

# Basics

Basic syntax and functions from the Java programming language.

## Boilerplate

```
class HelloWorld{  
    public static void main(String args[]){  
        System.out.println("Hello World");  
    }  
}
```

## Showing Output

It will print something to the output console.

```
System.out.println([text])
```

## Taking Input

It will take string input from the user

```
import java.util.Scanner; //import scanner class  
  
// create an object of Scanner class  
Scanner input = new Scanner(System.in);  
  
// take input from the user  
String varName = input.nextLine();
```

## Primitive Type Variables

The eight primitives defined in Java are int, byte, short, long, float, double, boolean, and char those aren't considered objects and represent raw values.

### byte

byte is a primitive data type it only takes up 8 bits of memory.

```
age = 18;
```

## long

long is another primitive data type related to integers. long takes up 64 bits of memory.

```
viewsCount = 3_123_456L;
```

## float

We represent basic fractional numbers in Java using the float type. This is a single-precision decimal number. Which means if we get past six decimal points, this number becomes less precise and more of an estimate.

```
price = 100INR;
```

## char

Char is a 16-bit integer representing a Unicode-encoded character.

```
letter = 'A';
```

## boolean

The simplest primitive data type is boolean. It can contain only two values: true or false. It stores its value in a single bit.

```
isEligible = true;
```

## int

int holds a wide range of non-fractional number values.

```
var1 = 256;
```

## short

If we want to save memory and byte is too small, we can use short.

```
short var2 = 786;
```

## Comments

A comment is the code that is not executed by the compiler, and the programmer uses it to keep track of the code.

## Single line comment

```
// It's a single line comment
```

## Multi-line comment

```
/* It's a  
multi-line  
comment  
*/
```

## Constants

Constants are like a variable, except that their value never changes during program execution.

```
final float INTEREST_RATE = 0.04;
```

## Arithmetic Expressions

These are the collection of literals and arithmetic operators.

### Addition

It can be used to add two numbers

```
int x = 10 + 3;
```

### Subtraction

It can be used to subtract two numbers

```
int x = 10 - 3;
```

### Multiplication

It can be used to multiply add two numbers

```
int x = 10 * 3;
```

## Division

It can be used to divide two numbers

```
int x = 10 / 3;  
float x = (float)10 / (float)3;
```

## Modulo Remainder

It returns the remainder of the two numbers after division

```
int x = 10 % 3;
```

# Augmented Operators

## Addition assignment

```
var += 10 // var = var + 10
```

## Subtraction assignment

```
var -= 10 // var = var - 10
```

## Multiplication assignment

```
var *= 10 // var = var * 10
```

## Division assignment

```
var /= 10 // var = var / 10
```

## Modulus assignment

```
var %= 10 // var = var % 10
```

## Escape Sequences

It is a sequence of characters starting with a backslash, and it doesn't represent itself when used inside string literal.

### Tab

It gives a tab space

```
\t
```

### Backslash

It adds a backslash

```
\\
```

### Single quote

It adds a single quotation mark

```
\'
```

### Question mark

It adds a question mark

```
\?
```

### Carriage return

Inserts a carriage return in the text at this point.

```
\r
```

### Double quote

It adds a double quotation mark

\"

## Type Casting

Type Casting is a process of converting one data type into another

### Widening Type Casting

It means converting a lower data type into a higher

```
// int x = 45;  
double var_name = x;
```

### Narrowing Type Casting

It means converting a higher data type into a lower

```
double x = 165.48  
int var_name = (int)x;
```

## Decision Control Statements

Conditional statements are used to perform operations based on some condition.

### if Statement

```
if (condition) {  
    // block of code to be executed if the condition is true  
}
```

### if-else Statement

```
if (condition) {  
    // If condition is True then this block will get executed  
} else {  
    // If condition is False then this block will get executed  
}
```

## if else-if Statement

```
if (condition1) {  
  // Codes  
}  
else if(condition2) {  
  // Codes  
}  
else if (condition3) {  
  // Codes  
}  
else {  
  // Codes  
}
```

## Ternary Operator

It is shorthand of an if-else statement.

```
variable = (condition) ? expressionTrue : expressionFalse;
```

## Switch Statements

It allows a variable to be tested for equality against a list of values (cases).

```
switch(expression) {  
  case a:  
    // code block  
    break;  
  case b:  
    // code block  
    break;  
  default:  
    // code block  
}
```

## Iterative Statements

Iterative statements facilitate programmers to execute any block of code lines repeatedly and can be controlled as per conditions added by the coder.

