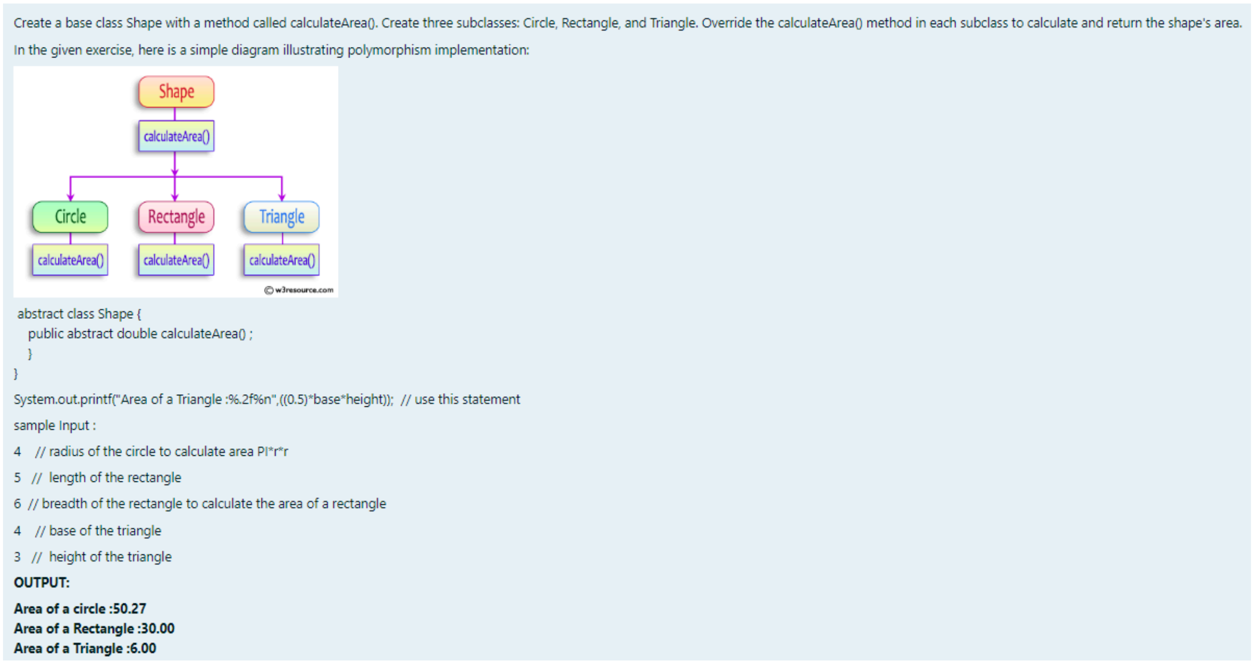
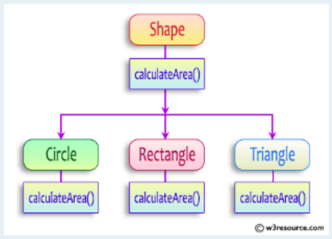
LAB-08-LOGIC BUILDING



Create a base class Shape with a method called calculateArea(). Create three subclasses: Circle, Rectangle, and Triangle. Override the calculateArea() method in each subclass to calculate and return the shape's area.

In the given exercise, here is a simple diagram illustrating polymorphism implementation:



```
 abstract class Shape {
   public abstract double calculateArea() ;
   }
}
System.out.printf("Area of a Triangle :%.2f%n",((0.5)*base*height));  // use this statement
```

sample Input :

```
4   // radius of the circle to calculate area PI*r*r
5  //  length of the rectangle
6  // breadth of the rectangle to calculate the area of a rectangle
4   // base of the triangle
3  //  height of the triangle
```

