

```
1  /**
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4   * AIML B2
5   */
6
7  package assignment5;
8
9  import java.util.Scanner;
10
11 public class Main {
12     public static void main(String[] args) {
13         Scanner scanner = new Scanner(System.in);
14         ShapeCalculator shapeCalculator = new
15         ShapeCalculator();
16         while (true) {
17             System.out.println("Menu:");
18             System.out.println("1. Calculate Area");
19             System.out.println("2. Calculate Volume"
20 );
21             System.out.println("3. Exit");
22             System.out.print("Enter your choice: ");
23             int choice = scanner.nextInt();
24             switch (choice) {
25                 case 1:
26                     shapeCalculator.calculateArea();
27                     break;
28                 case 2:
29                     shapeCalculator.calculateVolume
30 ();
31                     break;
32                 case 3:
33                     System.out.println("Exiting...");
34                     System.exit(0);
35                 default:
36                     System.out.println("Invalid
37 choice. Please try again.");
38             }
39         }
40     }
41 }
```

```
38     }  
39 }  
40  
41  
42  
43
```

```
1 package assignment5;
2 public abstract class Shape {
3     public abstract double area();
4
5     public abstract double perimeter();
6
7     public abstract void calculateArea();
8     public abstract void calculatePerimeter();
9     public void showShape(String shape) {
10         System.out.println("Shape: " + shape);
11     }
12 }
13
14
```

```
1 package assignment5;
2
3 import java.util.Scanner;
4
5 public class Circle extends Shape {
6     private double radius;
7
8     @Override
9     public double area() {
10         return 0;
11     }
12
13     @Override
14     public double perimeter() {
15         return 0;
16     }
17
18     @Override
19     public void calculateArea() {
20         Scanner scanner = new Scanner(System.in);
21         System.out.print("Enter radius of the circle
22 : ");
23         radius = scanner.nextDouble();
24         double area = Math.PI * radius * radius;
25         System.out.println("Area of the circle: " +
26 area);
27     }
28
29     @Override
30     public void calculatePerimeter() {
31         // Not implemented for a circle
32     }
33 }
```

```
1 package assignment5;
2
3 import java.util.Scanner;
4
5 public class Sphere extends Shape implements Volume {
6     private double radius;
7
8     @Override
9     public double area() {
10         return 0;
11     }
12
13     @Override
14     public double perimeter() {
15         return 0;
16     }
17
18     @Override
19     public void calculateArea() {
20         Scanner scanner = new Scanner(System.in);
21         System.out.print("Enter radius of the sphere
22 : ");
23         radius = scanner.nextDouble();
24         double area = 4 * Math.PI * radius * radius;
25         System.out.println("Surface area of the
26 sphere: " + area);
27     }
28
29     @Override
30     public void calculatePerimeter() {
31         // Not implemented for a sphere
32     }
33
34     @Override
35     public void calculateVolume() {
36         double volume = (4.0 / 3.0) * Math.PI * Math.
37         pow(radius, 3);
38         System.out.println("Volume of the sphere: "
39 + volume);
40     }
41 }
```

38

39

```
1 package assignment5;
2
3 import java.util.Scanner;
4
5 public class Square extends Shape {
6     private double side;
7
8     @Override
9     public double area() {
10         return 0;
11     }
12
13     @Override
14     public double perimeter() {
15         return 0;
16     }
17
18     @Override
19     public void calculateArea() {
20         Scanner scanner = new Scanner(System.in);
21         System.out.print("Enter side length of the
square: ");
22         side = scanner.nextDouble();
23         double area = side * side;
24         System.out.println("Area of the square: " +
area);
25     }
26
27     @Override
28     public void calculatePerimeter() {
29         double perimeter = 4 * side;
30         System.out.println("Perimeter of the square
: " + perimeter);
31     }
32 }
33
34
```

```
1 package assignment5;  
2  
3 public interface Volume {  
4     void calculateVolume();  
5 }  
6  
7
```



```
1 package assignment5;
2
3 import java.util.Scanner;
4
5 public class Pyramid extends Shape implements Volume
6 {
7     private double baseLength;
8     private double baseWidth;
9     private double height;
10
11     @Override
12     public void calculateArea() {
13         Scanner scanner = new Scanner(System.in);
14         System.out.print("Enter base length of the
15         pyramid: ");
16         baseLength = scanner.nextDouble();
17         System.out.print("Enter base width of the
18         pyramid: ");
19         baseWidth = scanner.nextDouble();
20         System.out.print("Enter height of the pyramid
21         : ");
22         height = scanner.nextDouble();
23
24         double baseArea = baseLength * baseWidth;
25         double lateralArea = baseLength * Math.sqrt(
26             Math.pow(baseWidth / 2, 2) + Math.pow(height, 2)) +
27             baseWidth * Math.sqrt(Math.pow(
28             baseLength / 2, 2) + Math.pow(height, 2));
29         double surfaceArea = baseArea + lateralArea;
30         System.out.println("Surface area of the
31         pyramid: " + surfaceArea);
32     }
33
34     @Override
35     public void calculatePerimeter() {
36         // Not implemented for a pyramid
37     }
38
39     @Override
40     public void calculateVolume() {
