5. Develop a JAVA program to create a class named shape. Create three sub classes namely: circle, triangle and square, each class has two member functions named draw () and erase (). Demonstrate polymorphism concepts by developing suitable methods, defining member data and main program.

```
class Shape {
    protected String name;

    public Shape(String name) {
        this.name = name;
    }

    public void draw() {
        System.out.println("Drawing a " + name);
    }

    public void erase() {
        System.out.println("Erasing a " + name);
    }
}

class Circle extends Shape {
    private double radius;

    public Circle(String name, double radius) {
        super(name);
        this.radius = radius;
    }

    public void draw() {
        System.out.println("Drawing a circle with radius " + radius);
    }
```

```
    public void erase() {
        System.out.println("Erasing a circle with radius " + radius);
    }
}

class Triangle extends Shape {
    private double base;
    private double height;

    public Triangle(String name, double base, double height) {
        super(name);
        this.base = base;
        this.height = height;
    }

    public void draw() {
        System.out.println("Drawing a triangle with base " + base + " and height " + height);
    }

    public void erase() {
        System.out.println("Erasing a triangle with base " + base + " and height " + height);
    }
}

class Square extends Shape {
    private double side;

    public Square(String name, double side) {
        super(name);
        this.side = side;
```

```
    }

    public void draw() {
        System.out.println("Drawing a square with side length " + side);
    }

    public void erase() {
        System.out.println("Erasing a square with side length " + side);
    }
}

public class ShapeDemo {
    public static void main(String[] args) {
        Shape[] shapes = new Shape[3];
        shapes[0] = new Circle("Circle", 5.0);
        shapes[1] = new Triangle("Triangle", 4.0, 6.0);
        shapes[2] = new Square("Square", 3.0);

        for (Shape shape : shapes) {
            shape.draw();
            shape.erase();
            System.out.println();
        }
    }
}
```

6. Develop a JAVA program to create an abstract class Shape with abstract methods calculateArea() and calculatePerimeter(). Create subclasses Circle and Triangle that extend the Shape class and implement the respective methods to calculate the area and perimeter of each shape.

```
abstract class Shape {
    abstract double calculateArea();
    abstract double calculatePerimeter();
}

class Circle extends Shape {
    private double radius;

    public Circle(double radius) {
        this.radius = radius;
    }

     double calculateArea() {
        return Math.PI * radius * radius;
    }

   double calculatePerimeter() {
        return 2 * Math.PI * radius;
    }
}

class Triangle extends Shape {
    private double side1;
    private double side2;
    private double side3;

    public Triangle(double side1, double side2, double side3) {
```

```
        this.side1 = side1;
        this.side2 = side2;
        this.side3 = side3;
    }

    double calculateArea() {
        // Using Heron's formula to calculate the area of a triangle
        double s = (side1 + side2 + side3) / 2;
        return Math.sqrt(s * (s - side1) * (s - side2) * (s - side3));
    }

    double calculatePerimeter() {
        return side1 + side2 + side3;
    }
}

public class ShapeDemo {
    public static void main(String[] args) {
        // Creating Circle and Triangle objects
        Circle circle = new Circle(5.0);
        Triangle triangle = new Triangle(3.0, 4.0, 5.0);

        // Calculating and displaying area and perimeter
        System.out.println("Circle Area: " + circle.calculateArea());
        System.out.println("Circle Perimeter: " + circle.calculatePerimeter());

        System.out.println("\nTriangle Area: " + triangle.calculateArea());
        System.out.println("Triangle Perimeter: " + triangle.calculatePerimeter());
    }
}
```