

## C++ for Loop

In this tutorial, we will learn about the C++ for loop and its working with the help of some examples. In computer programming, loops are used to repeat a block of code.

For example, let's say we want to show a message 100 times. Then instead of writing the print statement 100 times, we can use a loop.

That was just a simple example; we can achieve much more efficiency and sophistication in our programs by making effective use of loops.

There are 3 types of loops in C++.

- for loop
- while loop
- do...while loop

### C++ for loop

The syntax of for-loop is:

```
for (initialization; condition; update) {  
    // body of-loop  
}
```

Here,

- initialization - initializes variables and is executed only once
- condition - if true, the body of for loop is executed
- if false, the for loop is terminated
- update - updates the value of initialized variables and again checks the condition

## Example 1: Printing Numbers From 1 to 5

```
#include <iostream>

using namespace std;

int main() {
    for (int i = 1; i <= 5; ++i) {
        cout << i << " ";
    }
    return 0;
}
```

**Output:**

```
1 2 3 4 5
```

Here is how this program works

Iteration	Variable	$i \leq 5$	Action
1st	<code>i = 1</code>	true	1 is printed. <code>i</code> is increased to 2.
2nd	<code>i = 2</code>	true	2 is printed. <code>i</code> is increased to 3.
3rd	<code>i = 3</code>	true	3 is printed. <code>i</code> is increased to 4.
4th	<code>i = 4</code>	true	4 is printed. <code>i</code> is increased to 5.
5th	<code>i = 5</code>	true	5 is printed. <code>i</code> is increased to 6.
6th	<code>i = 6</code>	false	The loop is terminated

## C++ While Loop

While studying for loop we have seen that the number of iterations is *known beforehand*, i.e. the number of times the loop body is needed to be executed is known to us. while loops are used in situations where we do not know the exact number of iterations of the loop beforehand. The loop execution is terminated on the basis of the test conditions.

Syntax: We have already stated that a loop mainly consists of three statements – initialization expression, test expression, and update expression. The syntax of the three loops – For, while, and do while mainly differs in the placement of these three statements.

```
initialization expression;
while (test_expression)
{
    // statements

    update_expression;
}
```

**Example:**

```
// C++ program to illustrate while loop
#include <iostream>
using namespace std;

int main()
{
    // initialization expression
    int i = 1;

    // test expression
    while (i < 6)
    {
        cout << "Hello World\n";

        // update expression
        i++;
    }

    return 0;
}
```

**Output:**

```
Hello World
Hello World
Hello World
Hello World
Hello World
```

## C++ do-while loop

In do-while loops also the loop execution is terminated on the basis of test conditions. The main difference between a do-while loop and the while loop is in the do-while loop the condition is tested at the end of the loop body, i.e do-while loop is exit controlled whereas the other two loops are entry controlled loops.

**Note:** In a do-while loop, the loop body will ***execute at least once*** irrespective of the test condition.

**Syntax:**

```
initialization expression;
```

```
do
```

```
{
```

```
    // statements
```

```
    update_expression;
```

```
} while (test_expression);
```