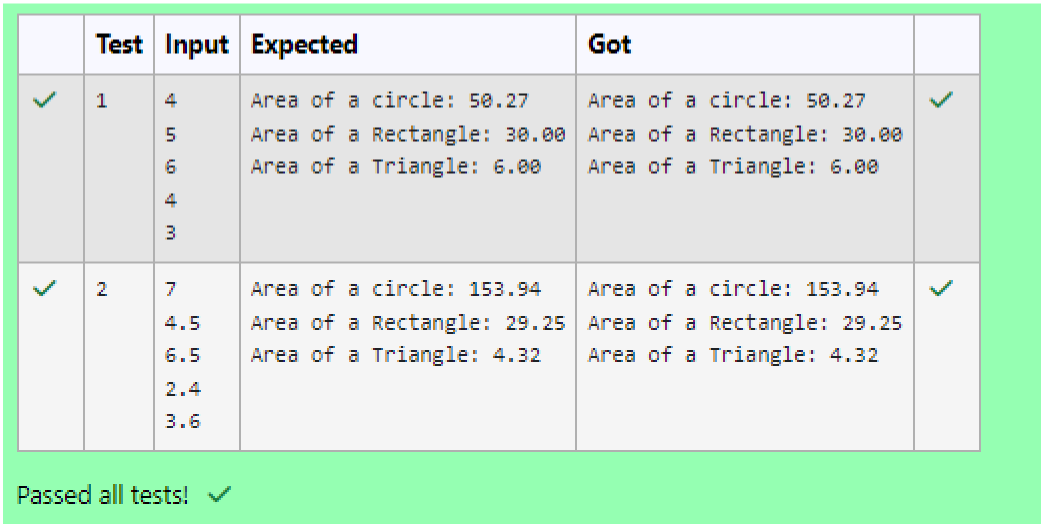
OUTPUT:

```
Area of a circle :50.27
Area of a Rectangle :30.00
Area of a Triangle :6.00
```

CODE:

