

```
// Circle.java
package Assign5;

import java.util.*;

public class Circle extends Shape implements Volume {
    private double radius;

    @Override
    public double calculateShape() {
        return Math.PI * Math.pow(radius, 2);
    }

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

    @Override
    public double calculateVolume() {
        // Volume calculation for a 3D circle (sphere) is not included for
        // simplicity
        return 0;
    }

    // Function to get input from the user
    public void getInput() {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter the radius of the circle: ");
        this.radius = scanner.nextDouble();
    }
}
```

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public double calculatePerimeter() {
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// Function to get input from the user
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}
}

```

```

// Pyramid.java
package Assign5;
import java.util.Scanner;

public class Pyramid extends Shape implements Volume {
    private double baseLength;
    private double baseWidth;
    private double height;

    @Override
    public double calculateShape() {
        // Surface area of a pyramid
        return baseLength * baseWidth + 0.5 * baseLength *
Math.sqrt(Math.pow(baseWidth / 2, 2) + Math.pow(height, 2))
        + 0.5 * baseWidth * Math.sqrt(Math.pow(baseLength / 2, 2) +
Math.pow(height, 2));
    }

    @Override
    public double calculatePerimeter() {
        // Perimeter calculation for a 3D shape is not applicable
        return 0;
    }

    @Override

```

```
public double calculateVolume() {
    return (1.0 / 3.0) * baseLength * baseWidth * height;
}

// Function to get input from the user
public void getInput() {
    Scanner scanner = new Scanner(System.in);
    System.out.print("Enter the base length of the pyramid: ");
    this.baseLength = scanner.nextDouble();
    System.out.print("Enter the base width of the pyramid: ");
    this.baseWidth = scanner.nextDouble();
    System.out.print("Enter the height of the pyramid: ");
    this.height = scanner.nextDouble();
}
}
```

```
// Rectangle.java
package Assign5;
import java.util.Scanner;

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

    @Override
    public double calculateShape() {
        return length * width;
    }

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

    // Function to get input from the user
    public void getInput() {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter the length of the rectangle: ");
        this.length = scanner.nextDouble();
        System.out.print("Enter the width of the rectangle: ");
        this.width = scanner.nextDouble();
    }
}
```

```
// Shape.java
package Assign5;
public abstract class Shape {
    // Non-abstract method
    public void showShape(String shape) {
        System.out.println("Selected shape: " + shape);
    }

    // Abstract methods to be implemented by subclasses
    public abstract double calculateShape();
    public abstract double calculatePerimeter();
}
```

```
/*
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 * AIML-B2
 * 2022-26
 * 22070126117
 */
// Main.java
package Assign5;
import java.util.Scanner;

public class Main {
    // Main function
    public static void main(String[] args) {
        // Add your name, PRN, and Batch details in comments here

        Scanner scanner = new Scanner(System.in);

        // Menu-driven program
        while (true) {
            System.out.println("\nSelect a shape:");
            System.out.println("1. Circle");
            System.out.println("2. Rectangle");
            System.out.println("3. Square");
            System.out.println("4. Sphere");
            System.out.println("5. Cylinder");
            System.out.println("6. Pyramid");
            System.out.println("0. Exit");

            int choice = scanner.nextInt();
```

```

        switch (choice) {
            case 1:
                calculateCircleAreaAndPerimeter();
                break;
            case 2:
                calculateRectangleAreaAndPerimeter();
                break;
            case 3:
                calculateSquareAreaAndPerimeter();
                break;
            case 4:
                calculateSphereAreaAndVolume();
                break;
            case 5:
                calculateCylinderAreaAndVolume();
                break;
            case 6:
                calculatePyramidAreaAndVolume();
                break;
            case 0:
                System.out.println("Ending program... So long comrade!");
                System.exit(0);
            default:
                System.out.println("Invalid choice. Please try again.");
        }
    }
}

// Function to calculate the area and perimeter of a circle
private static void calculateCircleAreaAndPerimeter() {
    Circle circle = new Circle();
    circle.showShape("Circle");
    circle.getInput();

    double area = circle.calculateShape();
    double perimeter = circle.calculatePerimeter();

    System.out.println("Area: " + area);
    System.out.println("Perimeter: " + perimeter);
}

// Function to calculate the area and perimeter of a rectangle
private static void calculateRectangleAreaAndPerimeter() {
    Rectangle rectangle = new Rectangle();
    rectangle.showShape("Rectangle");
    rectangle.getInput();
}

```

```
        double area = rectangle.calculateShape();
        double perimeter = rectangle.calculatePerimeter();

        System.out.println("Area: " + area);
        System.out.println("Perimeter: " + perimeter);
    }

    // Function to calculate the area and perimeter of a square
    private static void calculateSquareAreaAndPerimeter() {
        Square square = new Square();
        square.showShape("Square");
        square.getInput();

        double area = square.calculateShape();
        double perimeter = square.calculatePerimeter();

        System.out.println("Area: " + area);
        System.out.println("Perimeter: " + perimeter);
    }

    // Function to calculate the area and volume of a sphere
    private static void calculateSphereAreaAndVolume() {
        Sphere sphere = new Sphere();
        sphere.showShape("Sphere");
        sphere.getInput();

        double area = sphere.calculateShape();
        double volume = sphere.calculateVolume();

        System.out.println("Surface Area: " + area);
        System.out.println("Volume: " + volume);
    }

    // Function to calculate the area and volume of a cylinder
    private static void calculateCylinderAreaAndVolume() {
        Cylinder cylinder = new Cylinder();
        cylinder.showShape("Cylinder");
        cylinder.getInput();

        double area = cylinder.calculateShape();
        double volume = cylinder.calculateVolume();

        System.out.println("Surface Area: " + area);
        System.out.println("Volume: " + volume);
    }

    // Function to calculate the area and volume of a pyramid
    private static void calculatePyramidAreaAndVolume() {
```

Suyash Tambe Assignment 5

```
Pyramid pyramid = new Pyramid();
pyramid.showShape("Pyramid");
pyramid.getInput();

double area = pyramid.calculateShape();
double volume = pyramid.calculateVolume();

System.out.println("Surface Area: " + area);
System.out.println("Volume: " + volume);
}
}
```

Output:

```
Select a shape:
1. Circle
2. Rectangle
3. Square
4. Sphere
5. Cylinder
6. Pyramid
0. Exit
1
Selected shape: Circle
Enter the radius of the circle: 6
Area: 113.09733552923255
Perimeter: 37.69911184307752

Select a shape:
1. Circle
2. Rectangle
3. Square
4. Sphere
5. Cylinder
6. Pyramid
0. Exit
3
Selected shape: Square
Enter the side length of the square: 10
Area: 100.0
Perimeter: 40.0
```