**Problem Statement – 1**

/\*

Create a class named 'Student' with String variable 'name' and integer variable 'roll\_no'. Assign the value of roll\_no as '2' and that of name as "John" by creating an object of the class Student.

\*/

/\*\*

 \* practical\_4\_problem\_statement\_1

 \*/

class Student {

    String name;

    int roll\_no;

}

public class practical\_4\_problem\_statement\_1 {

    public static void main(String[] args) {

        Student john = new Student();

        john.name = "John";

        john.roll\_no = 2;

        System.out.println("\n\nName of the Student: " + john.name);

        System.out.println("Roll No of the Student: " + john.roll\_no);

    }

}

**Output:**

Graphical user interface, text, application, email

Description automatically generated

**Problem Statement - 2**

/\*

Write a program to print the area and perimeter of a triangle having sides of 3, 4 and 5 units by creating a class named 'Triangle' without any parameter in its constructor.

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/\*\*

 \* practical\_4\_problem\_statement\_2

 \*/

import java.math.\*;

class Triangle {

    double a;

    double b;

    double c;

    public double area() {

        double s = ((a + b + c) / 2);

        return s \* Math.pow((s \* (s - a) \* (s - b) \* (s - c)), (1 / 2));

    }

    public double perimeter(){

        return a+b+c;

    }

}

public class practical\_4\_problem\_statement\_2 {

    public static void main(String[] args) {

        Triangle triangle = new Triangle();

        triangle.a = 5;

        triangle.b = 4;

        triangle.c = 3;

        System.out.println("Area of the Triangle = " + triangle.area());

        System.out.println("Perimeter of the Triangle = " + triangle.perimeter());

    }

}

**Output:**

Text

Description automatically generated

**Problem Statement – 3**

/\*

Write a program to print the area of a rectangle by creating a class named 'Area' taking the values of its length and breadth as parameters of its constructor and having a method named 'returnArea' which returns the area of the rectangle. Length and breadth of the rectangle are entered through the keyboard.

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/\*\*

 \* practical\_4\_problem\_statement\_3

 \*/

import java.util.Scanner;

class Area {

    double length;

    double breadth;

    public Area(double l, double b) {

        length = l;

        breadth = b;

    }

    public double returnArea() {

        return length \* breadth;

    }

}

public class practical\_4\_problem\_statement\_3 {

    public static void main(String[] args) {

        Scanner sc = new Scanner(System.in);

        System.out.print("Enter Length of the Rectangle: ");

        double length = sc.nextDouble();

        System.out.print("Enter Breadth of the Rectangle: ");

        double breadth = sc.nextDouble();

        Area rectangle = new Area(length, breadth);

        System.out.println("\nArea of the Rectangle = " + rectangle.returnArea());

    }

}

**Output:**

Text, application

Description automatically generated

**Problem Statement – 4**

/\*

Print the sum, difference and product of two complex numbers by creating a class named 'Complex' with separate methods for each operation whose real and imaginary parts are entered by the user.

\*/

/\*\*

 \* practical\_4\_problem\_statement\_4

 \*/

import java.util.Scanner;

class Complex {

    int real;

    int imaginary;

    public Complex() {

    }

    public Complex(int r, int i) {

        real = r;

        imaginary = i;

    }

    public void PrintComplexNumber(int real, int imaginary) {

        System.out.print(real + " + " + imaginary + "i");

    }

    public void AddComplex(Complex c1, Complex c2) {

        Complex temp\_complex = new Complex();

        temp\_complex.real = c1.real + c2.real;

        temp\_complex.imaginary = c1.imaginary + c2.imaginary;

        System.out.print("\nSum of Complex Numbers: ");

        PrintComplexNumber(temp\_complex.real, temp\_complex.imaginary);

    }

    public void SubtractComplex(Complex c1, Complex c2) {

        Complex temp\_complex = new Complex();

        temp\_complex.real = c1.real - c2.real;

        temp\_complex.imaginary = c1.imaginary - c2.imaginary;

        System.out.print("\nDifference of Complex Numbers: ");

        PrintComplexNumber(temp\_complex.real, temp\_complex.imaginary);

    }

    public void MultiplyComplex(Complex c1, Complex c2) {

        Complex temp\_complex = new Complex();

        temp\_complex.real = (c1.real \* c2.real - c1.imaginary \* c2.imaginary);

        temp\_complex.imaginary = (c1.real \* c2.imaginary + c1.imaginary \* c2.real);

