

## N.HARI PRASAD (LAB 6 ASSESSMENT)

1. Create a class called Person with attributes such as name and age. Derive a class called Student from Person that adds an attribute studentId. Write a program to demonstrate single inheritance by creating objects of both classes and displaying their attributes.

```
package hari;
public class Person {
    private String name;
    private age;
    // Constructor with arguments
    public Person (String n, int a)
    {
        name = n;
        age = a;
    }

    // Display method used for displaying name and
    age.
    public void display () {
        System.out.println("Name: " + name);
        System.out.println("Age: " + age);
    }
}

package hari;
public class student extends Person {
    private int studentId;
    // Constructor with arguments
    public student (String n, int a, int sid)
    {
        super (name, age);
        StudentId = sid;
    }

    // Display method (overrides the display method in
    Person class)

    public void display () {
        super.display();
        System.out.println("Student ID: " + studentId);
    }
}
```

```
}  
package hari;  
public class main {  
public static void main(String[] args) {  
    // Create a Person object  
    Person person = new Person("Hari", 23);  
  
    // Display Person attributes  
    System.out.println("Person Details:");  
    person.display();  
  
    // Create a Student object  
    student student = new student("Prasad", 22, 1999);  
  
    // Display Student attributes  
    System.out.println("\nStudent Details:");  
    student.display();  
}  
}
```

## OUTPUT:

```
Person Details:  
Name: Hari  
  
Age: 23  
  
Student Details:  
Name: prasad  
Age: 22  
Student ID: 1999
```

2. Design a class called Shape with methods to calculate the area and perimeter. Derive classes like Circle, Rectangle, and Triangle from Shape. Write a program to create objects of these classes and compute their areas and perimeters.

```
package hari;

public class Shape {
    public double calculateArea() {
        return 0.0;
    }
    public double calculatePerimeter() {
        return 0.0;
    }
}

package hari;

public class Circle extends Shape {
    private double radius;

    public Circle(double radius) {
        this.radius = radius;
    }
    public double calculateArea() {
        return Math.PI * Math.pow(radius, 2);
    }
    public double calculatePerimeter() {
        return 2 * Math.PI * radius;
    }
}
```

```
package hari;

public class Rectangle extends Shape {
    private double length;
    private double width;

    public Rectangle(double length, double width) {
        this.length = length;
        this.width = width;
    }
}
```

```

    public double calculateArea() {
    return length * width;
    }
    public double calculatePerimeter() {
    return 2 * (length + width);
    }
}

```

```

package hari;
    public class triangle extends Shape {
        private double sideA;
        private double sideB;
        private double sideC;

        public triangle(double sideA, double sideB,
double sideC) {
            this.sideA = sideA;
            this.sideB = sideB;
            this.sideC = sideC;
        }
        public double calculateArea() {
            // Using Heron's formula to calculate the
area of a triangle
            double s = (sideA + sideB + sideC) / 2;
            return Math.sqrt(s * (s - sideA) * (s -
sideB) * (s - sideC));
        }
        public double calculatePerimeter() {
            return sideA + sideB + sideC;
        }
    }

```

```

package hari;

public class Main1 {

    public static void main(String[] args) {
        Circle circle = new Circle(5);
        System.out.println("Circle Area: " +
circle.calculateArea());
    }
}

```

```
        System.out.println("Circle Perimeter: " +
circle.calculatePerimeter());

        Rectangle rectangle = new Rectangle(4, 6);
        System.out.println("Rectangle Area: " +
rectangle.calculateArea());
        System.out.println("Rectangle Perimeter: " +
rectangle.calculatePerimeter());

        triangle triangle = new triangle(3, 4, 5);
        System.out.println("Triangle Area: " +
triangle.calculateArea());
        System.out.println("Triangle Perimeter: " +
triangle.calculatePerimeter());
    }
}
```

### OUTPUT:

```
Circle Area: 78.53981633974483
Circle Perimeter: 31.41592653589793
Rectangle Area: 24.0
Rectangle Perimeter: 20.0
Triangle Area: 6.0
Triangle Perimeter: 12.0
```

3. Create a base class called **Animal** with a method named **sound ()**, which prints "Animal makes a sound." Derive classes **Cat** and **Dog** from **Animal**. Override the **sound ()** method in each derived class to print "Cat meows" and "Dog barks" respectively. Write a program to demonstrate method overriding by creating objects of the derived classes and calling the **sound ()** method.

```
package hari;
```

```
public class Animal {  
    public void sound() {  
        System.out.println("Animal makes a sound.");  
    }  
}
```

```
package hari;
```

```
public class Cat extends Animal {  
    public void sound() {  
        System.out.println("Cat meows.");  
    }  
}
```

```
package hari;
```

```
    public class Dog extends Animal {  
  
        public void sound() {  
            System.out.println("Dog barks.");  
        }  
    }
```

```
package hari;
```

```
public class main2 {  
  
    public static void main(String[] args) {  
        Animal animal = new Animal();  
        animal.sound();  
  
        Cat cat = new Cat();  
        cat.sound();  
    }  
}
```

```
        Dog dog = new Dog();  
        dog.sound();  
    }  
}
```

## OUTPUT:

```
Animal makes a sound.  
Cat meows.  
Dog barks.
```

4. Design a class called Shape with a method named calculate Area (). Derive classes such as Circle, Rectangle, and Triangle from Shape and override the calculate Area () method in each derived class to compute the area specific to that shape. Write a program to create objects of these classes and invoke the calculate Area () method to calculate and display their respective areas.

```
package hari;
```

```
public class Shape2 {
```

```
    public void calculateArea() {  
        System.out.println("Calculating area of the  
shape");  
    }  
}
```

```
package hari;
```

```
    public class Circle2 extends Shape {  
        private double radius;
```

```
        public Circle2(double radius)  
        {  
            this.radius = radius;  
        }  
        public double calculateArea()  
        {  
            return Math.PI * radius * radius;  
        }  
    }
```

```
package hari;
```

```
    public class Rectangle2 extends Shape {  
        private double length;  
        private double width;  
        private double height;
```

```
        public Rectangle2(double width, double  
height)  
        {  
            this.width = width;  
            this.height = height;
```



```

    }

    public double calculateArea()
    {
        return width * height;
    }
}

```

```

package hari;

public class Triangle2 extends Shape {
    private double base;
    private double height;

    public Triangle2(double base, double height)
    {
        this.base = base;
        this.height = height;
    }
    public double calculateArea()

    {
        double area = 0.5 * base * height;
        System.out.println("Area of the triangle: " +
area);
        return area;
    }
}

```

```

package hari;

public class Main3 {
    public static void main(String[] args) {
        Circle circle = new Circle(6.0);
        System.out.println("Circle Area: " +
circle.calculateArea());
        Rectangle2 rectangle2 = new Rectangle2(2.0, 4.0);
        System.out.println("Rectangle Area: " +
rectangle2.calculateArea());
        Triangle2 triangle2 = new Triangle2(3.0, 9.0);
        System.out.println("Triangle Area: " +
triangle2.calculateArea());
    }
}

```

## OUTPUT:

```
Circle Area: 113.09733552923255  
Rectangle Area: 8.0  
Area of the triangle: 13.5  
Triangle Area: 13.5
```