Module 1: Java Basics

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Topics covered in Module 1,

- OOP Paradigm
- Features of JAVA Language
- JVM
- Bytecode
- Java Program Structure
- Basic Programming Construct
- Data Types
- Variables
- Java naming conventions
- Operators

Relational (Comparison) Operators

Description: Relational operators are used to compare two values. These operators return a boolean value: `true` or `false`. The following are the relational operators in Java:

Operator	Description	Example
==	Equal to	`a == b`
!=	Not equal to	`a != b`
>	Greater than	`a > b`
<	Less than	`a < b`
>=	Greater than or equal to	`a >= b`
<=	Less than or equal to	`a <= b`

== : Equal to

The == operator compares if two values are equal. It returns `true` if the values on both sides are the same, and `false` if they are different.

`a == b` returns true if a is equal to b

Example:

$5 == 5$ returns `true`

!= : Not equal to

The `!=` operator compares if two values are not equal. It returns `true` if the values are different, and `false` if they are the same.

`a != b` returns true if a is not equal to b

Example:

$5! = 3$ returns `true`

> : Greater than

The > operator checks if the value on the left is greater than the value on the right. It returns `true` if the left operand is greater, and `false` otherwise.

`a > b` returns true if a is greater than b

Example:

$10 > 5$ returns `true`

< : Less than

The < operator checks if the value on the left is less than the value on the right. It returns `true` if the left operand is less, and `false` otherwise.

`a < b` returns true if a is less than b

Example:

$5 < 10$ returns `true`

>= : Greater than or equal to

The >= operator checks if the left operand is greater than or equal to the right operand. It returns `true` if the left value is greater than or equal, and `false` if it is less.

`a >= b` returns true if *a* is greater than or equal to *b*

Example:

$10 >= 10$ returns `true`

<= : Less than or equal to

The <= operator checks if the left operand is less than or equal to the right operand. It returns `true` if the left value is less than or equal, and `false` if it is greater.

`a <= b` returns true if a is less than or equal to b

Example:

$3 <= 7$ returns `true`

Examples

Example (Java Code)

```
public class Main {
    public static void main(String[] args) {
        int a = 10, b = 5;

        // Using relational operators
        System.out.println("a == b: " + (a == b));  // false
        System.out.println("a != b: " + (a != b));  // true
        System.out.println("a > b: " + (a > b));    // true
        System.out.println("a < b: " + (a < b));    // false
        System.out.println("a >= b: " + (a >= b));  // true
        System.out.println("a <= b: " + (a <= b));  // false
    }
}
```

Relational Operators Practice Questions

Practice Questions:

1. **Basic Relational Comparisons:** Write a Java program to compare two integers and check:
   - If they are equal.
   - If one is greater than the other.
   - If one is less than the other.
2. **Largest of Two Numbers:** Write a program that takes two numbers as input and prints which number is larger or if they are equal.
3. **Pass or Fail:** Write a program to check if a student has passed an exam. The program should take the marks as input and print "Pass" if the marks are greater than or equal to 40, otherwise print "Fail."
4. **Age Check:** Write a Java program that takes a person's age as input and checks if the person is eligible to vote (age ≥ 18).
5. **Number Range Check:** Write a program to check if a given number lies between 1 and 100 (inclusive).

Relational Operators Practice Questions

Practice Questions:

1. **Temperature Comparison:** Write a program that takes two temperatures (in degrees Celsius) as input and determines:
   - If the first temperature is hotter than the second.
   - If the temperatures are equal.
   - If the first temperature is cooler than the second.
2. **Triangle Validity Check:** Write a program to check if three sides can form a valid triangle. A triangle is valid if:

   sum of any two sides is greater than the third side.

3. **Discount Eligibility:** Write a program to check if a customer is eligible for a discount. The customer is eligible if their total purchase amount is greater than or equal to $100.
4. **Logical Use of Relational Operators:** Write a program to check if a number is divisible by 5 and lies between 50 and 100.

Relational Operators Practice Questions

Practice Questions:

1. **Relational Operators with Strings:** Java doesn't support == for comparing the content of strings directly. Write a program to demonstrate this and use `.equals()` to compare two strings.
2. **Challenge Problem:** Write a program that takes three numbers as input and finds the largest among them using relational operators.