

Conditional Statements and Loops in C

While Loop in C

The looping can be defined as repeating the same process multiple times until a specific condition satisfies. It is known as iteration also. There are three types of loops used in the C language.

In programming, a loop is used to repeat a block of code until the specified condition is met.

C programming has three types of loops:

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

The while loop in C is a fundamental looping construct that allows a block of code to be executed repeatedly based on a condition. Here's a detailed explanation:

**Syntax of `while` Loop**

```
c Copy code  
  
while (condition) {  
    // Code to be executed  
}
```

How It Works

1. **Initialization:** Before entering the loop, you typically set up any variables needed for the condition.
2. **Condition Checking:** The while loop evaluates the condition specified in the parentheses. If the condition is true (non-zero), the code inside the loop executes. If the condition is false (zero), the loop terminates and the program continues with the code following the loop.
3. **Execution:** If the condition is true, the block of code inside the while loop is executed.
4. **Update:** After executing the code block, the loop goes back to check the condition again. This process repeats until the condition evaluates to false.

 CBSE

 ICSE

 NTSE

 Banking & Insurance

 Central Govt. Service

 State Govt. Services

 LAW Entrance

 MBA Entrance

 Railways & Metro Services

...many more

abhyasonline.in

Course  
&  
Test Series

## Introduction to 'C' Language - Module 4

### Key Points

- **Infinite Loop:** If the condition always evaluates to true, the loop will run indefinitely. This is called an infinite loop and must be controlled using a break statement or by ensuring the condition eventually becomes false.
- **Condition Evaluation:** The condition is checked before each iteration. If the condition is false from the start, the code inside the loop will never execute.
- **Example:** The while loop is useful for situations where you don't know in advance how many times you need to loop. It's often used in cases where the number of iterations depends on runtime conditions.

### Solved Example

#### Basic `while` Loop Example

Print numbers from 1 to 5:

```
c Copy code  
  
#include <stdio.h>  
  
int main() {  
    int i = 1; // Initialization  
  
    while (i <= 5) { // Condition  
        printf("%d\n", i);  
        i++; // Update  
    }  
  
    return 0;  
}
```

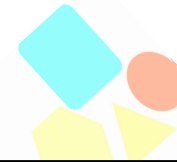
Explanation: This loop starts with `i` equal to 1 and continues to print the value of `i` until `i` is greater than 5. Each iteration increments `i` by 1.

#### Infinite Loop Example

Print "Hello" indefinitely:

```
c Copy code  
  
#include <stdio.h>  
  
int main() {  
    while (1) { // Always true  
        printf("Hello\n");  
    }  
  
    return 0;  
}
```

Explanation: The condition `1` is always true, so this loop will run forever unless interrupted by external means (like stopping the program manually).



 CBSE

 ICSE

 NTSE

 Banking &  
Insurance

 Central Govt.  
Service

 State Govt.  
Services

 LAW  
Entrance

 MBA  
Entrance

 Railways & Metro  
Services

...many more

abhyasonline.in

Corporate Office : A

www.abhyas



abhyasonline

na (India)

89-25411



**Course  
&  
Test Series**

**Introduction to 'C' Language - Module 4**

**Difference between For and While Loop**

Aspect	'for' Loop	'while' Loop
Syntax	<code>'for (initialization; condition; update) { &lt;br&gt; // Code to be executed &lt;br&gt;}'</code>	<code>'while (condition) { &lt;br&gt; // Code to be executed &lt;br&gt;}'</code>
Initialization	Initialization is done in the loop header.	Initialization is done before the loop.
Condition	Condition is checked before each iteration, in the loop header.	Condition is checked before each iteration, in the loop header.
Update	The update expression is included in the loop header and is executed after each iteration.	The update needs to be handled manually inside the loop body.
Use Cases	Best used when the number of iterations is known in advance (e.g., counting loops).	Best used when the number of iterations is not known in advance and depends on a condition being met.
Readability	More concise when dealing with loops that require initialization, condition-checking, and updating in one place.	Offers more flexibility but can be less concise, especially when the update step is complex or not needed.
Flexibility	Less flexible if the loop control variables are modified within the loop body.	More flexible, allowing more complex conditions and updates within the loop body.
Typical Example	Counting from 1 to 10: <code>'for (int i = 1; i &lt;= 10; i++) { &lt;br&gt; printf("%d\n", i); &lt;br&gt;}'</code>	Reading input until a condition is met: <code>'int x; &lt;br&gt; while (x != 0) { &lt;br&gt; scanf("%d", &amp;x); &lt;br&gt;}'</code>
When to Use	Use when you know how many times you want to loop.	Use when the loop should continue until a condition changes during the loop.

**Assignments**

- Write a program that uses a while loop to print all even numbers between 1 and 20.
- Write a program that asks the user for a positive integer N and uses a while loop to calculate the sum of the first N natural numbers.
- Write a program that takes an integer as input and uses a while loop to reverse its digits.
- Write a program that asks the user for a positive integer and uses a while loop to calculate its factorial.
- Write a program that takes a positive integer as input and uses a while loop to count the number of digits in the number.
- Write a program that takes a positive integer as input and uses a while loop to determine if the number is prime.
- Write a program that uses a while loop to print numbers from 1 to 10.

 **CBSE**

 **ICSE**

 **NTSE**

 **Banking &  
Insurance**

 **Central Govt.  
Service**

 **State Govt.  
Services**

 **LAW  
Entrance**

 **MBA  
Entrance**

 **Railways & Metro  
Services**

**...many more**

**abhyasonline.in**



Course  
&  
Test Series

Introduction to 'C' Language - Module 4



CBSE



ICSE



NTSE



Banking &  
Insurance



Central Govt.  
Service



State Govt.  
Services



LAW  
Entrance



MBA  
Entrance



Railways & Metro  
Services

...many more

abhyasonline.in

8. Write a program that uses a while loop to find the sum of all even numbers between 1 and 50.
9. Write a program that takes an integer as input and uses a while loop to print its multiplication table up to 10.
10. Write a program that asks the user for a positive integer and uses a while loop to count down from that number to 1.
11. Write a program that takes a positive integer as input and uses a while loop to find the smallest divisor of the number other than 1.