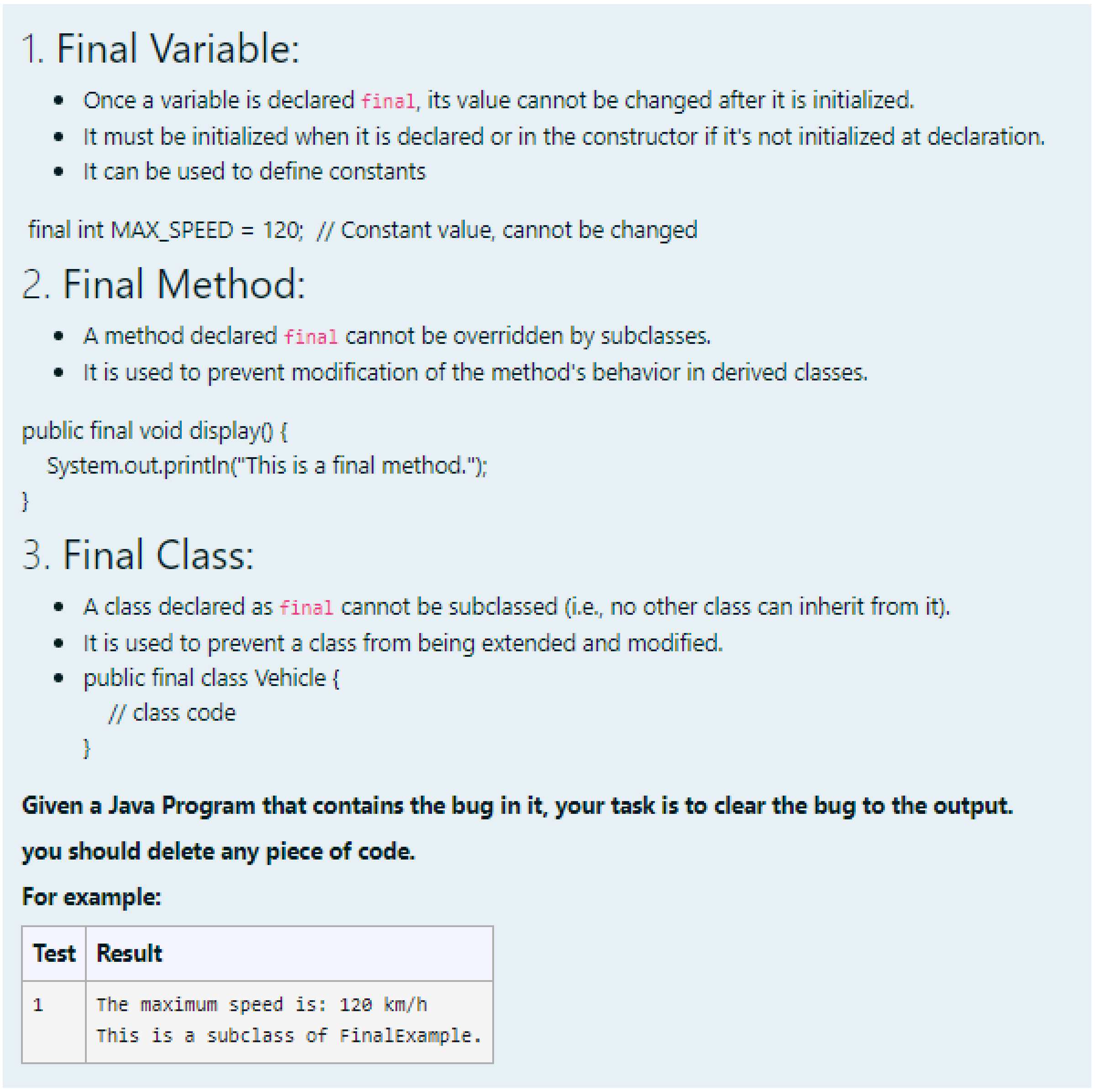
```
import java.util.Scanner;

abstract class Shape {
    public abstract double calculateArea();
}

class Circle extends Shape {
    double radius;

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

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

class Rectangle extends Shape {
    double length, breadth;
    Rectangle(double length, double breadth) {
        this.length = length;
        this.breadth = breadth;
    }

    public double calculateArea() {
        return length * breadth;
    }
}

class Triangle extends Shape {
    double base, height;

    Triangle(double base, double height) {
        this.base = base;
        this.height = height;
    }

    public double calculateArea() {
        return 0.5 * base * height;
    }
}

public class Main {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);

        double radius = scanner.nextDouble();
        double length = scanner.nextDouble();
        double breadth = scanner.nextDouble();
        double base = scanner.nextDouble();
        double height = scanner.nextDouble();

        Circle circle = new Circle(radius);
        Rectangle rectangle = new Rectangle(length, breadth);
        Triangle triangle = new Triangle(base, height);

        System.out.printf("Area of a circle: %.2f%n", circle.calculateArea());
        System.out.printf("Area of a Rectangle: %.2f%n", rectangle.calculateArea());
        System.out.printf("Area of a Triangle: %.2f%n", triangle.calculateArea());

        scanner.close();
    }
}
```

OUTPUT:



	Test	Input	Expected	Got	
✓	1	4 5 6 4 3	Area of a circle: 50.27 Area of a Rectangle: 30.00 Area of a Triangle: 6.00	Area of a circle: 50.27 Area of a Rectangle: 30.00 Area of a Triangle: 6.00	✓
✓	2	7 4.5 6.5 2.4 3.6	Area of a circle: 153.94 Area of a Rectangle: 29.25 Area of a Triangle: 4.32	Area of a circle: 153.94 Area of a Rectangle: 29.25 Area of a Triangle: 4.32	✓

Passed all tests! ✓



1. Final Variable:

- Once a variable is declared `final`, its value cannot be changed after it is initialized.
- It must be initialized when it is declared or in the constructor if it's not initialized at declaration.
- It can be used to define constants

```
final int MAX_SPEED = 120;  // Constant value, cannot be changed
```

2. Final Method:

- A method declared `final` cannot be overridden by subclasses.
- It is used to prevent modification of the method's behavior in derived classes.

```
public final void display() {
    System.out.println("This is a final method.");
}
```

3. Final Class:

- A class declared as `final` cannot be subclassed (i.e., no other class can inherit from it).
- It is used to prevent a class from being extended and modified.
- public final class Vehicle {
      // class code
  }

Given a Java Program that contains the bug in it, your task is to clear the bug to the output.

you should delete any piece of code.

