# Chapter 4

# CONTROL LOOP

ICSE COMPUTER APPLICATION / JAVA

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# Chapter 4

# *Loop loop loop*

Suppose we have to print name 10 times.
One way to do this is to print the name individually using System.out.println() statement.

But what if you are asked to print the name 100 times

Broadly classifying, there are three types of loops in Java programming which are:

**1. while loop**
**2. for loop**
**3. do.. while loop**

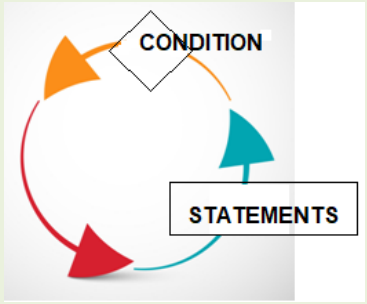

**Loop (condition) If the condition is true,**
**{**

**statements written in the body of the loop i.e. inside the braces { } are executed.**

**Then, again the condition is checked, and if found true,**
**again the statements inside body of the while loop are executed.**

**This process continues until the condition becomes false.**

**}**



**Syntax :**

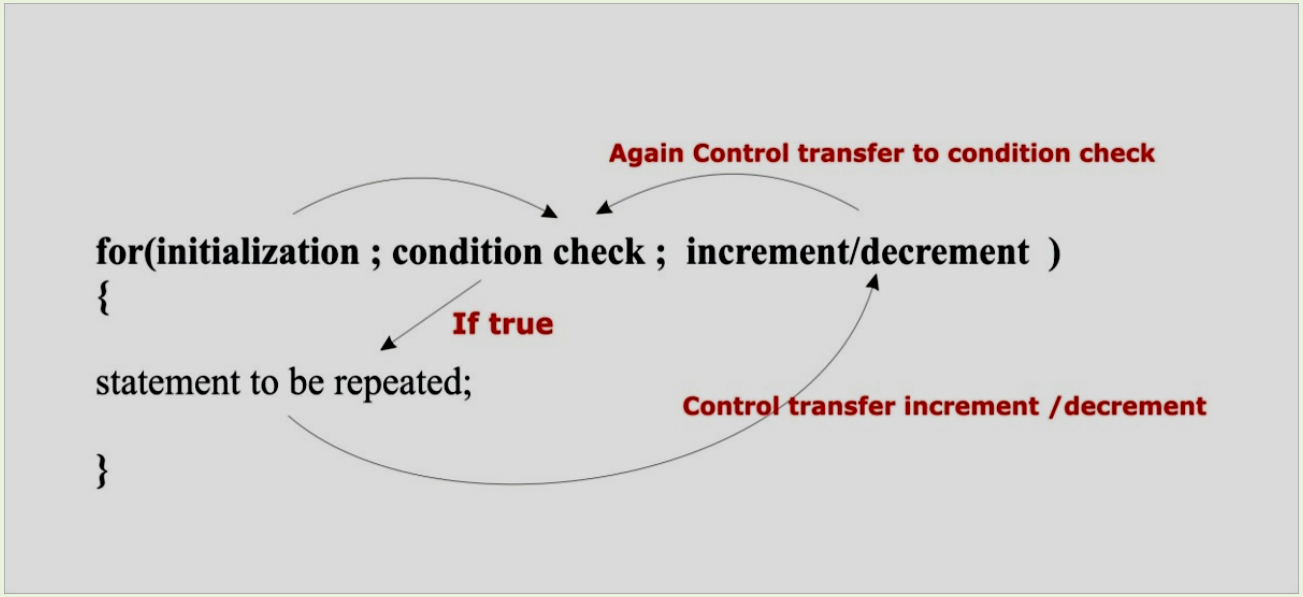
## *for loop*

```
for (initialization ; condition check ;  increment/decrement )
{

  statement to be repeated;

}
```

**Transfer of control**



**Example 1**

```
public class ForExample {
  public static void main(String[] args) {
    k=1;
    for(int i=1;i<=5;i++)
    {
      k=k+2;
      System.out.println("i="+i+"k="+k);
    }
} //end of main
} //end of class
```

