**NAME :SHAHMINA ZIA**

**ROLL NO：FA24-BCS-104**

**SECTION:B**

**Main Class:**

public class Main {

public static void main(String args[]) {

Shape shape;

Shape2D shape2D;

Shape3D shape3D;

Circle c1 = new Circle();

Rectangle r1 = new Rectangle();

Sphere s1 = new Sphere();

Cube cube1 = new Cube();

c1.setRadius(2);

r1.setLength(3);

r1.setWidth(4);

s1.setRadius(4);

cube1.setSide(2);

System.out.println("Single shape details:");

System.out.println("Circle Area: " + c1.area());

System.out.println("Rectangle Area: " + r1.area());

System.out.println("Rectangle Perimeter: " + r1.perimeter());

System.out.println("Sphere Area: " + s1.area());

System.out.println("Sphere Volume: " + s1.volume());

System.out.println("Cube Area: " + cube1.area());

System.out.println("Cube Volume: " + cube1.volume());

Shape[] arr = new Shape[20];

arr[0] = new Circle();

((Circle) arr[0]).setRadius(2);

arr[1] = new Rectangle();

((Rectangle) arr[1]).setLength(2);

((Rectangle) arr[1]).setWidth(2);

arr[3] = new Sphere();

((Sphere) arr[3]).setRadius(2);

arr[4] = new Cube();

((Cube) arr[4]).setSide(2);

arr[5] = new Circle();

((Circle) arr[5]).setRadius(2);

arr[6] = new Rectangle();

((Rectangle) arr[6]).setLength(2);

((Rectangle) arr[6]).setWidth(2);

arr[7] = new Sphere();

((Sphere) arr[7]).setRadius(2);

arr[8] = new Cube();

((Cube) arr[8]).setSide(2);

arr[9] = new Circle();

((Circle) arr[9]).setRadius(2);

arr[10] = new Rectangle();

((Rectangle) arr[10]).setLength(2);

((Rectangle) arr[10]).setWidth(2);

arr[11] = new Sphere();

((Sphere) arr[11]).setRadius(2);

arr[12] = new Cube();

((Cube) arr[12]).setSide(2);

arr[13] = new Circle();

((Circle) arr[13]).setRadius(2);

arr[14] = new Rectangle();

((Rectangle) arr[14]).setLength(2);

((Rectangle) arr[14]).setWidth(2);

arr[15] = new Sphere();

((Sphere) arr[15]).setRadius(2);

arr[16] = new Cube();

((Cube) arr[16]).setSide(2);

arr[17] = new Circle();

((Circle) arr[17]).setRadius(2);

arr[18] = new Rectangle();

((Rectangle) arr[18]).setLength(2);

((Rectangle) arr[18]).setWidth(2);

arr[19] = new Sphere();

((Sphere) arr[19]).setRadius(2);

System.out.println("\nAll shapes in array:");

ShapeUtils.displayShapes(arr);

Drawable[] drawables = new Drawable[] { c1, r1, s1, cube1 };

System.out.println("\nDrawing all drawables:");

ShapeUtils.drawable(drawables);

Rectangle testRect = new Rectangle(); // define testRect

testRect.setLength(2);

testRect.setWidth(2);

ShapeUtils utils = new ShapeUtils();

boolean doesIntersect = utils.isIntersect(arr, testRect);

System.out.println("\nAny intersection with test rectangle? " + doesIntersect);

}

}

**OUTPUT:**

**A screenshot of a computer program

AI-generated content may be incorrect.**