

Rajalakshmi Engineering College

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2024_28_III_OOPS Using Java Lab

REC_2028_OOPS using Java_Week 6_CY

Attempt : 1
Total Mark : 40
Marks Obtained : 40

Section 1 : Coding

1. Problem Statement

Teena is launching a new airline, Boeing747, and needs to calculate the total revenue generated from ticket sales based on the ticket cost and seat availability. Teena's airline offers two types of seats: regular and premium. The ticket cost and seat availability for both types of seats need to be considered for revenue calculation.

To help with this, Teena wants to implement a system using multilevel inheritance with three classes:

Airline: This class will have the ticket cost as an attribute and defines the method `setCost(double cost)` and `double getCost()`. **Indigo:** This class will extend **Airline** and add the seat availability attribute and defines the method `getSeatAvailability()` and `setSeatAvailability(int seatAvailability)`. **Boeing747:** This class will extend **Indigo** and include a

method `calculateTotalRevenue()` based on the ticket cost and seat availability .

Teena needs to calculate the total revenue using the formula:

$\text{Total Revenue} = \text{ticket cost} * \text{seat availability}$

Help Teena implement this system for calculating the revenue of her airline.

Input Format

The first line of input consists of a double value, representing the flight's ticket cost.

The second line consists of an integer, representing seat availability.

Output Format

The first line of output prints "Ticket Cost: Rs. " followed by a double value representing the ticket cost rounded to one decimal place.

The second line of output prints "Seat Availability: X seats" where X is an integer value representing the seat availability.

The third line of output prints "Total Revenue: Rs. " followed by a double value representing the total revenue rounded to one decimal place.

Refer to the sample output for the exact text and format.

Sample Test Case

Input: 1000.0
100

Output: Ticket Cost: Rs. 1000.0
Seat Availability: 100 seats
Total Revenue: Rs. 100000.0

Answer

```
import java.util.Scanner;  
  
class Airline {  
    private double ticketCost;
```

```
    public void setCost(double cost) {
        this.ticketCost = cost;
    }

    public double getCost() {
        return ticketCost;
    }
}

class Indigo extends Airline {
    private int seatAvailability;

    public void setSeatAvailability(int seatAvailability) {
        this.seatAvailability = seatAvailability;
    }

    public int getSeatAvailability() {
        return seatAvailability;
    }
}

class Boeing747 extends Indigo {

    public double calculateTotalRevenue() {
        return getCost() * getSeatAvailability();
    }
}

public class Main {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        Boeing747 plane = new Boeing747();

        double ticketCost = scanner.nextDouble();
        plane.setCost(ticketCost);
        int seatAvailability = scanner.nextInt();
        plane.setSeatAvailability(seatAvailability);

        System.out.printf("Ticket Cost: Rs. %.1f\n", plane.getCost());
        System.out.println("Seat Availability: " + plane.getSeatAvailability() + "
seats");
        System.out.printf("Total Revenue: Rs. %.1f\n",
plane.calculateTotalRevenue());
    }
}
```

Status : Correct

Marks : 10/10

2. Problem Statement

Bob has been tasked with creating a program using CircleUtils class to calculate and display the circumference and area of the circle.

The program should allow Bob to input the radius of a circle as both an integer and a double and compute both the circumference and area of the circle using separate overloaded methods:

calculateCircumference- To calculate the circumference using the formula $2 * 3.14 * \text{radius}$
calculateArea- To calculate the area $3.14 * \text{radius} * \text{radius}$

Write a program to help Bob.

Input Format

The first line of input consists of an integer m, representing the radius of the circle as a whole number.

The second line consists of a double value n, representing the radius of the circle as a decimal number.

Output Format

The first line of output displays two space-separated double values, rounded to two decimal places, representing the circumference of the circle with the integer radius and the double radius, respectively.

The second line displays two space-separated double values, rounded to two decimal places, representing the area of the circle with the integer radius and the double radius, respectively.

Refer to the sample output for formatting specifications.

Sample Test Case

Input: 5

3.50

Output: 31.40 21.98

78.50 38.47

Answer

```
import java.util.Scanner;
```

```
class CircleUtils {
```

```
    public double calculateCircumference(int radius) {  
        return 2 * 3.14 * radius;  
    }
```

```
    public double calculateCircumference(double radius) {  
        return 2 * 3.14 * radius;  
    }
```

```
    public double calculateArea(int radius) {  
        return 3.14 * radius * radius;  
    }
```

```
    public double calculateArea(double radius) {  
        return 3.14 * radius * radius;  
    }  
}
```

```
class Main {
```

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

```
        int radiusInt = scanner.nextInt();  
        double radiusDouble = scanner.nextDouble();
```

```
        CircleUtils circleUtils = new CircleUtils();
```

```
        double circumferenceInt = circleUtils.calculateCircumference(radiusInt);  
        double circumferenceDouble =  
circleUtils.calculateCircumference(radiusDouble);  
        double areaInt = circleUtils.calculateArea(radiusInt);  
        double areaDouble = circleUtils.calculateArea(radiusDouble);
```

```
        System.out.format("%.2f %.2f\n", circumferenceInt, circumferenceDouble);
```

```
        System.out.format("%.2f %.2f", areaInt, areaDouble);
    }
    scanner.close();
}
```

Status : Correct

Marks : 10/10

3. Problem Statement

A painter needs to determine the cost to paint different shapes based on their surface area. The program should be designed to handle the area of a sphere and calculate the total painting cost using the following formulas:

Area of sphere: $\text{Area} = 4 * \pi * r^2$ where $\pi = 3.14$
Total painting cost: $\text{Cost} = \text{cost per square meter} * \text{area of sphere}$

The program will consist of three classes:

Shape class: This class should set the shape type and radius.

Area class: This class should extend Shape to calculate the area.