**Output:**

```
i=1  k=3
i=2  k=5
i=3  k=7
i=4  k=9
i=5  k=11
```

## Example 2

**W.A.P. TO PRINT THE SERIES OF EVEN NUMBER UPTO N TERMS**
**2 4 6 8 10 ….**

```
import java.util.*;
class EvenSeries
{
public static void main (String args[])
{
        int i=1,s=0,sum=0,n;
       Scanner br = new Scanner(System.in);
        System.out.print("Enter Number Of  Tems :");
        n = br.nextInt();


        for(i=1;i<n;i++)
        {
        s=s+2;
        sum=sum+s;
        System.out.print(" " +s);
        }

System.out.print("Sum"+sum);
}
```

---

OUTPUT
Enter no. of terms: 5

2 4 6 8 10

sum=30

**Example 3:**

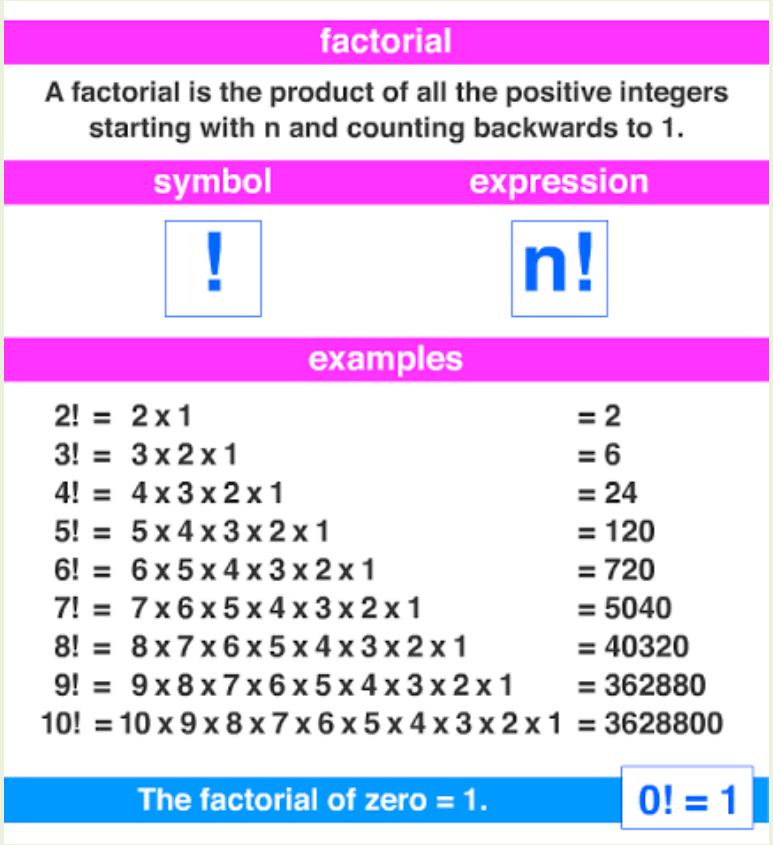
**W.A.P TO CALCULATE FACTORIAL OF A GIVEN NUMBER**

```
class Factorial
{
public static void main (String args[])
{
        int i,f=1,n;
        Scanner br = new Scanner(System.in);

        System.out.print("Enter Number :");
        n = br.nextInt();

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

        System.out.print("Factorial="+f);
}
```



**Example 4**

**W.A.P. TO CHECK WHETHER NUMBER IS PRIME OR NOT**

```
class Prime
{
public static void main (String args[])
int a,i,r,count=0,n;
 Scanner br = new Scanner(System.in);

        System.out.print("Enter Number :");
        n = br.nextInt();

        for(i=1;i<=n;i++)
        {
                r=n%i;

               if(r==0)
               {
               count++;
               }
        }

        if(count==2)
        System.out.print("Number is Prime :");
        else
        System.out.print("Number is Not Prime :");
}
}
```

## *While Loop*

- The Java *while loop* is used to iterate a part of the program several times.
- If the number of iteration is not fixed, it is recommended to use while loop.
- Here *while loop* woks same as *for loop* and also transfer of control exactly same.

