

1 Arithmetic Expressions

Used for calculations.

```
int a = 10;
int b = 3;

int sum = a + b;          // 13
int diff = a - b;         // 7
int product = a * b;       // 30
int quotient = a / b;      // 3 (integer division)
int remainder = a % b;     // 1
```

☞ $a + b$, $a * b$, $a \% b$ are **expressions**.

2 Relational (Comparison) Expressions

Used to compare values. Result is **true** or **false**.

```
int x = 5;
int y = 8;

boolean result1 = x < y;    // true
boolean result2 = x == y;   // false
boolean result3 = x != y;   // true
```

3 Logical Expressions

Used to combine conditions.

```
int age = 20;
boolean hasID = true;

boolean canEnter = (age >= 18) && hasID; // true
```

Operators:

- `&&` → AND
 - `||` → OR
 - `!` → NOT
-

4 Assignment Expressions

Assign values to variables.

```
int num = 10;  
num += 5;    // same as num = num + 5 (15)  
num *= 2;    // same as num = num * 2 (30)
```

5 Unary Expressions

Operate on a single value.

```
int count = 5;  
  
count++; // 6 (increment)  
count--; // 5 (decrement)  
  
boolean isOpen = false;  
boolean status = !isOpen; // true
```

6 Conditional (Ternary) Expression

A shortcut for `if-else`.

```
int marks = 75;  
  
String result = (marks >= 50) ? "Pass" : "Fail";
```

7 String Expressions

Used with text.

```
String firstName = "Yasir";  
String lastName = "Bhutta";  
  
String fullName = firstName + " " + lastName;  
// Yasir Bhutta
```

8 Mixed Expressions

Combining different types.

```
int a = 5;  
int b = 2;  
  
double result = a / (double) b; // 2.5
```

9 Expression inside `System.out.println()`

Very common for beginners.

```
System.out.println(10 + 5); // 15  
System.out.println("Sum = " + (10 + 5)); // Sum = 15
```

📝 Practice Questions (Java Expressions)

Q1. What will be the output?

```
System.out.println(8 + 2 * 5);
```

Q2. What is the value of `result`?

```
int a = 6;  
int b = 4;  
boolean result = a >= b;
```

Q3. What will be printed?

```
int x = 10;  
System.out.println(x++ + 5);
```

Q4. Identify the expression in the statement:

```
double avg = (a + b + c) / 3.0;
```

Q5. What is the output?

```
System.out.println(15 % 4);
```

Q6. What will be printed?

```
int num = 5;
System.out.println(num > 3 && num < 10);
```

Q7. What is the value of `status`?

```
int marks = 45;
String status = (marks >= 50) ? "Pass" : "Fail";
```

Q8. Which operator is used to reverse a boolean value?

```
boolean flag = false;
```

Q9. What will be the output?

```
System.out.println("Result: " + 10 + 20);
```

Q10. What is the result of this expression?

```
int result = 20 / 4 + 3 * 2;
```

📝 Tasks

◊ Lab 1: Basic Calculator

Write a Java program that:

- Declares two integer variables
- Performs `+` `-` `*` `/` `%`
- Prints all results

◊ Lab 2: Increment & Decrement

- Declare an integer variable
 - Apply `++` and `--`
 - Print values **before and after** operations
-

◊ Lab 3: Even or Odd

- Take an integer
 - Use an expression to check even or odd
 - Print the result
-

◊ Lab 4: Maximum of Two Numbers

- Declare two numbers
 - Use a **ternary expression**
 - Print the larger number
-

◊ Lab 5: Pass or Fail System

- Declare `marks`
 - Print "Pass" if `marks ≥ 50`, else "Fail"
-

◊ Lab 6: Logical Operator Practice

- Declare `age` and `hasID`
 - Allow entry if:
 - `age ≥ 18` AND `hasID` is true
-

◊ Lab 7: Simple Interest

- Declare `principal`, `rate`, `time`
- Use an expression to calculate simple interest

Formula:

$$SI = (P \times R \times T) / 100$$

◊ Lab 8: Positive, Negative, or Zero

- Declare a number
- Use **if-else with expressions**

- Print the result
-

◊ Lab 9: String Expression

- Declare first and last name
 - Combine them using `+`
 - Print full name
-

◊ Lab 10: Operator Precedence Test

- Write a program using:

```
int result = 10 + 2 * 3 - 4 / 2;
```

- Print and explain the output
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■ Related Topics

- Difference Between Expressions and Statements in Java | Java Basics Explained
- Data Types and Variables
- Type Casting