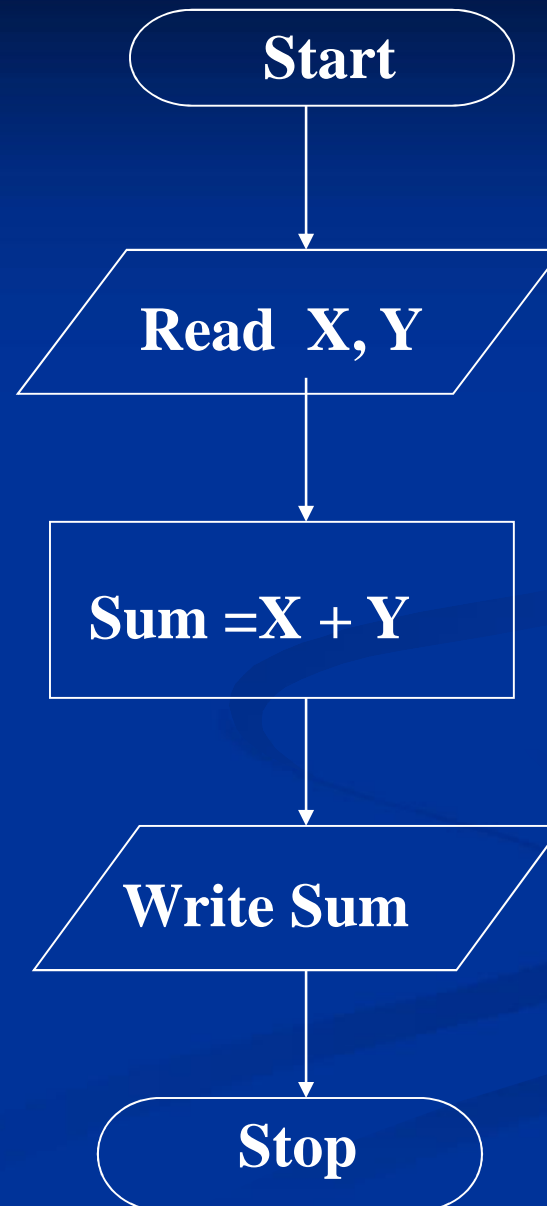
## Flow Chart

**Flow Chart is the Symbolic representation for solving a problem. The operation instructions are placed in different boxes which are connected by arrows, to indicate different kind of operations.**

### Need of Flow Chart

- ☐ **Easier to understand**
- ☐ **If the programmer himself or someone else wishes to correct or modify the program after sometime, the flow chart may be more clear and easy to understand then the actual program.**
- ☐ **Effective program documentation.**

## Draw a Flow Chart to add two integer number



**Write an algorithm that is used to convert the given Fahrenheit temperature to Centigrade temperature.**

$$C = \frac{5(F-32)}{9} \quad C = \frac{5(45-32)}{9} \quad C = \frac{5(13)}{9} \quad C = \frac{65}{9} \quad C = 7.23$$

This algorithm takes temperature in Fahrenheit(F) as input and convert it to centigrade(C) as output.

Step 1. Start

Step 2. Read: F(Temperature in Fahrenheit)