**Syntax:**

```
while (condition){
   //code to be executed  if condition is true
  }
```

**Example 1**

```
public class WhileExample {
public static void main(String[] args) {
    int i=1,k=1;
    while(i<=10){
       System.out.println("i="+ i+ "k="+ k);
        i++;
       k=k+2;
    }
}
}
```

**Output:**

```
i=1  k=3
i=2  k=5
i=3  k=7
i=4  k=9
i=5  k=11
```

## *Java do-while Loop*

- The Java *do-while loop* is used to iterate a part of the program several times.
- If the number of iteration is not fixed and you must have to execute the loop at least once, it is recommended to use do-while loop.
- The Java *do-while loop* is executed at least once because condition is checked after loop body.

### Syntax:

```
do{
    //code to be executed
  } while(condition);
```

### Example 2

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

     int i=1;
     do{
         System.out.println("i="+i+"k="+k);
         i++;
         k=k+2;
       }while(i<=10);
  }
 }
```

**Output:**

```
i=1  k=3
i=2  k=5
i=3  k=7
i=4  k=9
i=5  k=11
```

**Example 3**

**FIND THE SUM OF DIGITS OF ANY INTEGER NUMBER**

```
class DigitSum
{
public static void main (String args[])
        int r,sum=0,n,d;

        Scanner br = new Scanner(System.in);


        System.out.print("Enter Number :");
        n = br.nextInt();

          while(n>0)
          {
          r=n%10;
          d=n/10;
          n=d;
          sum=sum+r;
          }

         System.out.print("Sum of digit :"+sum);

}
```

**Example 4**

**WRITE A PROGRAM TO CHECK POSTION OF DIGITS IN THE GIVEN NUMBER**

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


int r,sum=0,dig,x=0;
int  n,d;

Scanner br = new Scanner(System.in);
System.out.print("Enter Number :");
n = br.nextInt();


System.out.print("Enter digit :");
dig = br.nextInt();

while(n>0)
{
 x++;
 r=n%10;
 d=n/10;
 n=d;

  if(dig==r)
  {
  System.out.print("digit is presentat"+x+"place from right");
  break;
  }
}

 if(n==0)
 System.out.print("digit is not present");

}
```

# < NESTED LOOP>

## LOOP WITHIN LOOP

```
for(i=1 ; i<=5;  i++)
  {

     for(j=1 ; j<=3 ; j++)
     {
       System.out.print(j);
     }
      System.out.println();
   }
}
```

O/p

1 2 3
1 2 3
1 2 3
1 2 3
1 2 3

**Example 1**

**PRINT THE FOLLOWING PATTERN**

**1**
**12**
**123**
**1234**
**12345**

```
class SeriesSum
{
public static void main (String args[])
int i=5,j=1;

for(i=1;i<=5;i++)
  {
     for(j=1 ; j<=i ; j++)
     {
      System.out.print(j);
     }
      System.out.println();
   }
}
```

---

**1**
**12**
**123**
**1234**
**12345**

```
class SeriesSum
{
public static void main (String args[])
int i=1,j=1;

for(i=1;i<=5;i)
  {
     for(j=i ; j>=1 ; j--)
     {
      System.out.print(j);
     }
      System.out.println();
   }
}
```

**Example 3**

**PRINT THE SUM OF SERIES 1/2! + 3/4! + 5/6! + 7/8! .....UPTO N TERMS**

```
class SeriesSum
{
public static void main (String args[])
int i=1,j,ser1=-1,ser2=0,fact,n;
float sum=0;

Scanner br = new Scanner(System.in);
System.out.print("Enter Number of Terms :");
n = br.nextInt();

for(i=1;i<=n;i++)
{
  e=e+2;
  odd=odd+2;

fact=1;
    for(j=1;j<=e;j++)
    {
    fact=fact*j;
    }
  sum=sum+(ser1/fact);

}
}
```

# COMPUTER APPLICATONS
## Java
(LAB- Loop Loop Loop)

**1-** **Write a program to find the sum of the following series using.**
**(I) for loop (II) While loop (III) do-while loop**