For example:

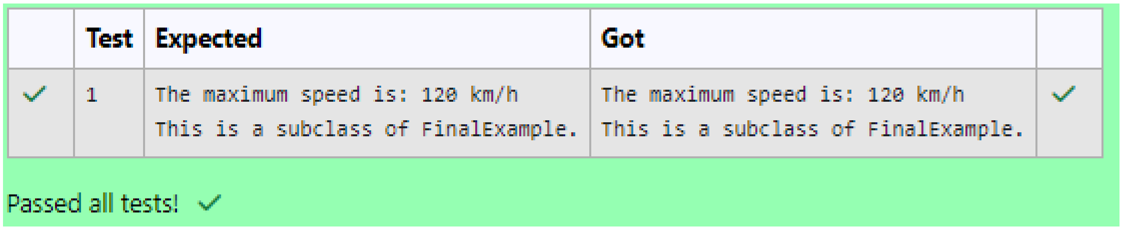
Test	Result
1	The maximum speed is: 120 km/h This is a subclass of FinalExample.

CODE:

```
class FinalExample {
 // Final variable
 final int maxSpeed = 120;
 // Final method
 public void displayMaxSpeed() {
 System.out.println("The maximum speed is: " + maxSpeed + " km/h");
 }
}
class SubClass extends FinalExample {
 public void displayMaxSpeed() {
```

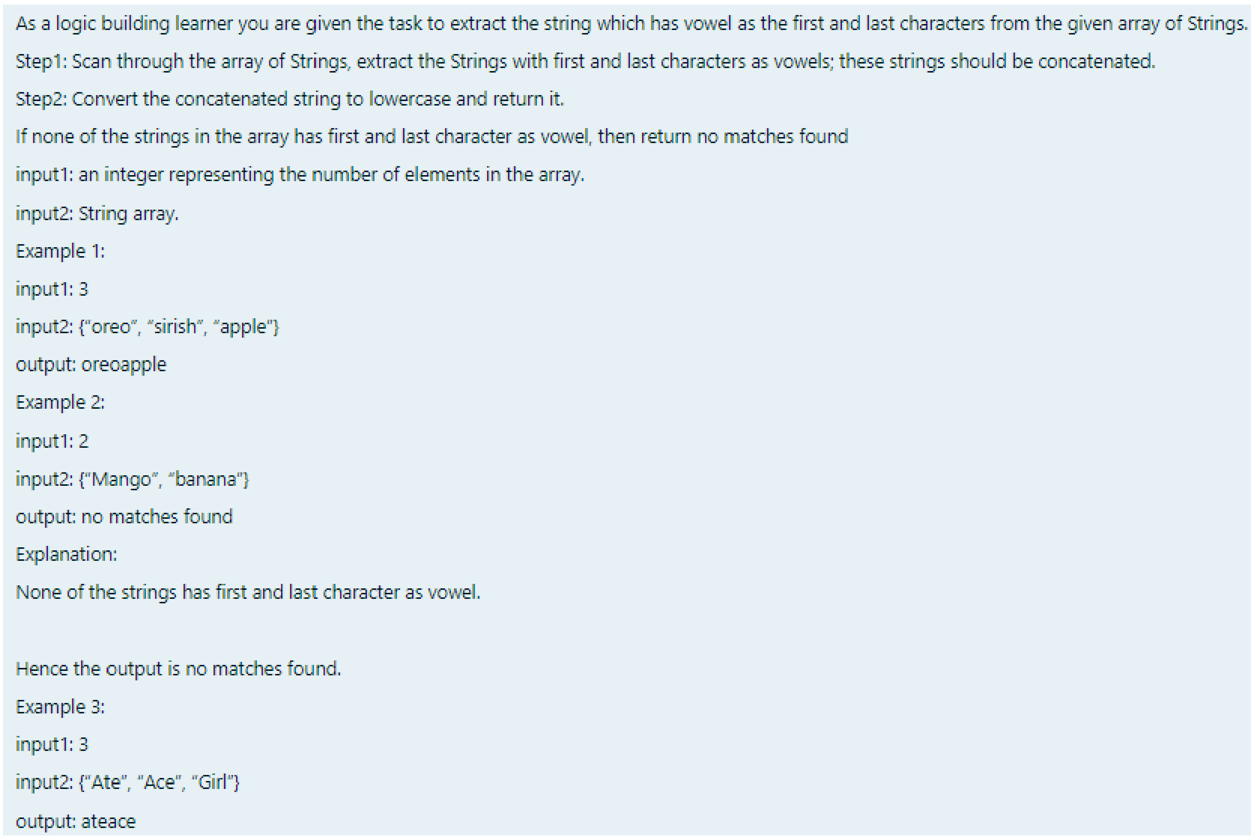
```
 System.out.println("Cannot override a final method");
 }
 // You can create new methods here
 public void showDetails() {
 System.out.println("This is a subclass of FinalExample.");
 }
}
class prog {
 public static void main(String[] args) {
 FinalExample obj = new FinalExample();
 obj.displayMaxSpeed();
 SubClass subObj = new SubClass();
 subObj.showDetails();
 }
}
```

