Operators in Java

**Operator** in [Java](https://www.javatpoint.com/java-tutorial) is a symbol that is used to perform operations. For example: +, -, \*, / etc.

There are many types of operators in Java which are given below:

* Unary Operator,
* Arithmetic Operator,
* Shift Operator,
* Relational Operator,
* Bitwise Operator,
* Logical Operator,
* Ternary Operator and
* Assignment Operator.

Java Operator Precedence

|  |  |  |
| --- | --- | --- |
| **Operator Type** | **Category** | **Precedence** |
| Unary | postfix | *expr*++ *expr*-- |
| prefix | ++*expr* --*expr* +*expr* -*expr* ~ ! |
| Arithmetic | multiplicative | \* / % |
| additive | + - |
| Shift | shift | << >> >>> |
| Relational | comparison | < > <= >= instanceof |
| equality | == != |
| Bitwise | bitwise AND | & |
| bitwise exclusive OR | ^ |
| bitwise inclusive OR | | |
| Logical | logical AND | && |
| logical OR | || |
| Ternary | ternary | ? : |
| Assignment | assignment | = += -= \*= /= %= &= ^= |= <<= >>= >>>= |

Java Unary Operator

The Java unary operators require only one operand. Unary operators are used to perform various operations i.e.:

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* incrementing/decrementing a value by one
* negating an expression
* inverting the value of a boolean

Java Unary Operator Example: ++ and --

1. **public** **class** OperatorExample{
2. **public** **static** **void** main(String args[]){
3. **int** x=10;
4. System.out.println(x++);//10 (11)
5. System.out.println(++x);//12
6. System.out.println(x--);//12 (11)
7. System.out.println(--x);//10
8. }}

**Output:**

10

12

12

10

Java Unary Operator Example 2: ++ and --

1. **public** **class** OperatorExample{
2. **public** **static** **void** main(String args[]){
3. **int** a=10;
4. **int** b=10;
5. System.out.println(a++ + ++a);//10+12=22
6. System.out.println(b++ + b++);//10+11=21
8. }}

**Output:**

22

21

Java Unary Operator Example: ~ and !

1. **public** **class** OperatorExample{
2. **public** **static** **void** main(String args[]){
3. **int** a=10;
4. **int** b=-10;
5. **boolean** c=**true**;
6. **boolean** d=**false**;
7. System.out.println(~a);//-11 (minus of total positive value which starts from 0)
8. System.out.println(~b);//9 (positive of total minus, positive starts from 0)
9. System.out.println(!c);//false (opposite of boolean value)
10. System.out.println(!d);//true
11. }}

**Output:**

-11

9

false

true

Java Arithmetic Operators

Java arithmetic operators are used to perform addition, subtraction, multiplication, and division. They act as basic mathematical operations.

Java Arithmetic Operator Example

1. **public** **class** OperatorExample{
2. **public** **static** **void** main(String args[]){
3. **int** a=10;
4. **int** b=5;
5. System.out.println(a+b);//15
6. System.out.println(a-b);//5
7. System.out.println(a\*b);//50
8. System.out.println(a/b);//2
9. System.out.println(a%b);//0
10. }}

**Output:**

15

5

50

2

0

Java Arithmetic Operator Example: Expression

1. **public** **class** OperatorExample{
2. **public** **static** **void** main(String args[]){
3. System.out.println(10\*10/5+3-1\*4/2);
4. }}

**Output:**

21

Java Left Shift Operator

The Java left shift operator << is used to shift all of the bits in a value to the left side of a specified number of times.

Java Left Shift Operator Example

1. **public** **class** OperatorExample{
2. **public** **static** **void** main(String args[]){
3. System.out.println(10<<2);//10\*2^2=10\*4=40
4. System.out.println(10<<3);//10\*2^3=10\*8=80
5. System.out.println(20<<2);//20\*2^2=20\*4=80
6. System.out.println(15<<4);//15\*2^4=15\*16=240
7. }}

**Output:**

40

80

80

240

Java Right Shift Operator

The Java right shift operator >> is used to move the value of the left operand to right by the number of bits specified by the right operand.

