Java Data Types :

A variable in Java must be a specified data type

Data types are divided into two groups :

* primitive data types (byte, short, int, long, float, double, boolean & char)
* non-primitive data types (String, Arrays & classes)

Primitive data types :

It specifies the size and type of variable values and it has no additional methods.

[byte → Size (1 byte) → Stores whole numbers from] example Similarly for all types.

Java numbers :

Primitive number types are divided into two groups :

* **Integer types :** (Stores whole number, positive or negative without decimals)
* **Floating point types :** (Fractional part containing one or more decimals)
  i) Float ii) double

The most used for number in Java are **int (whole numbers)** and **double (for floating point numbers)**

Integer types :

Byte : (Whole Numbers from -128 to 127)

```
byte myNum = 100;
System.out.println(myNum);
```

Short : (-32768 to 32767) :

```
short myNum = 5000;
System.out.println(myNum);
```

Int : (-2147483648 to 2147483647)

(Int data type is the preferred data type)

```
int myNum = 100000;
System.out.println(myNum);
```

Long: whole numbers from (-9... to 9...)

```
long myNum = 150000L;
System.out.println(myNum);
```

Floating point types:

whenever you need a number with a decimal, 9.99 (or) 3.14515.

* the float and double data types can store Fractional numbers end with an "f" for floats and "d" for doubles

```
float myNum = 5.75f;
System.out.println(myNum);
```

```
double myNum = 19.99d;
System.out.println(myNum);
```

Scientific Numbers:

The floating point number can also be a scientific number with an "e" to indicate the power of 10.

Java Boolean Data types:

A data type that can only have one of two values; like:

i) yes/NO ii) ON/OFF iii) TRUE/FALSE

Java characters:

The char data type is used to store a single character

EX:
```
char myGrade = 'B';
System.out.println(myGrade);
```

Strings:

The String data type is used to store a sequence of characters (text)

Ex:
```
String greetings = "Hello World";
System.out.println(greeting);
```

Non-primitive Data types:

* called as reference types.

i) Primitive types (already defined) in Java

ii) Non-primitive types (not defined by Java) (except for String)

* primitive → has always a value, lowercase letter
non-primitive → null, uppercase letter

Java Types Casting:

* When you assign a value of one primitive data type to another type

Two types i) Widening casting (automatically)
Converting a smaller type to a larger type size
byte → short → char → int → long → float → double

ii) Narrowing casting (manually) - converting a larger to smaller size type
double → float ... → byte

Java operators:

To perform operations on variables and values

+ ⇒ operator to add

Ex: int x = 100 + 50

Ex: int sum3 = sum1 + sum2

Java operators types or groups:

i) Arithmetic operators (+, -, *, /, %, ++, --)
ii) Assignment operators (=) (+=, -=, *=)
iii) Comparison operators (>, <, >=, <=, ==)
iv) Logical operators (&& ⇒ and, || ⇒ or, ! ⇒ not)
v) Bitwise operators.

Java strings:

* Strings are used for storing text.
* It contains a collection of characters surrounded by double quotes.

String length:

A string in Java is actually an object, which contain methods that can perform certain operation on strings

More String Methods

There are many String methods available, for ex: toUpperCase() and toLowerCase()

Finding a character in a string:

The indexOf() method returns the index of the first occurrence of a specified text in a string.

Java String Concatenation:

* String concatenation, The (+) operator can be used between strings to combine them.
* You can also use the concat() method.

```
String firstName = "John";
String lastName = "Doe";
System.out.println( firstName + " " + lastName);
    (or)
System.out.println( firstName.concat(lastName));
```

Java Numbers and Strings:

Adding Numbers and Strings; [∵ Java uses (+) operator for both addition & concatenation. Numbers are added & strings are concatenated]

two Numbers:

Ex: `int x = 10;`
`int y = 20;`
`int z = x + y;` (z will 30)

two Strings:

Ex: `String x = "10";`
`String y = "20";`
`String z = x + y;` // (z will be 1020)

number & a String:

Ex: `String x = "10";`
`int y = 20;`
`String z = x + y;` // z will 1020.

Strings – special characters:

The backslash (\) escape character turns special characters into strings characters:

(In the middle of the sentence to include " " instead we use /" to avoid the error)

String txt = "We are \" Vikings \" from the north.

Java Math:

To perform mathematical Tasks on numbers.

* Math.max(x, y)
  to find the highest value of x and y.
* Math.min(x, y)
  to find minimum value of x & y
* Math.sqrt(x)
  to returns the square root of x
* Math.abs(x)
  To absolute (positive) value of x
* Math.random()
  returns random number between 0.0 and 1.0