Operators are special symbols in Java used to perform operations on variables and values. They are essential building blocks in expressions and statements.

Types of Operators
Arithmetic Operators: perform basic arithmetic calculations.

+ (Addition), - (Subtraction), * (Multiplication),
/ (Division), % (Modulus)

Unary Operators: operate on a single operand.

++ (Increment), -- (Decrement), + (Unary plus), - (Unary minus),
! (Logical NOT)

Relational Operators: compare two values and return boolean results.

== (equal to), != (not equal to),
< (less than), > (greater than),
<= (less than or equal to), >= (greater than or equal to)

Logical Operators: combine multiple boolean expressions.

&& (logical AND), || (logical OR), ! (logical NOT)

Bitwise Operators: operate on bits and perform bit-level operations.

& (AND), | (OR), ^ (XOR), ~ (Complement), << (Left shift),
>> (Right shift)

Assignment Operators: assign values to variables.

=, +=, -=, *=, /=, %= etc.

Ternary Operator: conditional operator with three operands.

(condition) ? expression1 : expression2

Operator Precedence and Associativity
Operators have priority that determines the order of evaluation in expressions.

For example, multiplication has higher precedence than addition.

Associativity determines order when operators have the same precedence (mostly left-to-right).

Sample Programs
Basic Arithmetic Operations:

java
```
int a = 10, b = 3;
System.out.println(a + b);  // 13
System.out.println(a - b);  // 7
System.out.println(a * b);  // 30
System.out.println(a / b);  // 3
System.out.println(a % b);  // 1
```
Using Unary Operators:

java
```
int x = 5;
System.out.println(++x);  // 6 (pre-increment)
System.out.println(x--);  // 6 (post-decrement)
System.out.println(x);    // 5
```
Relational and Logical Operators:

```
java
int age = 20;
if (age >= 18 && age <= 60) {
    System.out.println("Adult");
} else {
    System.out.println("Not Adult");
}
```
Ternary Operator Example:

```
java
int score = 75;
String result = (score >= 50) ? "Pass" : "Fail";
System.out.println(result);
```
Interview Questions and Answers

What are operators in Java?
Operators are special symbols used to perform operations on variables and values, such as arithmetic calculations, comparisons, and logic tests.

What is the difference between == and =?
= is the assignment operator used to assign a value to a variable, while == is a relational operator used to compare two values for equality.

Explain the difference between && and &.
&& is a logical AND operator that evaluates the second operand only if the first is true (short-circuit evaluation), whereas & is a bitwise AND operator (or logical AND if used with booleans) that always evaluates both operands.

How does the ternary operator work?
It’s a concise if-else statement. It evaluates a condition; if true, it returns the first expression, else the second.

What does operator precedence mean?
Operator precedence determines the order in which parts of an expression are evaluated. For example, multiplication has higher precedence than addition.

What is the difference between pre-increment and post-increment operators?
Pre-increment (++x) increments the value before using it; post-increment (x++) uses the value first, then increments.

Can assignment operators be combined with arithmetic operators?
Yes, for example += adds and assigns in one step: a += 5; is equivalent to a = a + 5;.

What are bitwise operators? Give an example.
Bitwise operators perform operations on binary representations of integers. For example, 5 & 3 results in 1 because 0101 & 0011 = 0001.

Can logical operators be used with non-boolean data types?
No, logical operators require boolean operands in Java.

What is short-circuit evaluation?
It means evaluation stops as soon as the result is determined. For &&, if the first operand is false, the second is not evaluated.

Assignments
Write a program demonstrating all arithmetic operators with two numbers.

Use unary operators to show the difference between pre- and post-increment.

Write a program that uses relational operators to compare two numbers.

Implement a program using logical operators to check if a number lies within a range.

Write a program that uses the ternary operator to find the maximum of two numbers.