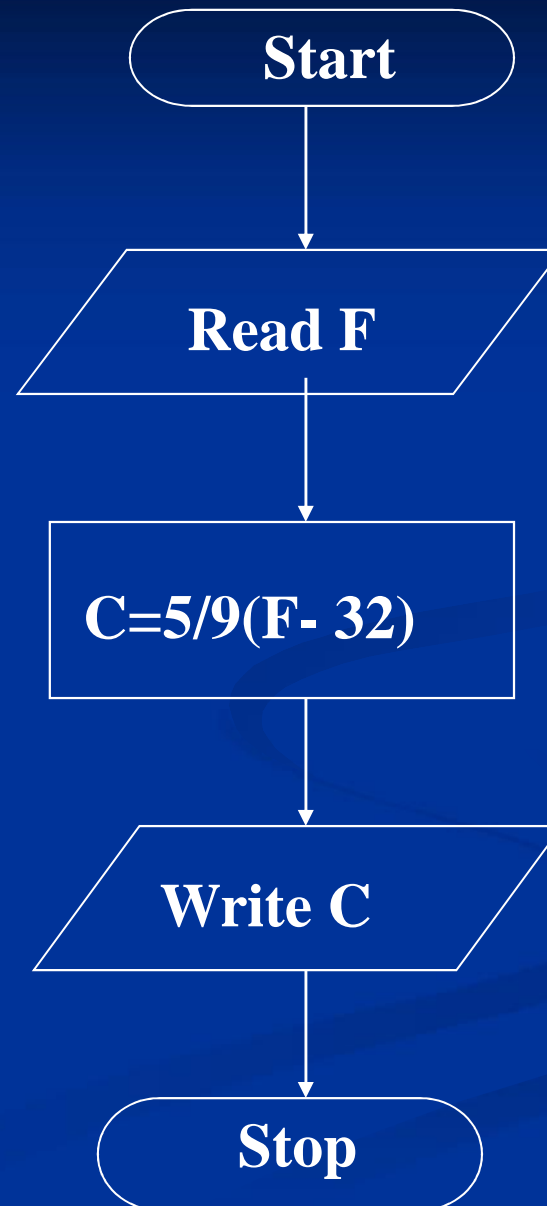
Step 3.  $C := 5/9(F-32)$

Step 4. Write: C(Temperature in Centigrade)

Step 5. Exit

Draw a flow chart for converting the given Fahrenheit temperature to Centigrade temperature.

$$C = \frac{5}{9}(F - 32)$$





**Write an algorithm that will take three number as input and find average of those number.**

Step1. Start

Step 2. Read: A, B, C

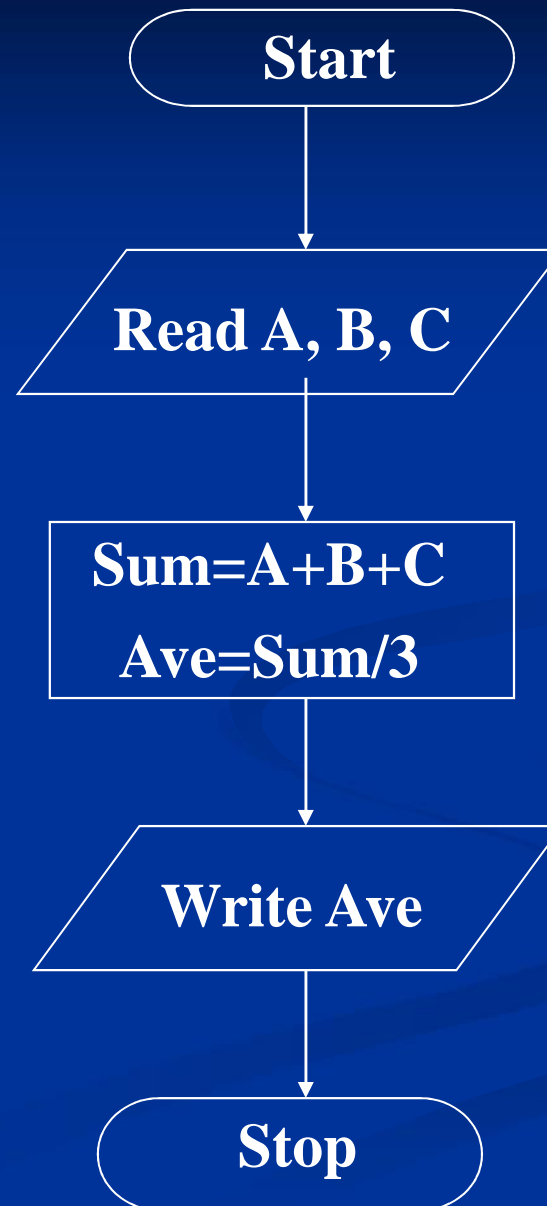
Step 3.  $\text{Sum} := A + B + C$

Step 4.  $\text{Ave} := \text{Sum}/3$

Step 5. Write: Ave

Step 6. Exit

**Write an algorithm that will take three number as input and find average of those number.**



# **Write an algorithm to check if a given number is Even or Odd. ( $4\%2=0$ , $7\%2=1$ , $8\%2=0$ , $11\%2=1$ )**

This algorithm takes one number as input and find if the number is even or odd. Here Let  $X = \text{Given Number}$