Java Right Shift Operator Example

1. **public** OperatorExample{
2. **public** **static** **void** main(String args[]){
3. System.out.println(10>>2);//10/2^2=10/4=2
4. System.out.println(20>>2);//20/2^2=20/4=5
5. System.out.println(20>>3);//20/2^3=20/8=2
6. }}

**Output:**

2

5

2

Java Shift Operator Example: >> vs >>>

1. **public** **class** OperatorExample{
2. **public** **static** **void** main(String args[]){
3. //For positive number, >> and >>> works same
4. System.out.println(20>>2);
5. System.out.println(20>>>2);
6. //For negative number, >>> changes parity bit (MSB) to 0
7. System.out.println(-20>>2);
8. System.out.println(-20>>>2);
9. }}

**Output:**

5

5

-5

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Java AND Operator Example: Logical && and Bitwise &

The logical && operator doesn't check the second condition if the first condition is false. It checks the second condition only if the first one is true.

The bitwise & operator always checks both conditions whether first condition is true or false.

1. **public** **class** OperatorExample{
2. **public** **static** **void** main(String args[]){
3. **int** a=10;
4. **int** b=5;
5. **int** c=20;
6. System.out.println(a<b&&a<c);//false && true = false
7. System.out.println(a<b&a<c);//false & true = false
8. }}

**Output:**

false

false

Java AND Operator Example: Logical && vs Bitwise &

1. **public** **class** OperatorExample{
2. **public** **static** **void** main(String args[]){
3. **int** a=10;
4. **int** b=5;
5. **int** c=20;
6. System.out.println(a<b&&a++<c);//false && true = false
7. System.out.println(a);//10 because second condition is not checked
8. System.out.println(a<b&a++<c);//false && true = false
9. System.out.println(a);//11 because second condition is checked
10. }}

**Output:**

false

10

false

11

Java OR Operator Example: Logical || and Bitwise |

The logical || operator doesn't check the second condition if the first condition is true. It checks the second condition only if the first one is false.

The bitwise | operator always checks both conditions whether first condition is true or false.

1. **public** **class** OperatorExample{
2. **public** **static** **void** main(String args[]){
3. **int** a=10;
4. **int** b=5;
5. **int** c=20;
6. System.out.println(a>b||a<c);//true || true = true
7. System.out.println(a>b|a<c);//true | true = true
8. //|| vs |
9. System.out.println(a>b||a++<c);//true || true = true
10. System.out.println(a);//10 because second condition is not checked
11. System.out.println(a>b|a++<c);//true | true = true
12. System.out.println(a);//11 because second condition is checked
13. }}

**Output:**

true

true

true

10

true

11

Java Ternary Operator

Java Ternary operator is used as one line replacement for if-then-else statement and used a lot in Java programming. It is the only conditional operator which takes three operands.

Java Ternary Operator Example

1. **public** **class** OperatorExample{
2. **public** **static** **void** main(String args[]){
3. **int** a=2;
4. **int** b=5;
5. **int** min=(a<b)?a:b;
6. System.out.println(min);
7. }}

**Output:**

2

Another Example:

1. **public** **class** OperatorExample{
2. **public** **static** **void** main(String args[]){
3. **int** a=10;
4. **int** b=5;
5. **int** min=(a<b)?a:b;
6. System.out.println(min);
7. }}

**Output:**

5

Java Assignment Operator

Java assignment operator is one of the most common operators. It is used to assign the value on its right to the operand on its left.

Java Assignment Operator Example

1. **public** **class** OperatorExample{
2. **public** **static** **void** main(String args[]){
3. **int** a=10;
4. **int** b=20;
5. a+=4;//a=a+4 (a=10+4)
6. b-=4;//b=b-4 (b=20-4)
7. System.out.println(a);
8. System.out.println(b);
9. }}

**Output:**

14

16

Java Assignment Operator Example

1. **public** **class** OperatorExample{
2. **public** **static** **void** main(String[] args){
3. **int** a=10;
4. a+=3;//10+3
5. System.out.println(a);
6. a-=4;//13-4
7. System.out.println(a);
8. a\*=2;//9\*2
9. System.out.println(a);
10. a/=2;//18/2
11. System.out.println(a);
12. }}

**Output:**

13

9

18

9

Java Assignment Operator Example: Adding short

1. **public** **class** OperatorExample{
2. **public** **static** **void** main(String args[]){
3. **short** a=10;
4. **short** b=10;
5. //a+=b;//a=a+b internally so fine
6. a=a+b;//Compile time error because 10+10=20 now int
7. System.out.println(a);
8. }}

**Output:**

Compile time error

After type cast:

1. **public** **class** OperatorExample{
2. **public** **static** **void** main(String args[]){
3. **short** a=10;
4. **short** b=10;
5. a=(**short**)(a+b);//20 which is int now converted to short
6. System.out.println(a);
7. }}

**Output:**

20