41         double volume = (1.0 / 3.0) * baseLength *
```

```
34 baseWidth * height;
35         System.out.println("Volume of the pyramid: "
    + volume);
36     }
37
38     @Override
39     public double area() {
40         return 0;
41     }
42
43     @Override
44     public double perimeter() {
45         return 0; // Since a pyramid doesn't have a
    traditional perimeter, return 0
46     }
47 }
48
49
```

```
1 package assignment5;
2
3 import java.util.Scanner;
4
5 public class Cylinder extends Shape implements Volume
6 {
7     private double radius;
8     private double height;
9
10    @Override
11    public double area() {
12        return 0;
13    }
14
15    @Override
16    public double perimeter() {
17        return 0;
18    }
19
20    @Override
21    public void calculateArea() {
22        Scanner scanner = new Scanner(System.in);
23        System.out.print("Enter radius of the
24        cylinder: ");
25        radius = scanner.nextDouble();
26        System.out.print("Enter height of the
27        cylinder: ");
28        height = scanner.nextDouble();
29
30        double surfaceArea = 2 * Math.PI * radius * (
31        radius + height);
32        System.out.println("Surface area of the
33        cylinder: " + surfaceArea);
34    }
35
36    @Override
37    public void calculatePerimeter() {
38        // Not implemented for a cylinder
39    }
40
41    @Override
42    public void calculateVolume() {
43        // Not implemented for a cylinder
44    }
45}
```

```
37     public void calculateVolume() {  
38         double volume = Math.PI * radius * radius *  
    height;  
39         System.out.println("Volume of the cylinder: "  
        + volume);  
40     }  
41 }  
42  
43  
44
```

```
1 package assignment5;
2
3 public class Triangle extends Shape {
4     double base, side1, side2, height;
5     public Triangle(double base, double side1, double
        side2,
6         double height) {
7         super();
8         this.base = base;
9         this.height = height;
10        this.side1 = side1;
11        this.side2 = side2;
12    }
13    @Override
14    public double area() {
15 // TODO Auto-generated method stub
16        return (0.5 * base * height);
17    }
18    @Override
19    public double perimeter() {
20 // TODO Auto-generated method stub
21        return (base + side1 + side2);
22    }
23
24    @Override
25    public void calculateArea() {
26
27    }
28
29    @Override
30    public void calculatePerimeter() {
31
32    }
33 }
34
```

```
1 package assignment5;
2
3 import java.util.Scanner;
4
5 public class Rectangle extends Shape {
6     private double length;
7     private double width;
8
9     @Override
10    public double area() {
11        return 0;
12    }
13
14    @Override
15    public double perimeter() {
16        return 0;
17    }
18
19    @Override
20    public void calculateArea() {
21        Scanner scanner = new Scanner(System.in);
22        System.out.print("Enter length of the
rectangle: ");
23        length = scanner.nextDouble();
24        System.out.print("Enter width of the
rectangle: ");
25        width = scanner.nextDouble();
26        double area = length * width;
27        System.out.println("Area of the rectangle: "
+ area);
28    }
29
30    @Override
31    public void calculatePerimeter() {
32        // Not implemented for a rectangle
33    }
34 }
35
```

```
1 package assignment5;
2
3 import java.util.Scanner;
4
5 public class ShapeCalculator {
6     private Scanner scanner;
7
8     public ShapeCalculator() {
9         scanner = new Scanner(System.in);
10    }
11
12    public void calculateArea() {
13        System.out.println("Choose a shape:");
14        System.out.println("1. Circle");
15        System.out.println("2. Rectangle");
16        System.out.println("3. Square");
17        System.out.println("4. Sphere");
18        System.out.println("5. Cylinder");
19        System.out.println("6. Pyramid");
20
21        System.out.print("Enter your choice: ");
22        int choice = scanner.nextInt();
23
24        Shape shape = null;
25
26        switch (choice) {
27            case 1:
28                shape = new Circle();
29                break;
30            case 2:
31                shape = new Rectangle();
32                break;
33            case 3:
34                shape = new Square();
35                break;
36            case 4:
37                shape = new Sphere();
38                break;
39            case 5:
40                shape = new Cylinder();
41            break;
```

```
42         case 6:
43             shape = new Pyramid();
44             break;
45         default:
46             System.out.println("Invalid choice."
47     );
48         return;
49     }
50     shape.calculateArea();
51     shape.calculatePerimeter();
52 }
53
54 public void calculateVolume() {
55     System.out.println("Choose a shape:");
56     System.out.println("1. Sphere");
57     System.out.println("2. Cylinder");
58     System.out.println("3. Pyramid");
59
60     System.out.print("Enter your choice: ");
61     int choice = scanner.nextInt();
62
63     Volume volumeShape = null;
64
65     switch (choice) {
66         case 1:
67             volumeShape = new Sphere();
68             break;
69         case 2:
70             volumeShape = new Cylinder();
71             break;
72         case 3:
73             volumeShape = new Pyramid();
74             break;
75         default:
76             System.out.println("Invalid choice."
77     );
78         return;
79     }
80     volumeShape.calculateVolume();
```



```
81     }  
82 }  
83  
84
```