

Cyber Security Department

PROGRAMMING FUNDAMENTALS_I

First Class

Loop Statements

2. For loop

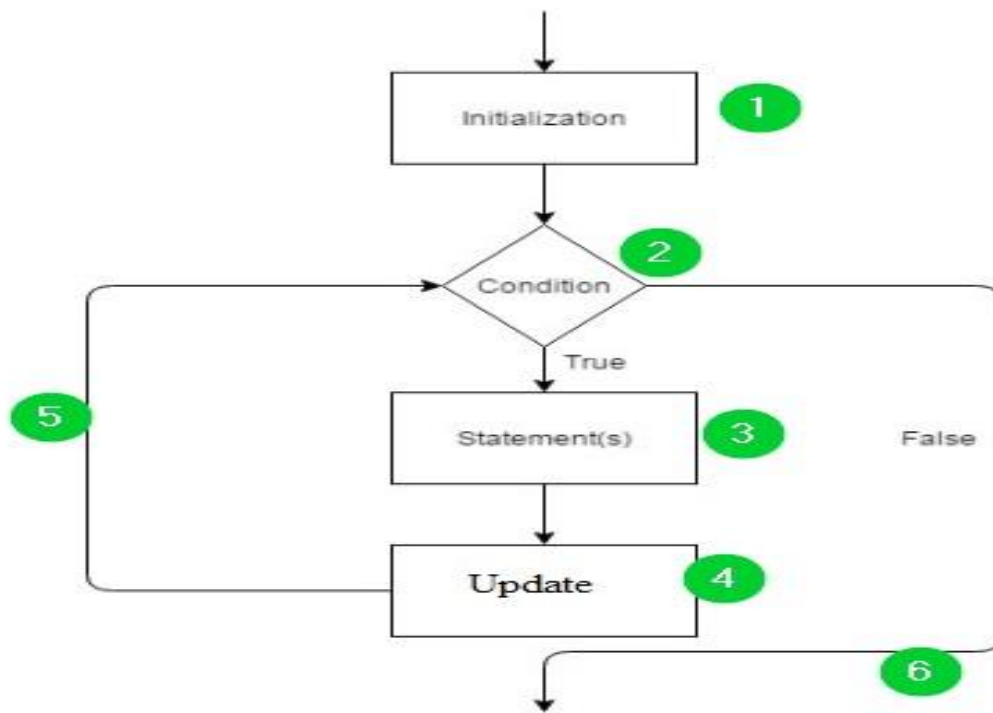
The general form of the for loop is:

```
for (initialization; continuation condition; update)
{
    statement(s);
}
```

Here,

- The **initialization** step is executed first, and only once. This step allows you to declare and initialize any loop control variables. You are not required to put a statement here, as long as a semicolon appears.
- Next, the **condition** is evaluated. If it is true, the body of the loop is executed. If it is false, the body of the loop does not execute, and the flow of control jumps to the next statement just after the for loop.
- After the body of the for loop executes, the flow of control jumps back to the **update** statement. This statement can be left blank, as long as a semicolon appears after the condition.
- The **condition** is now evaluated again. If it is **true**, the loop executes, and the process repeats itself (body of the loop, then update step, and then again **condition**). After the **condition** becomes **false**, the for loop terminates.

The Flowchart of **for** Loop is shown as follows



Ex 1:

- Write a C++ program for printing numbers between 0 and 5.

```
#include <iostream.h>
#include <conio.h>
void main()
{
    for ( int i = 0; i <=5; i ++ )
    {
        cout << i << " ";
    }
    getch();
}
```

Output
0 1 2 3 4 5

Ex 2.

- Write a C++ program for printing the odd numbers between 1 and 9.

```
#include <iostream.h>
#include <conio.h>
Void main()
{
    for ( int i = 1; i <=9; i += 2)
    {
        cout << i;
    }
    getch();
}
```

Output

1 3 5 7 9

Ex 3.

- Write a C++ program for printing the even numbers between 0 and 8.

```
#include <iostream.h>
#include <conio.h>
Void main()
{
    for ( int i = 0; i <=8; i= i+ 2)
    {
        cout << i;
    }
    getch();
}
```

Output

0 2 4 6 8

Ex 4.

- Write a C++ program for printing numbers between 10 and 14.

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

```

    ( for( int a = 10; a < 15; a = a + 1
      {
          cout << "value of a: " << a << endl;
      }
      getch();
  }

```

Output

```

value of a: 10
value of a: 11
value of a: 12
value of a: 13
value of a: 14

```

Ex 5.

- Write a C++ program to sum the numbers between 1 and 5.

```

#include<iostream.h>
#include<conio.h>
void main( )
{
    int sum = 0;
    for ( int i = 1; i <= 5; i ++ ){
        sum = sum + i;
    }
    cout << "The sum is: " << sum;
    getch();
}

```

Output

```
The sum is: 15
```

Ex 6.

- Write a C++ program to find the factorial of n, using for loop.

$$n! = n * n-1 * n-2 * n-3 * \dots * 2 * 1$$

```

#include <iostream.h>
#include<conio.h>
Void main()
{
    int n;
    int f = 1;
    cout << "Enter a positive integer: ";
    cin >> n;
    if (n < 0)

```

Output 1

```

Enter a positive integer: -10
Error! Factorial of a negative number doesn't exist.

```

Output 2

```

Enter a positive integer: 5
Factorial of 5 = 120

```

```

        cout << "Error! Factorial of a negative number doesn't exist.";
else
{
    for(int i = n; i >= 1; i--)
    {
        f= f * i;
    }
    cout << "Factorial of " << n << " = " << f;
}
}

```

Output 3

Enter a positive integer: 6 Factorial of 6 = 720

Ex 7:

- Write a C++ program to solve the following equation.

$$\text{sum} = \sum_{i=1}^4 a_i^2$$

```

#include <iostream.h>
#include <conio.h>
Void main()
{
    int sum = 0;
    for ( int i = 1; i <= 4; i ++ )
    {
        sum = sum + ( i * i );
    }
    cout << "The sum is: " << sum;
}

```

Output

The sum is: 30
