

Java Data Types

What are Data Types?

A **data type** tells the computer what kind of information a variable can hold. In Java, every variable must have a data type. Think of data types as rules that tell the computer how to store and work with different kinds of information.

Java has **8 primitive (basic) data types**. Each type stores a different kind of information and uses a different amount of computer memory.

Simple Analogy: Data Types are Like Different Containers

Imagine you are organizing your kitchen. You have different containers for different things:

- **Small jar** → holds one piece of candy (like **byte**)
- **Letter box** → holds one letter of the alphabet (like **char**)
- **Money box** → holds coins and small bills (like **int**)
- **True/False card** → shows YES or NO (like **boolean**)
- **Big safe** → holds large amounts of money (like **long**)
- **Measuring cup** → holds liquid measurements (like **float** and **double**)

Each container is designed for a specific purpose. You wouldn't put soup in a letter box, and you wouldn't put a letter in a measuring cup!

The 8 Primitive Data Types

Data Type	What It Stores	Size	Example Values
byte	Very small whole numbers	8 bits	-128 to 127
short	Small whole numbers	16 bits	-32,768 to 32,767
int	Regular whole numbers	32 bits	-2 billion to 2 billion
long	Very large whole numbers	64 bits	Very big numbers
float	Decimal numbers (less precise)	32 bits	3.14, -2.5
double	Decimal numbers (more precise)	64 bits	3.141592, -25.789
char	Single character or letter	16 bits	'A', 'x', '5', '!'
boolean	True or False only	1 bit	true, false

How to Use Data Types

Pattern: **dataType** **variableName** = **value**;

Examples:

```
int age = 25;
→ Stores the whole number 25 in a variable called "age"

double price = 19.99;
→ Stores the decimal number 19.99 in a variable called "price"
```

```
char grade = 'A';
```

→ Stores the letter 'A' in a variable called "grade"

```
boolean isStudent = true;
```

→ Stores the value true in a variable called "isStudent"

```
byte smallNumber = 100;
```

→ Stores the small number 100 in a variable called "smallNumber"

Important Rules to Remember

- You must choose the data type **before** you create the variable
- You cannot change the data type after you create the variable
- Choose the right size data type for your needs (don't use **long** if **int** is enough)
- Use **char** for single characters (letters, numbers, symbols)
- Use **boolean** for yes/no or true/false questions

Your Turn: Write Your Own Definition

What is a data type? How would you explain it to a friend?

Write your definition in your own words:

Why do you think Java requires us to specify data types for variables?