        System.out.print("\nProduct of Complex Numbers: ");

        PrintComplexNumber(temp\_complex.real, temp\_complex.imaginary);

    }

}

public class practical\_4\_problem\_statement\_4 {

    public static void main(String[] args) {

        Complex comp = new Complex();

        Scanner sc = new Scanner(System.in);

        System.out.println("\n\nEnter the Values For First Complex Number.");

        System.out.print("\nEnter Real Part of Complex Number: ");

        int rl1 = sc.nextInt();

        System.out.print("Enter Imaginary Part of Complex Number: ");

        int img1 = sc.nextInt();

        Complex c1 = new Complex(rl1, img1);

        System.out.print("\nComplex Number: ");

        comp.PrintComplexNumber(rl1, img1);

        System.out.println("\n\nEnter the Values For Second Complex Number.");

        System.out.print("\nEnter Real Part of Complex Number: ");

        int rl2 = sc.nextInt();

        System.out.print("Enter Imaginary Part of Complex Number: ");

        int img2 = sc.nextInt();

        Complex c2 = new Complex(rl2, img2);

        System.out.print("\nComplex Number: ");

        comp.PrintComplexNumber(rl2, img2);

        while (true) {

            System.out.println("\n");

            System.out.println("""

                    1. Enter 1 to Add Complex Numbers.

                    2. Enter 2 to Subtract Complex Numbers.

                    3. Enter 3 to Multiply Complex Numbers.

                    4. Enter 4 to Exit the Program.

                    """);

            System.out.print("\nEnter Your Choice: ");

            int user\_input = sc.nextInt();

            if (user\_input == 1) {

                comp.AddComplex(c1, c2);

            } else if (user\_input == 2) {

                comp.SubtractComplex(c1, c2);

            } else if (user\_input == 3) {

                comp.MultiplyComplex(c1, c2);

            } else if (user\_input == 4) {

                break;

            } else {

                System.out.println("Invalid Input!");

            }

        }

    }

}

**Output:**

Text

Description automatically generated

Text

Description automatically generated

**Problem Statement – 5**

/\*

Write a program to calculate the distance between two points (x1, y1) and (x2, y2). All numbers and return values should be of type double.

Definition of Done:

DoD 1: Two java files to be defined. One for class definitions and another for the application

DoD 2: A class point is defined with two float variables for x1 and x2 and the following functionality:

i. Non-parametrized and parameterized constructors are defined.

ii. Get and set methods are defined for all the instance variables.

iii. Distance function is defined to calculate the distance between two points.

iv. Display function is defined with width of 7 and precision of 2.

Write this program with a static method definition for calculating the distance between two points.

\*/

/\*\*

 \* practical\_4\_problem\_statement\_5

 \*/

import java.lang.Math;

class point {

    float x;

    float y;

    point() {

    }

    point(float temp\_x, float temp\_y) {

        this.x = temp\_x;

        this.y = temp\_y;

    }

    float getx() {

        return this.x;

    }

    float gety() {

        return y;

    }

    void setx(float temp\_x) {

        this.x = temp\_x;

    }

    void sety(float temp\_y) {

        this.y = temp\_y;

    }

    double Distance(point p) {

        double distance = Math.sqrt(Math.pow((this.x - p.x), 2) + Math.pow((this.y - p.y), 2));

        System.out.printf("\n\nThe Distance Between Two Points is: %2.7f", distance);

        return distance;

    }

}

public class practical\_4\_problem\_statement\_5 {

    public static void main(String[] args) {

        point p1 = new point(3, 5);

        point p2 = new point(2, 3);

        System.out.println("x1: " + p1.getx());

        System.out.print("y1: " + p1.gety());

        System.out.print("\n\n");

        System.out.println("x2: " + p2.getx());

        System.out.print("y2: " + p2.gety());

        p1.setx(2);

        p1.sety(9);

        p2.sety(4);

        p2.sety(6);

        System.out.print("\n\n");

        System.out.println("x1: " + p1.getx());

        System.out.print("y1: " + p1.gety());

        System.out.print("\n\n");

        System.out.println("x2: " + p2.getx());

        System.out.print("y2: " + p2.gety());

        p1.Distance(p2);

    }

}

**Output:**

Graphical user interface, text, email

Description automatically generated