

Don Bosco Institute of Technology, Kurla(W)
Department of Electronics and Tele-Communication Engineering
ECL304 - Skill Lab: C++ and Java Programming
Sem III
2021-22

Lab Number:	9
Student Name:	Raveena Rupesh Pitale
Roll No :	27

Title:

1. Write a java program to create an abstract class named Shape that contains two integers and an abstract method named printArea(). Provide three classes named Rectangle, Triangle and Circle such that each one of the classes extends the class Shape. Each one of the classes contain only the method printArea() that prints the area of the given shape.

Learning Objective:

Students will be able to implement abstract class and abstract method programs.

Learning Outcome:

- Understanding the abstraction concept and hiding of the unnecessary code.

Course Outcome:

ECL304.4	1. Implement different programming applications using packaging.
-----------------	--

Don Bosco Institute of Technology, Kurla(W)
Department of Electronics and Tele-Communication Engineering
ECL304 - Skill Lab: C++ and Java Programming
Sem III
2021-22

Theory:

- Explain in details about necessity of data hiding in any application / project.
 1. Data hiding ensures exclusive data access to class members and protects object integrity by preventing unintended or intended changes.
 2. Data hiding also reduces system complexity for increased robustness by limiting interdependencies between software components.
 3. Data hiding is also known as data encapsulation or information hiding.
 4. One advantage of data hiding is heightened security against hackers. Data hiding takes certain parts of code and hides those parts from the objects. The objects cannot directly access any data that is hidden.
 5. It is used as security such that no internal data will be accessed without authentication. An unauthorized end user will not get access to internal data. Programmatically we can implement data hiding by declaring data elements as private.
- Explain abstract class and abstract methods.
 1. **Abstract class:** is a restricted class that cannot be used to create objects (to access it, it must be inherited from another class).
 - Abstract classes can't be instantiated.
 - Other classes extend abstract classes.
 - Can have both abstract and concrete methods.
 - Similar to interfaces, but can Implement methods Fields can have various access modifiers Subclasses can only extend one abstract class.
 2. **Abstract method:** can only be used in an abstract class, and it does not have a body. The body is provided by the subclass (inherited from).
 - Abstract method bodies must be empty.
 - Sub-classes must implement the abstract class's abstract methods.
 - Has no definition in the class.
 - Has to be implemented in a derived class.

Algorithm :	<ol style="list-style-type: none">1.Start2.Create a abstract class - shape and declare necessary methods and attributes.3.Create a derived class of shape class - rectangle, circle , triangle and take input of dimensions and print its area4.Create the objects of derived classes in Main class and then call them to print the area.5.End
--------------------	--

Don Bosco Institute of Technology, Kurla(W)
Department of Electronics and Tele-Communication Engineering
ECL304 - Skill Lab: C++ and Java Programming
Sem III
2021-22

