

```

do
{
    f *= n;
    --n;
}
while (n > 1);
cout <<"factorial of"<<n<<" is"<< f ;
}

```

3. THE for LOOP

The for loop is written as given below: -

```

for (initial value ; condition ; increment /decrement)
{
    Block_of_statements ;
}

```

The for loop is controlled by three expressions: an *initialization*, a *condition*, and *update* (*increment/decrement*).

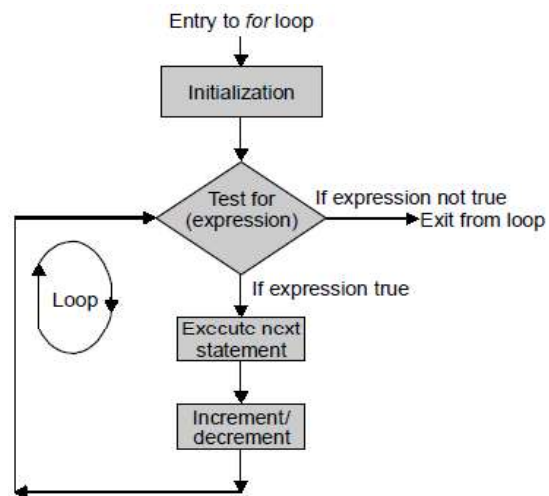
Ex:

```

for (i=0 ; i<=10 ; i++)
    x=i+2 ;

```

The statement ($x=i+2$) is executed repeatedly as long as ($i \leq 10$).



Ex: Write a program to evaluate the factorial of an integer.

```

#include<iostream.h>
void main()
{
    int n, f=1,i;
    cout << "Enter a positive integer: ";
    cin >> n;
    for(i=1;i<=n;++i)

```

```

    {
        f *= n;
    }
    cout <<"factorial= " << f ;
}

```

NESTED for LOOPS

If a function involves more than one variable and we want to evaluate it for different values of all the variables, we will have to use a nested for loop, as illustrated below:

```

for ( int n=0; n<= A; n++)
{
    for ( int m=0; m<= B ; m++)
    {
        Statements;
    }
}

```

Ex: Write a program finds the value of Z form the following formula:

$$Z = \sum_{i=0}^5 \sum_{j=0}^4 i * j$$

```

#include<iostream.h>
void main()
{
    int i, j, sum=0;
    for(i=0;i<=5;++i)
    {
        for(j=0;j<=4;++j)
            Z+=(i*j);
    }
    cout<<"Z="<<Z;
}

```

Ex: Write a program receives 25 integers and find the sum and the average.

```

#include<iostream.h>
void main()
{

```

```

int i, x, sum=0;
float av;
for (i=1; i<=25; ++i)
{
    cin>>x;
    sum+=x;
}
av=sum/i;
cout<<"sum= "<<sum<<endl;
cout<<" average= "<<av;
}

```

Ex: Write a program prints the following form.

```

0
21012
3210123
⋮
9876543210123456789

```

```

#include<iostream.h>
void main()
{
    int i,j,k,m;
    for (i=1; i<=10; i++)
    {
        for (j=10;j>=i; j--)
            cout<<" ";
        for (k=i; k>=1; k--)
            cout<<k;
        for(m=2; m<=i; m++)
            cout<<m;
        cout<<endl;
    }
}

```

Ex: Write a program to find the sum of the following series.

$$\text{sum} = \frac{2!}{x^2} - \frac{4!}{x^4} + \frac{6!}{x^6} - \frac{8!}{x^8} + \dots \dots \dots \mp \frac{n!}{x^n}$$

```
#include<iostream.h>
void main( )
{
    int i, j=2, r, n;
    long f;
    float p, x, sum=0;
    cin>>x>>n;
    while(j<=n)
    {
        i=r=f=1;
        while(i<=j)
        {
            f*=i;
            ++i;
        }
        p=pow(x, j)
        sum=sum+ (f/p) *r;
        j+=2;
        r*=-1;
    }
    cout<<"sum="<<sum;
}
```

ENDLESS for LOOP

If *for* loop is written as below it is called endless loop:

```
for (int i = 0 ; i<10 ; )
```

```
for ( ; ; )
```

THE break STATEMENT

We have already seen the break statement used in the switch statement. It is also used in *while*, *do...while*, and *for* loops. When it is executed, it terminates the loop, “breaking out” of

the iteration at that point. The following program illustrates the use of endless loop and break statement:

```
#include<iostream.h>
void main( )
{
    int i =1,sum=0 ;
    for( ; ; ) //endless for loop
    {
        sum += i;
        if (sum >25)
            break;//break to end the loop.
        i++;
    }
    cout<<"sum="<<sum;
}
```

THE continue STATEMENT

The continue statement goes back to the beginning of the loop to begin the next iteration.

```
#include<iostream.h>
main( )
{
    int n;
    for (;;)
    {
        cout<< "Enter an integer:";
        cin >> n;
        if (n%2 == 0) continue;
        if (n%3 == 0) break;
        cout<< "Hello my friend."<<endl;
    }
    cout << "Outside of loop";
}
```

Ex: Write a program to find the sum of the series (the sum doesn't exceed 50000):

$$1^3 + 3^3 + 5^3 + 7^3 + \dots$$

```
# include <iostream.h>
# include <math.h>
void main()
{
```

```
int i =1, sum=0;
cin>>n;
while ( i>0)
{
    sum = sum + pow(i,i) ;
    if (sum>50000)
        break;
    i+= 2 ;
}
cout<<" The sum of the series = "<<sum<<endl;
}
```

Ex: Write a program to find the sum of the following series:

$1 + 1/2! + 1/3! + \dots 1/n!$

```
# include <iostream.h>
void main()
{
    int i,j,n;
    long fact;
    float sum=0;
    cout<<" Enter the value of n :"<<endl;
    cin>>n;
    for (i=1;i<=n;i++)
    {
        fact=1;
        for (j=1;j<=i;j++)
            fact = fact * j;
        sum+= 1/float(fact);
    }
    cout<< " The sum of the series "<< sum;
}
```

H.W Write a program prints the following form:

```
 *
***
*****
*****
*****
```