# **📘 Operators in C++**

👉 An **operator** is a **symbol** that performs an operation on one or more operands (variables or values).  
 Example:

int a = 10, b = 5;

cout << a + b; // '+' is an operator → output = 15

## **🔹 1. Arithmetic Operators**

Used for mathematical calculations.

| **Operator** | **Example** | **Meaning** |
| --- | --- | --- |
| + | a + b | Addition |
| - | a - b | Subtraction |
| \* | a \* b | Multiplication |
| / | a / b | Division |
| % | a % b | Modulus (remainder) |

👉 Example:

int a = 10, b = 3;

cout << a / b; // 3

cout << a % b; // 1

## **🔹 2. Relational (Comparison) Operators**

Used to compare two values → returns true (1) or false (0).

| **Operator** | **Example** | **Meaning** |
| --- | --- | --- |
| == | a == b | Equal to |
| != | a != b | Not equal |
| > | a > b | Greater than |
| < | a < b | Less than |
| >= | a >= b | Greater or equal |
| <= | a <= b | Less or equal |

👉 Example:

int x = 5, y = 10;

cout << (x < y); // 1 (true)

## **🔹 3. Logical Operators**

Used to combine conditions.

| **Operator** | **Example** | **Meaning** |
| --- | --- | --- |
| && | (a > 0 && b > 0) | Logical AND |
| ` |  | ` |
| ! | !(a > b) | Logical NOT |

👉 Example:

int age = 20;

cout << (age > 18 && age < 30); // true (1)

## **🔹 4. Assignment Operators**

Used to assign values.

| **Operator** | **Example** | **Same As** |
| --- | --- | --- |
| = | a = 5 | Assign 5 |
| += | a += 2 | a = a + 2 |
| -= | a -= 2 | a = a - 2 |
| \*= | a \*= 2 | a = a \* 2 |
| /= | a /= 2 | a = a / 2 |

## **🔹 5. Increment & Decrement Operators**

Used to increase or decrease by 1.

| **Operator** | **Example** | **Meaning** |
| --- | --- | --- |
| ++a | Pre-increment | Increases before use |
| a++ | Post-increment | Increases after use |
| --a | Pre-decrement | Decreases before use |
| a-- | Post-decrement | Decreases after use |

👉 Example:

int a = 5;

cout << ++a; // 6 (pre-increment)

cout << a++; // 6 (then a becomes 7)

## **🔹 6. Bitwise Operators (Advanced but useful)**

Works at **binary level**.

| **Operator** | **Example** | **Meaning** |
| --- | --- | --- |
| & | a & b | AND |
| ` | ` | `a |
| ^ | a ^ b | XOR |
| ~ | ~a | NOT (1’s complement) |
| << | a << 1 | Left shift |
| >> | a >> 1 | Right shift |

## **🔹 7. Miscellaneous Operators**

**sizeof** → Returns size of a data type.  
  
 cout << sizeof(int); // usually 4

**?: (Ternary)** → Short if-else.  
  
 int age = 18;

string result = (age >= 18) ? "Adult" : "Minor";

* **& (Address-of)** → Gives memory address.
* **\* (Dereference)** → Access value at an address.

# **✅ Example Program**

#include <iostream>

using namespace std;

int main() {

int a = 10, b = 3;

cout << "Addition: " << a + b << endl;

cout << "Comparison (a > b): " << (a > b) << endl;

cout << "Logical AND: " << (a > 5 && b < 5) << endl;

cout << "Assignment (a += 2): " << (a += 2) << endl;

cout << "Increment (a++): " << a++ << endl;

cout << "Bitwise AND: " << (a & b) << endl;

return 0;

}

✅ **In simple words for students:**

Operators are like **symbols on a calculator**.

* + - \* / → Math operations.
* ==, >, < → Comparisons.
* &&, || → Logic decisions.
* =, +=, -= → Assign values.
* ++ / -- → Increase or decrease.