Parent class: -

Shape. Java: -

package geometry;

public class Shape {

public void displayArea() {

System.out.println("This shape does not have a specific area calculation method.");

}

}

Circle. Java: -

package geometry;

public class Circle extends Shape{

private double radius;

public Circle(double radius) {

this.radius = radius;

}

@Override

public void displayArea() {

System.out.println("Area of the Circle: " + calculateArea());

}

public double calculateArea() {

return Math.PI \* radius \* radius;

}

}

Rectangle. Java: -

package geometry;

public class Rectangle extends Shape {

private double length;

private double width;

public Rectangle(double length, double width) {

this.length = length;

this.width = width;

}

@Override

public void displayArea() {

System.out.println("Area of the Rectangle: " + calculateArea());

}

public double calculateArea() {

return length \* width;

}

}

Triangle. Java: -

package geometry;

public class Triangle extends Shape {

private double base;

private double height;

public Triangle(double base, double height) {

this.base = base;

this.height = height;

}

@Override

public void displayArea() {

System.out.println("Area of the Triangle: " + calculateArea());

}

public double calculateArea() {

return 0.5 \* base \* height;

}

}

Child class: -

GeometryApp. Java: -

package geometry;

import geometry.Circle;

import geometry.Rectangle;

import geometry.Shape;

import geometry.Triangle;

import java.util.ArrayList;

public class GeometryApp {

public static void main(String[] args) {

ArrayList<Shape> shapes = new ArrayList<>();

try {

shapes.add(new Circle(5.0));

shapes.add(new Rectangle(4.0, 6.0));

shapes.add(new Triangle(3.0, 4.0));

for (Shape shape : shapes) {

shape.displayArea();

}

} catch (Exception e) {

System.err.println("An error occurred: " + e.getMessage());

} finally {

System.out.println("Program execution completed.");

}

}

}