Step 1. Start

Step 2. Read:  $X$

Step 3.  $Y := X\%2$

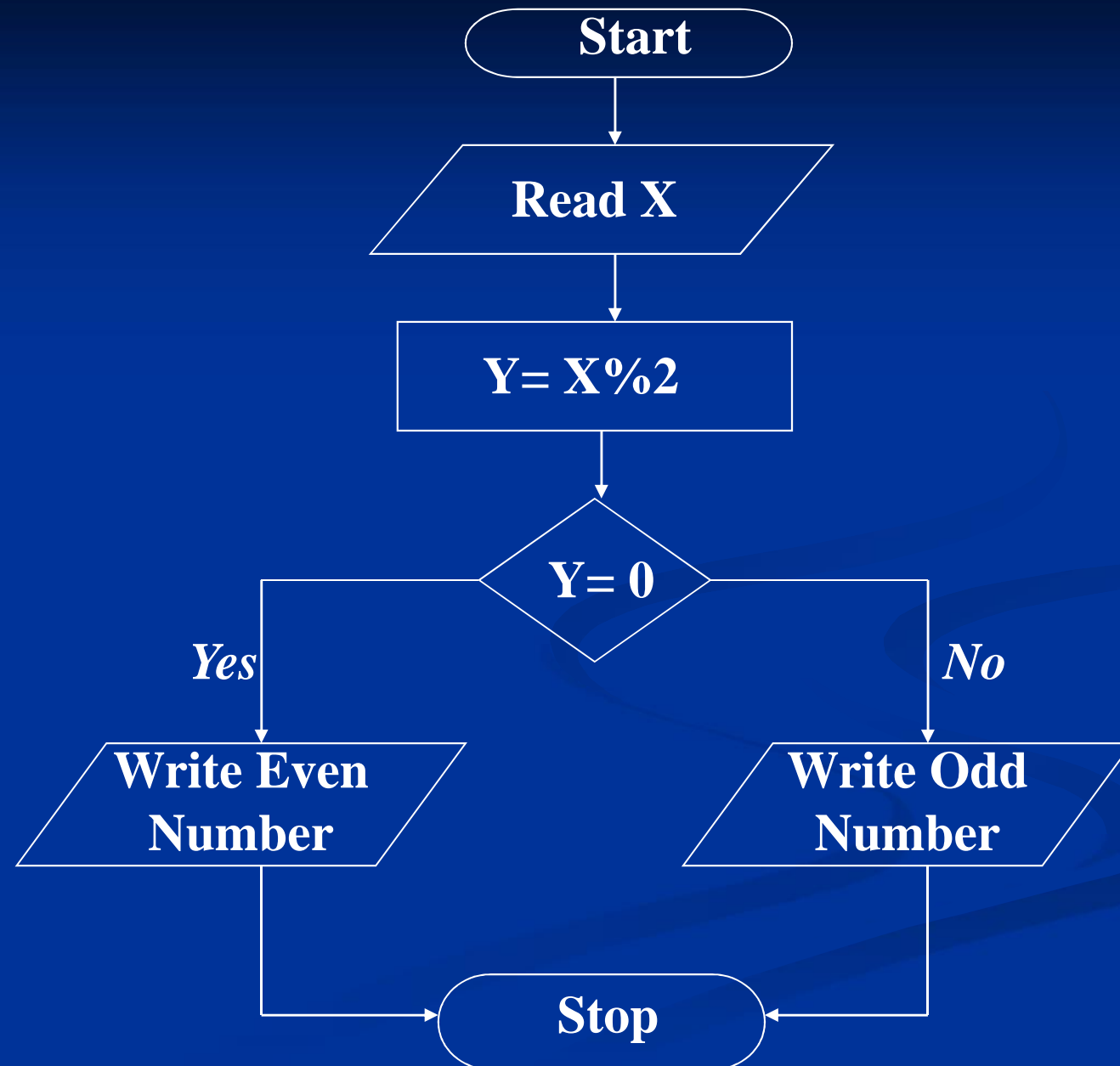
Step 4. If  $Y := 0$ , Then

    Write: Even Number

    else if  $Y := 1$

    Write: Odd Number

Step 5. Exit



**write an algorithm that will used to compute the following after reading a value of X**

- |                           |            |
|---------------------------|------------|
| 1. $Y = (X^2 + 2X - 1)/5$ | If $X < 0$ |
| 2. $Y = X - 3$            | If $X = 0$ |
| 3. $Y = X - 14$           | If $X > 0$ |

