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ArrayList

1. Explore this code and determine its EXACT output if the following points are read from the keyboard:
   (1.5, 2.1), (9.7, 2.1), (9.7, 7.3), (1.5, 7.3).
   These points represent consecutive vertices of a rectangle and must be entered in consecutive order!

```java
public class RectangleTester
{
    public static void main(String args[])
    {
        Rectangle MyRect = new Rectangle();
    }
}
```

```java
import java.util.Scanner;          //for Console I/O
import java.util.Formatter;        //for Output Formatting
import java.awt.geom.Point2D;      // for Point2D.Double
import java.util.ArrayList;        // for ArrayList

public class Rectangle
{
    private ArrayList <Point2D.Double> MyRectangle;      //ArrayList of (X,Y) Point objects

    public Rectangle()
    {
        MyRectangle = new ArrayList <Point2D.Double>();
        input();
        output();
        double area = calculateArea();
        System.out.printf("The area of the rectangle is %5.2f", area);
        System.out.println();
    }

    private void input()
    {
        Scanner in = new Scanner(System.in);
        System.out.println("We need four vertices for our rectangle.");
        System.out.println("Please provide them in consecutive order.");
        for (char ch = 'A'; ch <= 'D'; ch++)
        {
            System.out.print("Give me the X coordinate for point " + ch + ": ");
            double x = in.nextDouble();
            System.out.print("Give me the Y coordinate for point " + ch + ": ");
            double y = in.nextDouble();
            Point2D.Double MyPoint = new Point2D.Double(x,y);
            MyRectangle.add(MyPoint);
        }
    }
```
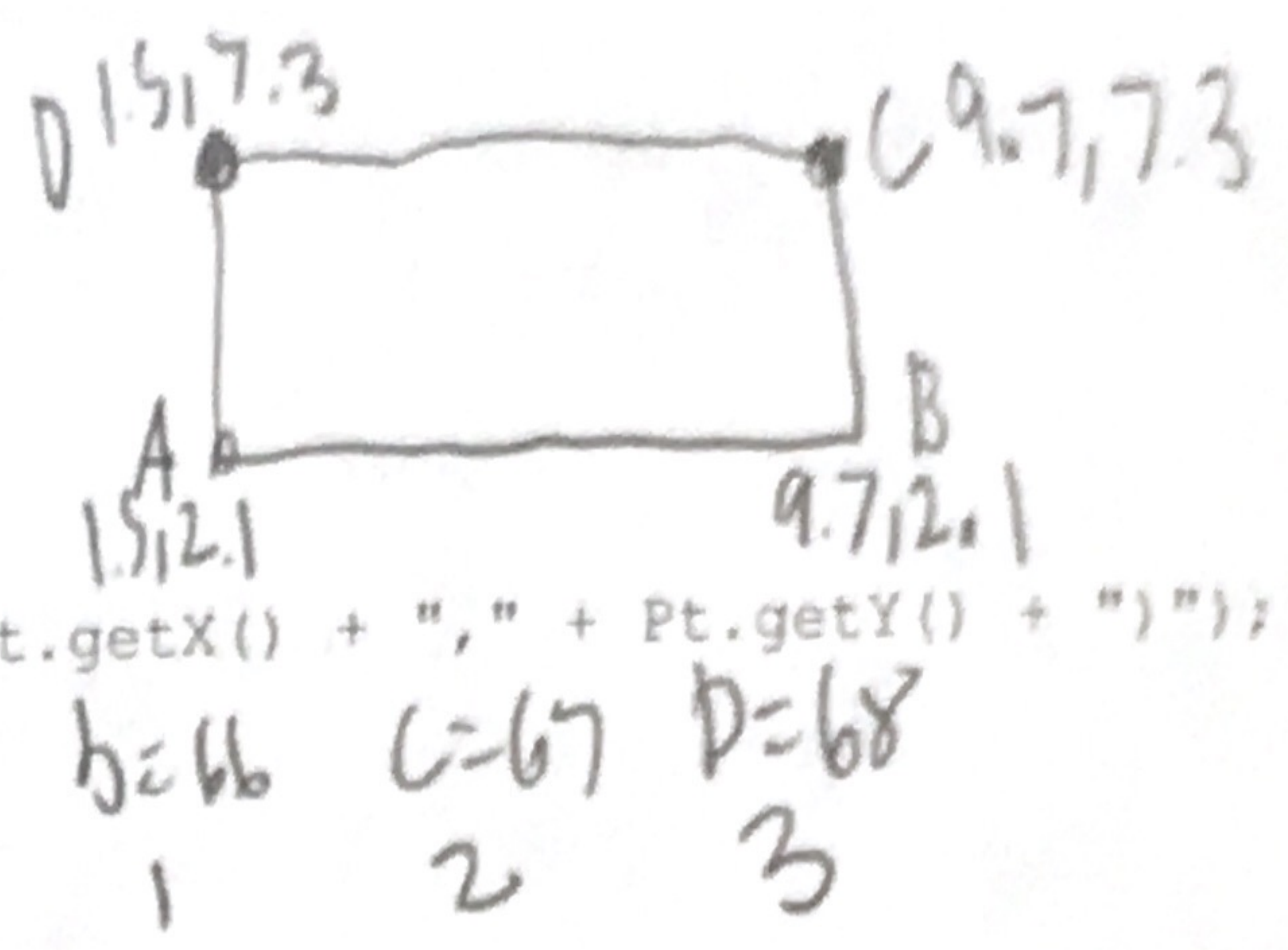
```java
private void output()
{
    for (char ch = 'A'; ch <= 'D'; ch++)
    {
        Point2D.Double Pt = MyRectangle.get(ch - 65);
        System.out.println("Point " + ch + " is (" + Pt.getX() + "," + Pt.getY() + ")");
    }
}


private double calculateArea()
{
    Point2D.Double PtA = MyRectangle.get(0);
    Point2D.Double PtB = MyRectangle.get(1);     // PtC not needed to calculate area
    Point2D.Double PtC = MyRectangle.get(2);
    Point2D.Double PtD = MyRectangle.get(3);     //Use Point2D.Double distance() method!
    double base = PtA.distance(PtB);             //Use Point2D.Double distance() method!
    double height = PtA.distance(PtD);
    return base * height;
}
}
```

(handwritten annotations):

D (1.5, 7.3)   C (9.7, 7.3)

A (1.5, 2.1)   B (9.7, 2.1)

A=65 b=66 C=67 D=68
 0   1   2   3

A to B ⟶ 9.7 - 1.7 = 8.2

A to D is 7.3 - 2.1 = 5.2

$\frac{8.2}{5.2}$ 42.64

EXACT INPUT AND OUTPUT OF ALL CODE:

We need four vertices for our rectangle
Please provide them in Consecutive order
Give me the X coordinate for point A: 1.5
Give me the Y coordinate for point A: 2.1
Give me the X coordinate for point B: 9.7
Give me the Y coordinate for point B: 2.1
Give me the X coordinate for point C: 9.7
Give me the Y coordinate for point C: 7.3
Give me the X coordinate for point D: 1.5
Give me the Y coordinate for point D: 7.3
Point A is (1.5, 2.1)
Point B is (9.7, 2.1)
Point C is (9.7, 7.3)
Point D is (1.5, 7.3)
The area of the rectangle is 42.64