**(a)sum = 1+2+3+.....+n**
**(b)sum = 1+3+5+.....+n**
**(c)sum = 1+2+4+.....+n**

**(d)sum= 1/2 + 3/4 + 5/6 + ..... upto n terms.**

**(e)sum= 1/4 + 1/8 + 1/12 + ..... upto n terms.**

**(f) sum = $1^2 + 2^2 + 3^2 + 4^2 + .....+ n^2$**

**(h) sum = $1 + 2^2 + 4^2 + 6^2$ .....+ $n^2$**

**(h) sum = $1 + 3^2 + 5^2 + 7^2$ .....+ $n^{21}$**

**(j) sum = 1 + -1 +1 -1 .....+$n^2$**

**(j) sum = $1 - 3^2 + 5^2 -$ .....+$n^2$**

**(f) sum = $\frac{1}{1!} - \frac{2}{2!} + \frac{3}{3!}$ ..... $\frac{n}{n!}$**

**(g)sum = $1 - \frac{1}{1!} + \frac{2}{2!} - \frac{3}{3!} + \frac{n}{n!}$**

**(f) sum = $x + \frac{x^2}{2!} + \frac{x^4}{4!} + \frac{x^6}{6!}$ +..... $\frac{x^n}{n!}$**

(f) sum = $x + \frac{x^2}{2!} + \frac{x^4}{4!} + \frac{x^6}{6!} + \ldots\ldots\ldots + \frac{x^n}{n!}$

2- Write a program to generate the following series of numbers:-

(i)
```
1
2 1
3 2 1
4 3 2 1
5 4 3 2 1
```

(ii)
```
5 4 3 2 1
4 3 2 1
3 2 1
2 1
1
```

(iii)
```
1
1 2
1 2 3
1 2 3 4
1 2 3 4 5
```

(iv)
```
1 2 3 4 5
1 2 3 4
1 2 3
1 2
1
```

3- Write a program that prints the factorial of a given number using
(i) for loop (ii) while loop (iii) do-while loop

4- Write a program that prints a given number whether it is a prime number or not, using.
(i) for loop (ii) while loop (iii) do-while loop

(Hint: Prime number is a number which is divisible only by I and by itself,
is a prime number since it is divisible by 1 and 3 whereas, 6 is not a prime because it is divisible by 1, 2 and 3

5- Write a program to read any five real numbers and print the average.

6- Write a program to solve a general quadratic equation, $ax^2 + bx + c = 0$

7- Write a program to generate a fibonacci series of 'n' numbers, where n is defined by a program .( The series should be: 1 1 2 3 5 8 13 21 32 and so on.)

8- Write a program to read a number n from the standard input device, i.e. keyboard and again read a digit and check whether the digit is present in the number n. If it is so, count how many times it is repeated in the number n.
n= 12576
digit to be check 5.
The digit is present once.

**9- Write a program to read a number n, and digit d, and check whether d is present numbers n. If it is so, find out the position of d in the number n. For example, n= 75689**
**d = 5 digit, i.e. is present at the position 4 from left to right.**

**10- W.A.P. to find whether no. is perfect or Not**

**11- Generate first 100 Prime Number**

**12- Find LCM and HCF of the given number n1,n2 .**

**13- WAP a program to accept a number and check whether it is spy number or not.**
**Eg: number =1124**
**Sum of digits=1+1+2+4=8**
**Product of the digit=1x1x2x4=8**

**14. Using switch statement, write a menu driven program for the following :**
**(1) to find and display the sum of the series given below:**
**S= $x^1 - x^2 + x^3 - x^4 + X^5 - X^{20}$ (WHERE x=2)**

**(2) to display the following series**
**1 11 111 1111 1111**
**For an incorrect option , an appropriate error should be displayed.**

**15. Using switch statement, write a menu driven program for the followings**

**(a) To print the Floyd's triangle given below**

```
1
2  3
4  5  6
7  8  9  10
11 12 13 14 15
```

**(b)**

```
I
I  C
I  C  S
I   C  S  E
```

**16.** **wap a program to accept a number and check and display whether**
**It is a NIVEN number or not.**
**(niven number is which is divisible by sum of digits)**
**Example :**
**Consider the number 126**
**Sum of digits is 1+2+6=9 and 126 is divisible by 9**

**17** **write two separate programs to generate the following patterns using iteration**

**(a)**

```
*
*   #
*   #  *
*   #   *   #
*   #   *   #   *
```

**(b)**

```
5  4  3  2  1
5  4  3  2
5  4  3
5  4
5
```

**18.** **Write a rogram to print the pascal triangle for the following series**

```
          1
       1  2  1
    1  2  3  2  1
 1  2  3  4  3  2  1
```