Step1. Start

Step2. Read: X

Step3. If  $X < 0$ , then

$$Y = (X^2 + 2X - 1)/5$$

else if  $X = 0$ , then

$$Y = X - 3$$

else if  $X > 0$ , then

$$Y = X - 14$$

Step4. Write: Y

Step5. Exit

**Write an algorithm to solve the following equation:**  
 **$1+2+3+4+5$**

Step1. Sum := 0

Step2. Sum := Sum + 1

Step3. Sum := Sum + 2

Step4. Sum := Sum + 3

Step5. Sum := Sum + 4

Step6. Sum := Sum + 5

Step7: Write: Sum

Step8: Exit

$$\text{sum}=\text{sum}+1=0 + 1 = 1$$

$$\text{sum}=\text{sum}+2=1+2=3$$

$$\text{sum}=\text{sum}+3=3+3=6$$

$$\text{sum}=\text{sum}+4=6+4=10$$

$$\text{sum}=\text{sum}+5=10+5=15$$

**Write an algorithm to solve the following equation:**

$$1+2+3+4+5$$

Step 1. Start

Step 2. Read: N

Step 3. Set  $K := 1$ ,  $\text{Sum} := 0$

Step 4: Repeat Steps 4 and 5 while  $K \leq N$

Step 5.  $\text{Sum} := \text{Sum} + K$

Step 6. Set  $K := K + 1$ ;