Program:

```
package com.company;
import java.util.*;

abstract class Shape {
    int length, breadth, base, height, radius;
    Scanner sc = new Scanner(System.in);

    abstract void printArea();
}

class Rectangle extends Shape {
    void printArea() {
        System.out.print("Enter length & breadth: ");
        length = sc.nextInt();
        breadth = sc.nextInt();
        System.out.println("Area of Rectangle is: " + length *
breadth);
    }
}

class Triangle extends Shape {
    void printArea() {
        System.out.print("Enter Base And Height: ");
        base = sc.nextInt();
        height = sc.nextInt();
        System.out.println("Area of Triangle is: " + ((base *
height) / 2));
    }
}

class Circle extends Shape {
    void printArea() {
        System.out.print("Enter Radius: ");
        radius = sc.nextInt();
        System.out.println("Area of Circle is: " + 3.14 *
radius * radius);
    }
}

public class Main {
    public static void main(String[] args) {
        Shape rec = new Rectangle();
        rec.printArea();

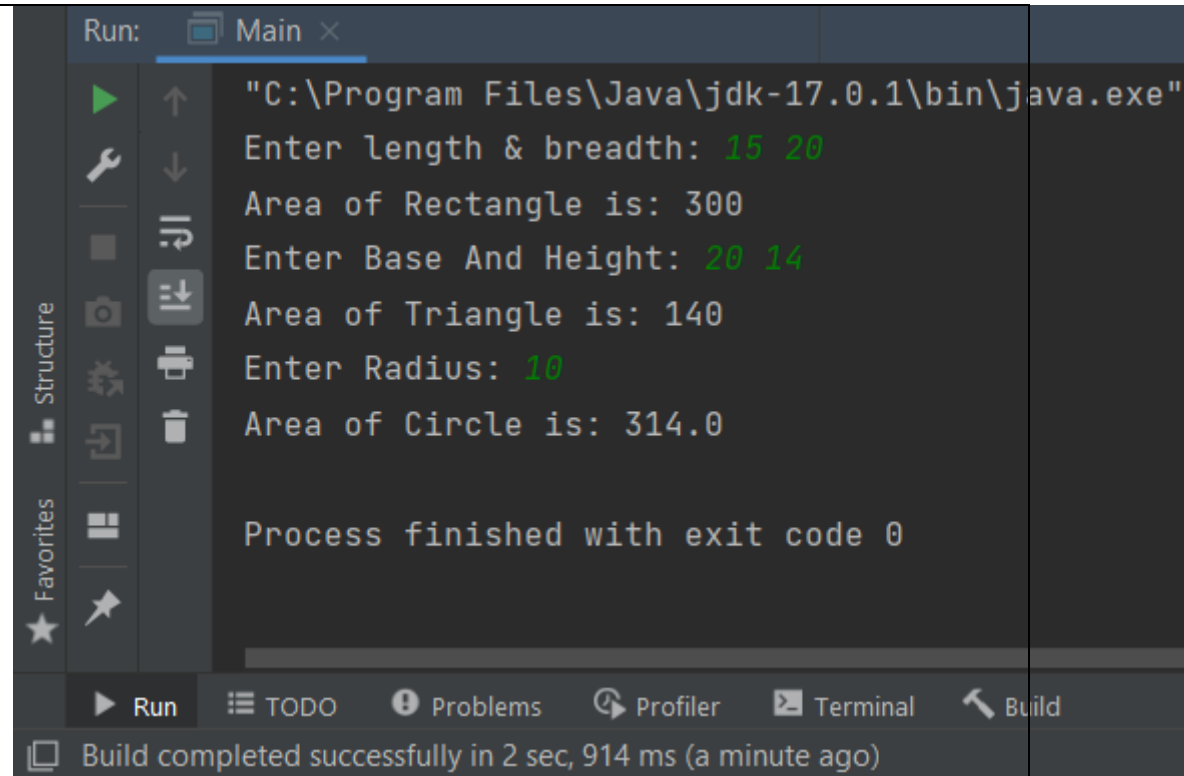
        Shape tri = new Triangle();
        tri.printArea();

        Shape cri = new Circle();
        cri.printArea();
    }
}
```

Faculty: Ms. Deepali Kayande

Don Bosco Institute of Technology, Kurla(W)
Department of Electronics and Tele-Communication Engineering
ECL304 - Skill Lab: C++ and Java Programming
Sem III
2021-22

**Output
Screenshot:**



```
Run: Main x
"C:\Program Files\Java\jdk-17.0.1\bin\java.exe"
Enter length & breadth: 15 20
Area of Rectangle is: 300
Enter Base And Height: 20 14
Area of Triangle is: 140
Enter Radius: 10
Area of Circle is: 314.0

Process finished with exit code 0

Run TODO Problems Profiler Terminal Build
Build completed successfully in 2 sec, 914 ms (a minute ago)
```

Faculty: Ms. Deepali Kayande