Main.java

```java
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// Batch: AIML 2023-27
// Github : https://github.com/mvrck-dev/Java-Lab/tree/main/Assignments/Assignment%204

import java.util.Scanner;
public class Main {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        boolean exit = false;

        while (!exit) {
            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. Equilateral Pyramid");
            System.out.println("7. Exit");
            System.out.print("Enter your choice: ");

            int choice = scanner.nextInt();
            Shape shape = null;
            Volume volumeShape = null;

            switch (choice) {
                case 1:
                    System.out.print("Enter radius of the circle: ");
                    double radius = scanner.nextDouble();
                    shape = new Circle(radius);
                    break;

                case 2:
                    System.out.print("Enter length and width of the rectangle: ");
                    double length = scanner.nextDouble();
                    double width = scanner.nextDouble();
                    shape = new Rectangle(length, width);
                    break;

                case 3:
                    System.out.print("Enter side of the square: ");
                    double side = scanner.nextDouble();
                    shape = new Square(side);
                    break;

                case 4:
                    System.out.print("Enter radius of the sphere: ");
                    double sphereRadius = scanner.nextDouble();
                    volumeShape = new Sphere(sphereRadius);
                    break;
```

```
52
53                 case 5:
54                     System.out.print("Enter radius and height of the cylinder: ");
55                     double cylRadius = scanner.nextDouble();
56                     double height = scanner.nextDouble();
57                     volumeShape = new Cylinder(cylRadius, height);
58                     break;
59
60                 case 6:
61                     System.out.print("Enter base side and height of the equilateral
   pyramid: ");
62                     double baseSide = scanner.nextDouble();
63                     double pyrHeight = scanner.nextDouble();
64                     volumeShape = new EquilateralPyramid(baseSide, pyrHeight);
65                     break;
66
67                 case 7:
68                     exit = true;
69                     break;
70
71                 default:
72                     System.out.println("Invalid choice! Try again.");
73                     continue;
74             }
75
76             if (shape != null) {
77                 shape.displayShape();
78                 System.out.println("Area: " + shape.calculateArea());
79                 System.out.println("Perimeter: " + shape.calculatePerimeter());
80             }
81
82             if (volumeShape != null) {
83                 System.out.println("Volume: " + volumeShape.calculateVolume());
84             }
85         }
86         scanner.close();
87     }
88 }
89
```

Rectangle.java

```java
public class Rectangle extends Shape {
    private double length, width;

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

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

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

```

Shape.java

```java
public abstract class Shape {
    protected String shapeName;

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

    public abstract double calculateArea();
    public abstract double calculatePerimeter();

    public void displayShape() {
        System.out.println("\nShape Selected: " + shapeName);
    }
}

```

Sphere.java

```java
public class Sphere extends Shape implements Volume {
    private double radius;

    public Sphere(double radius) {
        super("Sphere");
        this.radius = radius;
    }

    @Override
    public double calculateArea() {
        return 4 * Math.PI * radius * radius;
    }

    @Override
    public double calculatePerimeter() {
        return 0; // Perimeter is not applicable for Sphere
    }

    @Override
    public double calculateVolume() {
        return (4.0 / 3.0) * Math.PI * Math.pow(radius, 3);
    }
}

```

Square.java

```java
public class Square extends Shape {
    private double side;

    public Square(double side) {
        super("Square");
        this.side = side;
    }

    @Override
    public double calculateArea() {
        return side * side;
    }

    @Override
    public double calculatePerimeter() {
        return 4 * side;
    }
}

```

Volume.java

```java
public interface Volume {
    double calculateVolume();
}

```

Circle.java

```java
import java.util.Scanner;
public class Circle extends Shape {
    private double radius;

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

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

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

```

Cylinder.java

```java
public class Cylinder extends Shape implements Volume {
    private double radius, height;

    public Cylinder(double radius, double height) {
        super("Cylinder");
        this.radius = radius;
        this.height = height;
    }

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

    @Override
    public double calculatePerimeter() {
        return 0; // Perimeter is not applicable for Cylinder
    }

    @Override
    public double calculateVolume() {
        return Math.PI * radius * radius * height;
    }
}

```

EquilateralPyramid.java

```java
public class EquilateralPyramid extends Shape implements Volume {
    private double baseSide, height;

    public EquilateralPyramid(double baseSide, double height) {
        super("Equilateral Pyramid");
        this.baseSide = baseSide;
        this.height = height;
    }

    @Override
    public double calculateArea() {
        double baseArea = baseSide * baseSide;
        double slantHeight = Math.sqrt((baseSide / 2) * (baseSide / 2) + height * height);
        double lateralArea = 2 * baseSide * slantHeight;
        return baseArea + lateralArea;
    }

    @Override
    public double calculatePerimeter() {
        return 4 * baseSide;
    }

    @Override
    public double calculateVolume() {
        return (1.0 / 3.0) * baseSide * baseSide * height;
    }
}

```

```
Select a Shape:
1. Circle
2. Rectangle
3. Square
4. Sphere
5. Cylinder
6. Equilateral Pyramid
7. Exit
Enter your choice: 5
Enter radius and height of the cylinder: 23 67
Volume: 111347.46842118303

Select a Shape:
1. Circle
2. Rectangle
3. Square
4. Sphere
5. Cylinder
6. Equilateral Pyramid
7. Exit
Enter your choice: 6
Enter base side and height of the equilateral pyramid: 40 50 70
Volume: 26666.666666666664

Select a Shape:
1. Circle
2. Rectangle
3. Square
4. Sphere
5. Cylinder
6. Equilateral Pyramid
7. Exit
Enter your choice: Invalid choice! Try again.

Select a Shape:
1. Circle
2. Rectangle
3. Square
4. Sphere
5. Cylinder
6. Equilateral Pyramid
7. Exit
Enter your choice: 7
```

```
Select a Shape:
1. Circle
2. Rectangle
3. Square
4. Sphere
5. Cylinder
6. Equilateral Pyramid
7. Exit
Enter your choice: 1
Enter radius of the circle: 4

Shape Selected: Circle
Area: 50.26548245743669
Perimeter: 25.132741228718345

Select a Shape:
1. Circle
2. Rectangle
3. Square
4. Sphere
5. Cylinder
6. Equilateral Pyramid
7. Exit
Enter your choice: 2
Enter length and width of the rectangle: 23 23

Shape Selected: Rectangle
Area: 529.0
Perimeter: 92.0

Select a Shape:
1. Circle
2. Rectangle
3. Square
4. Sphere
5. Cylinder
6. Equilateral Pyramid
7. Exit
Enter your choice: 3
Enter side of the square: 4

Shape Selected: Square
Area: 16.0
Perimeter: 16.0

Select a Shape:
1. Circle
2. Rectangle
3. Square
4. Sphere
5. Cylinder
6. Equilateral Pyramid
7. Exit
Enter your choice: 4
Enter radius of the sphere: 4
Volume: 268.082573106329
```