Step 7.  $\text{Sum} := \text{Sum} + K$

Step 8. Set  $K := K + 1$

Step 9.  $\text{Sum} := \text{Sum} + K$

Step 10. Set  $K := K + 1$

Step 11.  $\text{Sum} := \text{Sum} + K$

Step 12. Set  $K := K + 1$

Step 13.  $\text{Sum} := \text{Sum} + K$

Step 14. Write: Sum

Step 15. Exit

$$\text{sum} = \text{sum} + K = 0 + 1 = 1$$

$$K = K + 1 = 1 + 1 = 2$$

$$\text{sum} = \text{sum} + K = 1 + 2 = 3$$

$$K = K + 1 = 2 + 1 = 3$$

$$\text{sum} = \text{sum} + k = 3 + 3 = 6$$

$$K = K + 1 = 3 + 1 = 4$$

$$\text{sum} = \text{sum} + K = 6 + 4 = 10$$

$$K = K + 1 = 4 + 1 = 5$$

$$\text{sum} = \text{sum} + K = 10 + 5 = 15$$

**Write an algorithm to solve the following equation:**

$$1+2+3+4+5+\dots+N$$

Step 1. Start

Step 2. Read: N

Step 3. Set  $K := 1$ ,  $\text{Sum} := 0$

Step 4: Repeat Steps 4 and 5 while  $K \leq N$

Step 5.  $\text{Sum} := \text{Sum} + K$

Step 6. Set  $K := K + 1$

Step 7: Write: Sum

Step 8: Exit



**Write an algorithm to solve the following equation:**  
 **$1+3+5+7+\dots+N$**

Step 1. Start

Step 2. Read: N

Step 3. Set  $K := 1$ ,  $\text{Sum} := 0$

Step 4. Repeat Steps 4 and 5 while  $K \leq N$

Step 5.  $\text{Sum} := \text{Sum} + K$

Step 6. Set  $K := K + 2$

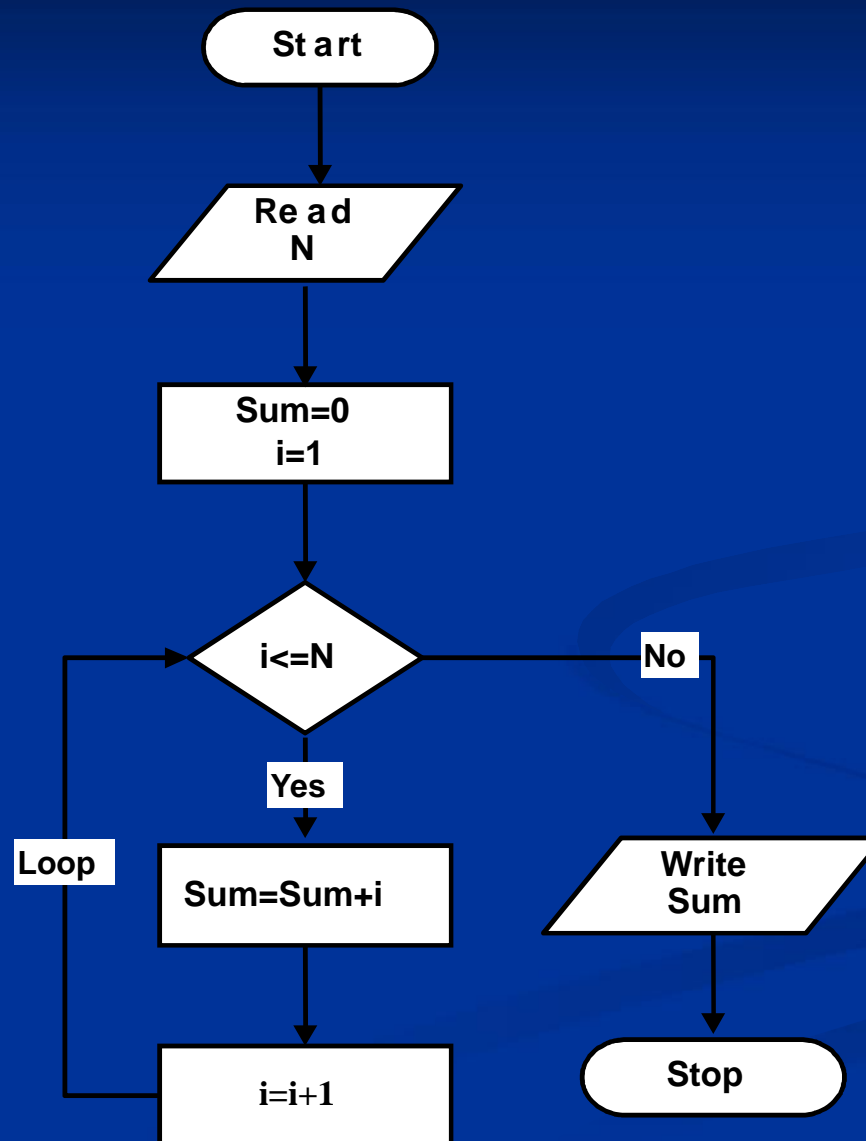
Step 7. Write: Sum

Step 8. Exit

**Draw a flow chart to find the sum of the series:**

**$1+2+3+4+\dots\dots\dots+N$**

Let  $N=5$  Then  $\text{Sum}=1+2+3+4+5=15$



Write an algorithm to find the factorial of a given number.