## while Loop

It iterates the block of code as long as a specified condition is True

```
while (condition) {  
  // code block  
}
```

## for Loop

for loop is used to run a block of code several times

```
for (initialization; termination; increment) {  
  statement(s)  
}
```

## for-each Loop

```
for(dataType item : array) {  
  ...  
}
```

## do-while Loop

It is an exit controlled loop. It is very similar to the while loop with one difference, i.e., the body of the do-while loop is executed at least once even if the condition is False

```
do {  
  // body of loop  
} while(textExpression)
```

## Break statement

break keyword inside the loop is used to terminate the loop

```
break;
```

## Continue statement



continue keyword skips the rest of the current iteration of the loop and returns to the starting point of the loop

```
continue;
```

## Arrays

Arrays are used to store multiple values in a single variable

### Declaring an array

Declaration of an array

```
String[] var_name;
```

### Defining an array

Defining an array

```
String[] var_name = {'Harry', 'Rohan', 'Aakash'};
```

### Accessing an array

Accessing the elements of an array

```
String[] var_name = {'Harry', 'Rohan', 'Aakash'};  
System.out.println(var_name[index]);
```

### Changing an element

Changing any element in an array

```
String[] var_name = {'Harry', 'Rohan', 'Aakash'};  
var_name[2] = "Shubham";
```

### Array length

It gives the length of the array

```
System.out.println(var_name.length);
```

## Loop through an array

It allows us to iterate through each array element

```
String[] var_name = { "Harry", "Rohan", "Aakash" };
for (int i = 0; i < var_name.length; i++) {
    System.out.println(var_name[i]);
}
```

## Multi-dimensional Arrays

Arrays can be 1-D, 2-D or multi-dimensional.

```
// Creating a 2x3 array (two rows, three columns)
int[2][3] matrix = new int[2][3];
matrix[0][0] = 10;
// Shortcut
int[2][3] matrix = {
    { 1, 2, 3 },
    { 4, 5, 6 }
};
```

## Methods

Methods are used to divide an extensive program into smaller pieces. It can be called multiple times to provide reusability to the program.

### Declaration

Declaration of a method

```
returnType methodName(parameters) {
    //statements
}
```

### Calling a method

Calling a method

```
methodName(arguments);
```

## Method Overloading

Method overloading means having multiple methods with the same name, but different parameters.

```
class Calculate
{
void sum (int x, int y)
{
System.out.println("Sum is: +(a+b)) ;
}
void sum (float x, float y)
{
System.out.println("Sum is: +(a+b));
}
Public static void main (String[] args)
{
Calculate calc = new Calculate();
calc.sum (5,4); //sum(int x, int y) is method is called.
calc.sum (1.2f, 5.6f); //sum(float x, float y) is called.
}
}
```

## Recursion

Recursion is when a function calls a copy of itself to work on a minor problem. And the function that calls itself is known as the Recursive function.

```
void recurse()
{
... ..
recurse();
... ..
}
```

## Strings

It is a collection of characters surrounded by double quotes.

### Creating String Variable

```
String var_name = "Hello World";
```

## String Length

Returns the length of the string

```
String var_name = "Harry";  
System.out.println("The length of the string is: " + var_name.length());
```

## String Methods toUpperCase()

Convert the string into uppercase

```
String var_name = "Harry";  
System.out.println(var_name.toUpperCase());
```

## toLowerCase()

Convert the string into lowercase

```
String var_name = "Harry";  
System.out.println(var_name.toLowerCase());
```

## indexOf()

Returns the index of specified character from the string

```
String var_name = "Harry";  
System.out.println(var_name.indexOf("a"));
```

## concat()

Used to concatenate two strings

```
String var1 = "Harry";  
String var2 = "Bhai";  
System.out.println(var1.concat(var2));
```

## Math Class

Math class allows you to perform mathematical operations.