Cost class: This class should extend Area to calculate the total painting cost.

Input Format

The input consists of a string representing the shape type, a double value representing the radius, and another double value representing the cost per square meter on each line.

Output Format

For a valid shape type of "Sphere":

- The first line prints: "Area of Sphere is: <calculated_area>" rounded to two decimal places.
- The second line prints: "Cost to paint the shape is: <total_painting_cost>" rounded to two decimal places.

For any other shape types, print: "Invalid type".

Refer to the sample output for formatting specifications.

Sample Test Case

Input: Sphere

3.4

5.8

Output: Area of Sphere is: 145.19

Cost to paint the shape is: 842.12

Answer

```
import java.util.Scanner;
```

```
class Shape {  
    String type;  
    double radius;
```

```
    public void setShape(String type, Scanner sc) {  
        this.type = type;  
        this.radius = sc.nextDouble();  
    }  
}
```

```
class Area extends Shape {  
    protected double area;
```

```
    public void calculateArea() {  
        if (!type.equals("Sphere")) {  
            area = -1;  
        } else {  
            area = 4 * 3.14 * radius * radius;  
        }  
    }  
}
```

```
    public double getArea() {  
        return area;  
    }  
}
```

```
class Cost extends Area {  
    private double costPerSqMeter;  
    private double totalCost;
```

```

    public void setCost(double cost) {
        this.costPerSqMeter = cost;
    }

    public void calculateCost() {
        if (area == -1) {
            System.out.println("Invalid type");
        } else {
            totalCost = area * costPerSqMeter;
            System.out.printf("Area of Sphere is: %.2f%n", area);
            System.out.printf("Cost to paint the shape is: %.2f%n", totalCost);
        }
    }
}

public class Main {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        String s = scanner.next();
        Cost shape = new Cost();
        shape.setShape(s, scanner);
        double costToPaint = scanner.nextDouble();
        shape.calculateArea();
        shape.setCost(costToPaint);
        shape.calculateCost();
    }
}

```

Status : Correct

Marks : 10/10

4. Problem Statement

A bank provides two types of deposit schemes: Fixed Deposits (FD) and Recurring Deposits (RD). Customers want to calculate the interest they can earn based on their selected scheme.

Develop a Java program using inheritance to compute the interest for FD and RD. The program should include:

A base class Account with attributes accountHolder and principalAmount, along with a method for interest calculation. A subclass FixedDeposit that

calculates interest for FD. A subclass `RecurringDeposit` that calculates interest for RD.

Formulas Used:

Interest for FD: $(\text{principal amount} * \text{duration in years} * \text{rate of interest}) / 100$

Interest for RD: $(\text{maturity amount} * \text{duration in months} * \text{rate of interest}) / (12 * 100)$, where maturity amount = monthly deposit * duration in months.

Input Format

The first line of input consists of the choice (1 for FD, 2 for RD).

If the choice is 1, the following lines consist of account holder (string), principal amount (double), duration in years (int), and rate of interest (double).

If the choice is 2, the following lines consist of account holder (string), monthly deposit (int), duration in months (int), and rate of interest (double).

Output Format

The output prints the calculated interest with one decimal place in the following format.

For choice 1: "Interest for FD: <calculated interest >"

For choice 2: "Interest for FD: <calculated interest >"

Refer to the sample output for formatting specifications.

Sample Test Case

Input: 1

Alice

50000.56

5

6.5

Output: Interest for FD: 16250.2

Answer

```
import java.util.Scanner;
```

```
class Account {
    String accountHolder;
    double principalAmount;

    public Account(String accountHolder, double principalAmount) {
        this.accountHolder = accountHolder;
        this.principalAmount = principalAmount;
    }

    public double calculateInterest() {
        return 0;
    }
}
```

```
class FixedDeposit extends Account {
    private int durationYears;
    private double rateOfInterest;

    public FixedDeposit(String accountHolder, double principalAmount, int
durationYears, double rateOfInterest) {
        super(accountHolder, principalAmount);
        this.durationYears = durationYears;
        this.rateOfInterest = rateOfInterest;
    }

    @Override
    public double calculateInterest() {
        return (principalAmount * durationYears * rateOfInterest) / 100;
    }
}
```

```
class RecurringDeposit extends Account {
    private int durationMonths;
    private double rateOfInterest;

    public RecurringDeposit(String accountHolder, double monthlyDeposit, int
durationMonths, double rateOfInterest) {
        super(accountHolder, monthlyDeposit);
        this.durationMonths = durationMonths;
        this.rateOfInterest = rateOfInterest;
    }
}
```

```

@Override
public double calculateInterest() {
    double maturityAmount = principalAmount * durationMonths;
    return (maturityAmount * durationMonths * rateOfInterest) / (12 * 100);
}
}

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

        int choice = sc.nextInt();

        switch (choice) {
            case 1:
                sc.nextLine();
                String fdName = sc.nextLine();
                double fdPrincipal = sc.nextDouble();
                int fdDuration = sc.nextInt();
                double fdRate = sc.nextDouble();

                FixedDeposit fd = new FixedDeposit(fdName, fdPrincipal, fdDuration,
                fdRate);
                System.out.printf("Interest for FD: %.1f", fd.calculateInterest());
                break;

            case 2:
                sc.nextLine();
                String rdName = sc.nextLine();
                int rdDeposit = sc.nextInt();
                int rdDuration = sc.nextInt();
                double rdRate = sc.nextDouble();

                RecurringDeposit rd = new RecurringDeposit(rdName, rdDeposit,
                rdDuration, rdRate);
                System.out.printf("Interest for RD: %.1f", rd.calculateInterest());
                break;

            default:
                System.out.println("Invalid Choice");
        }
    }
}

```

Status : Correct

Marks : 10/10