

Variables

boolean Data Type

In Java, the `boolean` primitive data type is used to store a value, which can be either `true` or `false`.

```
boolean result = true;
boolean isMarried = false;
```

Strings

A String in Java is a Object that holds multiple characters. It is not a primitive datatype.

A String can be created by placing characters between a pair of double quotes (`"`).

To compare Strings, the `equals()` method must be used instead of the primitive equality comparator `==`.

```
// Creating a String variable
String name = "Bob";

// The following will print "false" because strings
// are case-sensitive
System.out.println(name.equals("bob"));
```

int Data Type

In Java, the `int` datatype is used to store integer values. This means that it can store all positive and negative whole numbers and zero.

```
int num1 = 10;    // positive value
int num2 = -5;    // negative value
int num3 = 0;     // zero value
int num4 = 12.5;  // not allowed
```

char Data Type

In Java, `char` is used to store a single character. The character must be enclosed in single quotes.

```
char answer = 'y';
```

Primitive Data Types

Java's most basic data types are known as *primitive data types* and are in the system by default.

The available types are as follows:

- `int`
- `char`
- `boolean`
- `byte`
- `long`
- `short`
- `double`
- `float`

`null` is another, but it can only ever store the value `null`.

Static Typing

In Java, the type of a variable is checked at compile time. This is known as *static typing*. It has the advantage of catching the errors at compile time rather than at execution time.

Variables must be declared with the appropriate data type or the program will not compile.

final Keyword

The value of a variable cannot be changed if the variable was declared using the `final` keyword.

Note that the variable must be given a value when it is declared as `final`.

`final` variables cannot be changed; any attempts at doing so will result in an error message.

```
int age = 28;

char grade = 'A';

boolean late = true;

byte b = 20;

long num1 = 1234567;

short no = 10;

float k = (float)12.5;

double pi = 3.14;
```

```
int i = 10;           // type is int
char ch = 'a';        // type is char

j = 20;               // won't compile, no type is
                      // given
char name = "Lil";    // won't compile, wrong data type
```

```
// Value cannot be changed:
final double PI = 3.14;
```

double Data Type

The `double` primitive type is used to hold decimal values.

Math Operations

Basic math operations can be applied to `int`, `double` and `float` data types:

- `+` addition
- `-` subtraction
- `*` multiplication
- `/` division
- `%` modulo (yields the remainder)

These operations are not supported for other data types.

```
double PI = 3.14;  
double price = 5.75;
```

```
int a = 20;  
int b = 10;  
  
int result;  
  
result = a + b; // 30  
  
result = a - b; // 10  
  
result = a * b; // 200  
  
result = a / b; // 2  
  
result = a % b; // 0
```

Comparison Operators

Comparison operators can be used to compare two values:

- `>` greater than
- `<` less than
- `>=` greater than or equal to
- `<=` less than or equal to
- `==` equal to
- `!=` not equal to

They are supported for primitive data types and the result of a comparison is a boolean value `true` or `false`.

Compound Assignment Operators

Compound assignment operators can be used to change and reassign the value of a variable using one line of code. Compound assignment operators include

`+=`, `-=`, `*=`, `/=`, and `%=`.

```
int a = 5;
int b = 3;

boolean result = a > b;
// result now holds the boolean value true
```

```
int number = 5;

number += 3; // Value is now 8
number -= 4; // Value is now 4
number *= 6; // Value is now 24
number /= 2; // Value is now 12
number %= 7; // Value is now 5
```

Increment and Decrement Operators

The increment operator, (`++`), can increase the value of a number-based variable by `1` while the decrement operator, (`--`), can decrease the value of a variable by `1`.

```
int numApples = 5;
numApples++; // Value is now 6

int numOranges = 5;
numOranges--; // Value is now 4
```

Order of Operations

The order in which an expression with multiple operators is evaluated is determined by the order of operations: parentheses → multiplication → division → modulo → addition → subtraction.