$$5! = 1 * 2 * 3 * 4 * 5 = 120$$

Step 1. Start

Step 2. Read: N

Step 3. Set  $K := 1$ ,  $Fact := 0$

Step 4. Repeat Steps 4 and 5 while  $K \leq N$

Step 5.  $Fact := Fact * K$

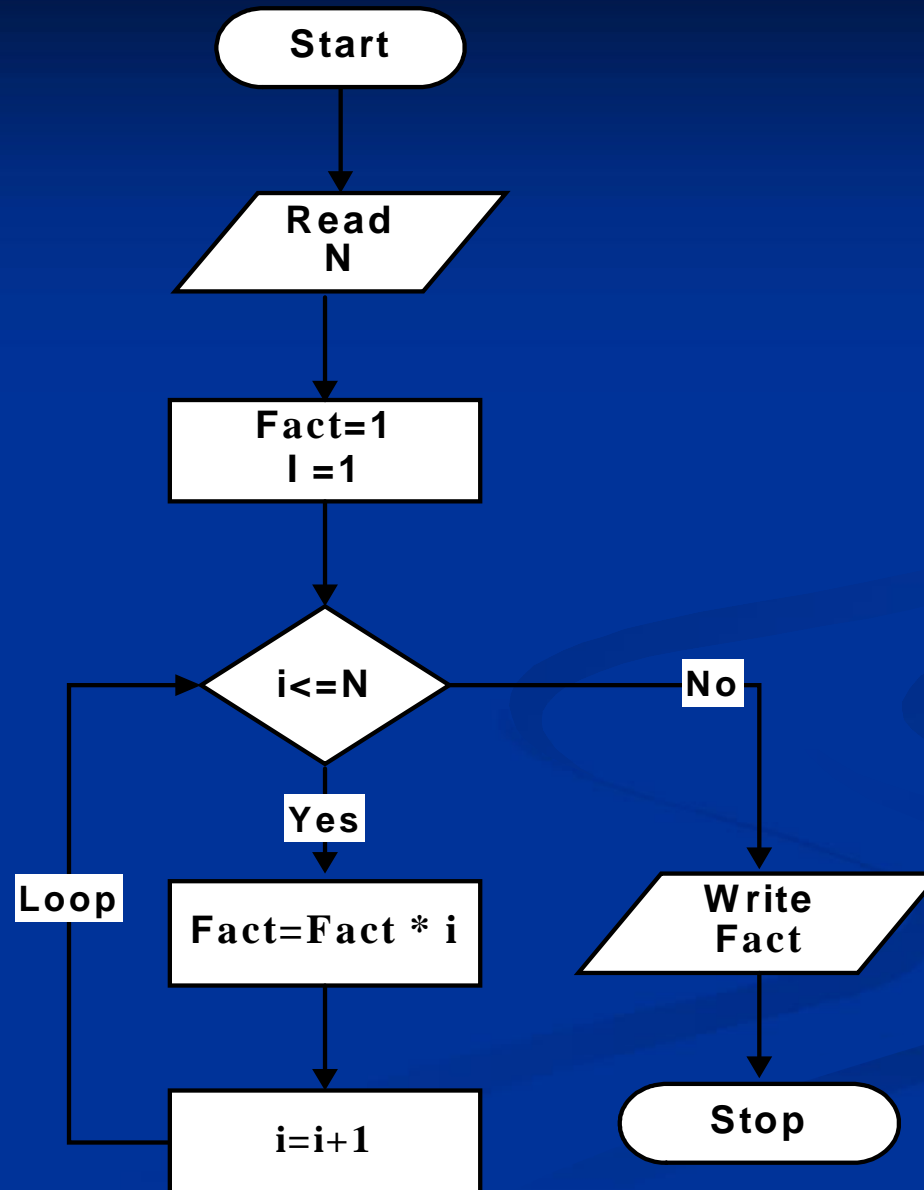
Step 6. Set  $K := K + 1$

Step 7. Write: Fact

Step 8. Exit

**Draw a flow chart to find the factorial of a given number.**

$$5! = 1 * 2 * 3 * 4 * 5 = 120$$



Write an algorithm to calculate the following equation

$$y=a^2+2ab+b^2$$

Step 1. Start

Step 2. Read: a, b

Step 3.  $y := a^2+2ab+b^2$

Step 4. Write: y

Step 5. Exit

Write an algorithm to find result using the following conditions:

Conditions	Result
Number $\geq$ 90	A
Number $\geq$ 85	A-
Number $\geq$ 80	B+
Number $\geq$ 75	B
Number $\geq$ 70	B-

Step1. Read: number

Step2. If number  $\geq 90$ , then

    result="A"

    else if number  $\geq 85$ , then

        result="A-"

    else if number  $\geq 80$ , then

        result="B"

    else if number  $\geq 75$ , then

        result="B"

    else if number  $\geq 70$ , then

        result="B-"

Step 3. Write: **Result**

Step 4. Exit