## Methods max() method

It is used to find the greater number among the two

```
Math.max(25, 45);
```

## min() method

It is used to find the smaller number among the two

```
Math.min(8, 7);
```

## sqrt() method

It returns the square root of the supplied value

```
Math.sqrt(144);
```

## random() method

It is used to generate random numbers

```
Math.random(); //It will produce random number b/w 0.0 and 1.0
```

```
int random_num = (int)(Math.random() * 101); //Random num b/w 0 and 100
```

# Object-Oriented Programming

It is a programming approach that primarily focuses on using objects and classes. The objects can be any real-world entities.

## object

An object is an instance of a Class.

```
className object = new className();
```

## class

A class can be defined as a template/blueprint that describes the behavior/state that the object of its type support.

```
class ClassName {  
    // Fields  
    // Methods  
    // Constructors  
    // Blocks  
}
```

## Encapsulation

Encapsulation is a mechanism of wrapping the data and code acting on the data together as a single unit. In encapsulation, the variables of a class will be hidden from other classes and can be accessed only through the methods of their current class.

```
public class Person {  
    private String name; // using private access modifier  
  
    // Getter  
    public String getName() {  
        return name;  
    }  
  
    // Setter  
    public void setName(String newName) {  
        this.name = newName;  
    }  
}
```

## Inheritance

Inheritance can be defined as the process where one class acquires the properties of another. With the use of inheritance the information is made manageable in a hierarchical order.

```
class Subclass-name extends Superclass-name  
{  
    //methods and fields  
}
```

## Polymorphism

Polymorphism is the ability of an object to take on many forms. The most common use of polymorphism in OOP occurs when a parent class reference is used to refer to a child class object.

```
// A class with multiple methods with the same name
public class Adder {
// method 1
public void add(int a, int b) {
System.out.println(a + b);
}

// method 2
public void add(int a, int b, int c) {
System.out.println(a + b + c);
}

// method 3
public void add(String a, String b) {
System.out.println(a + " + " + b);
}
}

// My main class
class MyMainClass {
public static void main(String[] args) {
Adder adder = new Adder(); // create a Adder object
adder.add(5, 4); // invoke method 1
adder.add(5, 4, 3); // invoke method 2
adder.add("5", "4"); // invoke method 3
}
}
```

## File Operations

File handling refers to reading or writing data from files. Java provides some functions that allow us to manipulate data in the files.

### canRead method

Checks whether the file is readable or not

```
file.canRead()
```

## **createNewFile method**

It creates an empty file

```
file.createNewFile()
```

## **canWrite method**

Checks whether the file is writable or not

```
file.canWrite()
```

## **exists method**

Checks whether the file exists

```
file.exists()
```

## **delete method**

It deletes a file

```
file.delete()
```

## **getName method**

It returns the name of the file

```
file.getName()
```

## **getAbsolutePath method**

It returns the absolute pathname of the file

```
file.getAbsolutePath()
```



## length Method

It returns the size of the file in bytes

```
file.length()
```

## list Method

It returns an array of the files in the directory

```
file.list()
```

## mkdir method

It is used to create a new directory

```
file.mkdir()
```

## close method

It is used to close the file

```
file.close()
```

## To write something in the file

```
import java.io.FileWriter; // Import the FileWriter class
import java.io.IOException; // Import the IOException class to handle errors

public class WriteToFile {
    public static void main(String[] args) {
        try {
            FileWriter myWriter = new FileWriter("filename.txt");
            myWriter.write("Laal Phool Neela Phool, Harry Bhaiya Beautiful");
            myWriter.close();
            System.out.println("Successfully wrote to the file.");
        } catch (IOException e) {
            System.out.println("An error occurred.");
            e.printStackTrace();
        }
    }
}
```

```
}
```

## Exception Handling

An exception is an unusual condition that results in an interruption in the flow of the program.

### try-catch block

try statement allow you to define a block of code to be tested for errors. catch block is used to handle the exception.

```
try {  
    // Statements  
}  
catch(Exception e) {  
    // Statements  
}
```

### finally block

finally code is executed whether an exception is handled or not.

```
try {  
    //Statements  
}  
catch (ExceptionType1 e1) {  
    // catch block  
}  
finally {  
    // finally block always executes  
}
```