Java Class and Objects

In this tutorial, you will learn about the concept of classes and objects in Java with the help of examples.

Java is an object-oriented programming language. The core concept of the object-oriented approach is to break complex problems into smaller objects.

An object is any entity that has a **state** and **behavior**. For example, a `bicycle` is an object. It has

- **States**: idle, first gear, etc

- **Behaviors**: braking, accelerating, etc.

Before we learn about objects, let's first know about classes in Java.

Java Class

A class is a blueprint for the object. Before we create an object, we first need to define the class.

We can think of the class as a sketch (prototype) of a house. It contains all the details about the floors, doors, windows, etc. Based on these descriptions we build the house. House is the object.

Since many houses can be made from the same description, we can create many objects from a class.

Create a class in Java

We can create a class in Java using the class keyword. For example,

```
class ClassName {

  // fields

  // methods

}
```

```
}
```

Here, `fields` (variables) and `methods` represent the **state** and **behavior** of the object respectively.

- fields are used to store data

- methods are used to perform some operations

For our `bicycle` object, we can create the class as

```java
class Bicycle {

  // state or field

  private int gear = 5;


  // behavior or method

  public void braking() {

    System.out.println("Working of Braking");

  }

}
```

In the above example, we have created a class named `Bicycle`. It contains a field named `gear` and a method named `braking()`.

Here, `Bicycle` is a prototype. Now, we can create any number of bicycles using the prototype. And, all the bicycles will share the fields and methods of the prototype.

> **Note**: We have used keywords `private` and `public`. These are known as access modifiers. To learn more, visit Java access modifiers.

Java Objects

An object is called an instance of a class. For example, suppose `Bicycle` is a class then `MountainBicycle`, `SportsBicycle`, `TouringBicycle`, etc can be considered as objects of the class.

Creating an Object in Java

Here is how we can create an object of a class.

```
className object = new className();

// for Bicycle class

Bicycle sportsBicycle = new Bicycle();



Bicycle touringBicycle = new Bicycle();
```

We have used the `new` keyword along with the constructor of the class to create an object. Constructors are similar to methods and have the same name as the class. For example, `Bicycle()` is the constructor of the `Bicycle` class. To learn more, visit Java Constructors.

Here, `sportsBicycle` and `touringBicycle` are the names of objects. We can use them to access fields and methods of the class.

As you can see, we have created two objects of the class. We can create multiple objects of a single class in Java.

> **Note**: Fields and methods of a class are also called members of the class.

Access Members of a Class

We can use the name of objects along with the `.` operator to access members of a class. For example,

```
class Bicycle {


  // field of class

  int gear = 5;



  // method of class

  void braking() {
```

```
    ...

  }

}

// create object

Bicycle sportsBicycle = new Bicycle();

// access field and method

sportsBicycle.gear;

sportsBicycle.braking();
```

In the above example, we have created a class named `Bicycle`. It includes a field named `gear` and a method named `braking()`. Notice the statement,

```
Bicycle sportsBicycle = new Bicycle();
```

Here, we have created an object of `Bicycle` named `sportsBicycle`. We then use the object to access the field and method of the class.

- **sportsBicycle.gear** - access the field `gear`

- **sportsBicycle.braking()** - access the method `braking()`

We have mentioned the word **method** quite a few times. You will learn about Java methods in detail in the next chapter.

Now that we understand what is class and object. Let's see a fully working example.

Example: Java Class and Objects

```
class Lamp {

  // stores the value for light

  // true if light is on

  // false if light is off

  boolean isOn;


  // method to turn on the light
```

```java
  void turnOn() {

    isOn = true;

    System.out.println("Light on? " + isOn);


  }



  // method to turnoff the light

  void turnOff() {

    isOn = false;

    System.out.println("Light on? " + isOn);

  }

}

class Main {

  public static void main(String[] args) {


    // create objects led and halogen

    Lamp led = new Lamp();

    Lamp halogen = new Lamp();


    // turn on the light by

    // calling method turnOn()

    led.turnOn();


    // turn off the light by

    // calling method turnOff()

    halogen.turnOff();

  }

}
```

Output:

```
Light on? true

Light on? false
```

In the above program, we have created a class named `Lamp`. It contains a variable: `isOn` and two methods: `turnOn()` and `turnOff()`.

Inside the `Main` class, we have created two objects: `led` and `halogen` of the `Lamp` class. We then used the objects to call the methods of the class.

- **led.turnOn()** - It sets the `isOn` variable to `true` and prints the output.

- **halogen.turnOff()** - It sets the `isOn` variable to `false` and prints the output.

The variable `isOn` defined inside the class is also called an instance variable. It is because when we create an object of the class, it is called an instance of the class. And, each instance will have its own copy of the variable.

That is, `led` and `halogen` objects will have their own copy of the `isOn` variable.

Example: Create objects inside the same class

Note that in the previous example, we have created objects inside another class and accessed the members from that class.

However, we can also create objects inside the same class.

```java
class Lamp {

  // stores the value for light

  // true if light is on

  // false if light is off

  boolean isOn;


  // method to turn on the light

  void turnOn() {

    isOn = true;

    System.out.println("Light on? " + isOn);


  }
```

```java
    public static void main(String[] args) {


        // create an object of Lamp

        Lamp led = new Lamp();



        // access method using object

        led.turnOn();

    }

}
```

Output

```
Light on? true
```

Here, we are creating the object inside the `main()` method of the same class.

```java
    public static void main(String[] args) {
```