

Java Programming Fundamentals

Complete Reference Guide

1. Variables

Definition: Named memory location storing typed data

Syntax:

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```
dataType variableName = value;
```

Examples:

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```
int age = 25;           // Integer
String name = "Alice"; // String
boolean isStudent = true; // Boolean
```

Key Properties:

- **Naming:** Start with letter/underscore, case-sensitive
- **Data Types:**
 - Primitive: `int`, `double`, `char`, `boolean`
 - Reference: `String`, `Arrays`, `Objects`
- **Scope:** Local (method), Instance (object), Class (static)

1.1 Comments

Types:

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```
// Single-line comment

/* Multi-line
   comment */

/** Javadoc for documentation */
```

2. Arithmetic Operators

Operator	Example	Result
+ (Addition)	5 + 3	8
- (Subtraction)	7 - 2	5
* (Multiplication)	4 * 3	12
/ (Division)	10 / 3	3 (int)
% (Modulus)	10 % 3	1
++ (Increment)	a++	a + 1
-- (Decrement)	b--	b - 1

Code Example:

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```
System.out.println(15 / 4); // 3 (integer division)
System.out.println(15.0 / 4); // 3.75 (floating-point)
```

3. Assignment Operators

Operator	Example	Equivalent
=	x = 5	x = 5
+=	x += 3	x = x + 3
-=	x -= 2	x = x - 2
*=	x *= 4	x = x * 4
/=	x /= 2	x = x / 2

Example:

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```
int score = 10;
score *= 2; // score = 20
```

4. Comparison Operators

Operator	Example	Result
==	5 == 5	true
!=	5 != 3	true
>	7 > 5	true
<	7 < 5	false
>=	7 >= 7	true
<=	5 <= 3	false

5. Logical Operators

Truth Table:

A	B	A && B	A B	! A
T	T	T	T	F
T	F	F	T	F
F	T	F	T	T
F	F	F	F	T

Example:

Example:

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```
if (isWeekend && hasMoney) {
    System.out.println("Go shopping!");
}
```

6. User Input

Using `Scanner` :

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```
import java.util.Scanner;

public class Main {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        System.out.print("Enter age: ");
        int age = sc.nextInt();
    }
}
```

Key Methods:

- `nextInt()` : Reads integer
- `nextDouble()` : Reads decimal
- `nextLine()` : Reads full string

7. if-else Statements

Syntax:

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```
if (condition1) {
    // Code block 1
} else if (condition2) {
    // Code block 2
} else {
    // Default block
}
```

Example:

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```
int marks = 85;
if (marks >= 90) {
    System.out.println("A");
} else if (marks >= 75) {
    System.out.println("B"); // Executes
}
```

8. Loops

for Loop

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```
for (int i = 0; i < 5; i++) {
    System.out.print(i + " "); // 0 1 2 3 4
}
```

while Loop

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```
int count = 3;
while (count > 0) {
    System.out.println(count); // 3, 2, 1
    count--;
}
```

do-while Loop

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```
int x = 5;
do {
    System.out.println(x); // 5,4,3,2,1
    x--;
} while (x > 0);
```

Loop Control

- `break` : Exit loop
- `continue` : Skip iteration

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```
for (int i = 0; i < 10; i++) {
    if (i == 2) continue; // Skip 2
    if (i == 7) break;    // Stop at 7
    System.out.print(i + " "); // 0 1 3 4 5 6
}
```

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Quick Reference Table

Concept	Syntax Example	Key Note
Variable	<code>int x = 10;</code>	Declare type
Arithmetic	<code>5 + 3 * 2</code>	PEMDAS order
Comparison	<code>a >= b</code>	Returns boolean
Logical	<code>cond1 && cond2</code>	Short-circuits
Input	<code>sc.nextInt()</code>	Import <code>Scanner</code>
if-else	<code>else if</code> ladder	Top-down evaluation
for Loop	<code>for (int i=0;i<5;i++)</code>	Fixed iterations
while	<code>while (cond)</code>	Pre-check
do-while	<code>do {...} while(cond);</code>	Post-check