OUTPUT:



	Test	Expected	Got	
✓	1	The maximum speed is: 120 km/h This is a subclass of FinalExample.	The maximum speed is: 120 km/h This is a subclass of FinalExample.	✓

Passed all tests! ✓



As a logic building learner you are given the task to extract the string which has vowel as the first and last characters from the given array of Strings.

Step1: Scan through the array of Strings, extract the Strings with first and last characters as vowels; these strings should be concatenated.

Step2: Convert the concatenated string to lowercase and return it.

If none of the strings in the array has first and last character as vowel, then return no matches found

input1: an integer representing the number of elements in the array.

input2: String array.

Example 1:

input1: 3

input2: {"oreo", "sirish", "apple"}

output: oreoapple

Example 2:

input1: 2

input2: {"Mango", "banana"}

output: no matches found

Explanation:

None of the strings has first and last character as vowel.

Hence the output is no matches found.

Example 3:

input1: 3

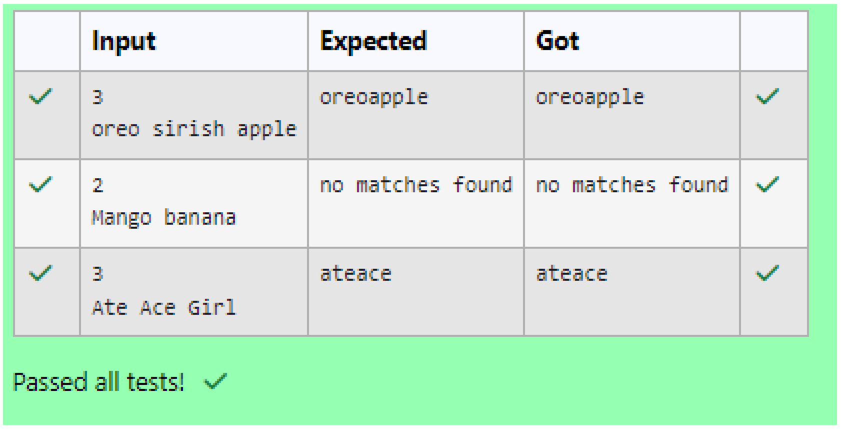
input2: {"Ate", "Ace", "Girl"}

output: ateace

CODE:

```
import java.util.Scanner;

public class Main {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);

        int n = sc.nextInt();
        String[] arr = new String[n];
        for (int i = 0; i < n; i++) {
            arr[i] = sc.next();
        }

        String vowels = "aeiouAEIOU";
        String result = "";
        for (String s : arr) {
            if (vowels.indexOf(s.charAt(0)) != -1 && vowels.indexOf(s.charAt(s.length() - 1)) !=
-1) {
                result += s;
            }
        }

        if (result.isEmpty()) {
            System.out.println("no matches found");
        } else {
            System.out.println(result.toLowerCase());
        }
    }
}
```

OUTPUT:



	Input	Expected	Got	
✓	3 oreo sirish apple	oreoapple	oreoapple	✓
✓	2 Mango banana	no matches found	no matches found	✓
✓	3 Ate Ace Girl	ateace	ateace	✓

Passed all tests! ✓