Questions

Level 1 Practice Programs

1. Write a program to find the age of Harry if the birth year is 2000. Assume the Current Year is 2024

I/P => NONE

O/P => Harry's age in 2024 is ____

2. Sam's mark in Maths is 94, Physics is 95 and Chemistry is 96 out of 100. Find the average percent mark in PCM

I/P => NONE

O/P => Sam's average mark in PCM is ___

3. Create a program to convert the distance of 10.8 kilometers to miles.

Hint: 1 km = 1.6 miles

I/P => NONE

O/P => The distance ___ km in miles is ___

4. Create a program to calculate the profit and loss in number and percentage based on the cost price of INR 129 and the selling price of INR 191.

Hint =>

1. Use a single print statement to display multiline text and variables.
2. Profit = selling price - cost price
3. Profit Percentage = profit / cost price * 100

I/P => NONE

O/P =>

The Cost Price is INR ___ and Selling Price is INR ___

The Profit is INR ___ and the Profit Percentage is ___

5. Suppose you have to divide 14 pens among 3 students equally. Write a program to find how many pens each student will get if the pens must be divided equally. Also, find the remaining non-distributed pens.

Hint =>

1. Use Modulus Operator (%) to find the reminder.
2. Use Division Operator to find the Quantity of pens

I/P => NONE

O/P => The Pen Per Student is ___ and the remaining pen not distributed is ___

6. The University is charging the student a fee of INR 125000 for the course. The University is willing to offer a discount of 10%. Write a program to find the discounted amount and discounted price the student will pay for the course.

Hint =>

1. Create a variable named fee and assign 125000 to it.
2. Create another variable discountPercent and assign 10 to it.
3. Compute discount and assign it to the discount variable.
4. Compute and print the fee you have to pay by subtracting the discount from the fee.

O/P => The discount amount is INR ___ and final discounted fee is INR ___

7. Write a Program to compute the volume of Earth in km^3 and miles^3

Hint => Volume of a Sphere is (4/3) * pi * r^3 and radius of earth is 6378 km

O/P => The volume of earth in cubic kilometers is ____ and cubic miles is ____

8. Create a program to convert distance in kilometers to miles.

Hint =>

1. Create a variable km and assign type as double as in `double km;`
2. Create `Scanner` Object to take user input from Standard Input that is the Keyboard as in `Scanner input = new Scanner(System.in);`

3. Use `Scanner` Object to take user input for km as in `km = input.nextInt();`
4. Use 1 mile = 1.6 km formulae to calculate miles and show the output

I/P => km

O/P => The total miles is ___ mile for the given ___ km

9. Write a new program similar to the program # 6 but take user input for Student Fee and University Discount

Hint =>

1. Create a variable named fee and take user input for fee.
2. Create another variable discountPercent and take user input.
3. Compute the discount and assign it to the discount variable.
4. Compute and print the fee you have to pay by subtracting the discount from the fee.

I/P => fee, discountPrecent

O/P => The discount amount is INR ___ and final discounted fee is INR ___

10. Write a program that takes your height in centimeters and converts it into feet and inches

Hint => 1 foot = 12 inches and 1 inch = 2.54 cm

I/P => height

O/P => Your Height in cm is ___ while in feet is ___ and inches is ___

Level 2 Practice Programs

1. Write a program to create a basic calculator for addition, subtraction, multiplication, and division. The program should ask for two numbers (floating point) and perform all the operations

Hint =>

1. Create a variable number1 and number2 and take user inputs.
2. Perform Arithmetic Operations of addition, subtraction, multiplication, and division assign the result to a variable, and finally print the result

I/P => number1, number2

O/P => The addition, subtraction, multiplication, and division value of 2 numbers ___ and ___ is ___, ____, ____, and ___

2. Write a program that takes the base and height in cm to find the area of a triangle in square inches and square centimeters

Hint => Area of a Triangle is ½ * base * height and 1 in = 2.54 cm

I/P => base, height

O/P => The Area of the triangle in sq in is ___ and sq cm is ___

3. Write a program to find the side of the square whose parameter you read from the user

Hint => Perimeter of the Square is 4 times the side

I/P => perimeter

O/P => The length of the side is ___ whose perimeter is ____

4. Write a program to find the distance in yards and miles for the distance provided by the user in feet

Hint => 1 mile = 1760 yards and 1 yard is 3 feet

I/P => distanceInFeet

O/P => The distance in yards is ___ while the distance in miles is ___

5. Write a program to input the unit price of an item and the quantity to be bought. Then, calculate the total price.

Hint => NA

I/P => unitPrice, quantity

O/P => The total purchase price is INR ___ if the quantity ___ and unit price is INR ___

6. Write a program to take 2 numbers and print their quotient and reminder

Hint => Use division operator (/) for quotient and moduli operator (%) for reminder

I/P => number1, number2

O/P => The Quotient is ___ and Reminder is ___ of two number ___ and ___

7. Write an ***IntOperation*** program by taking a, b, and c as input values and print the following integer operations a + b *c, a * b + c, c + a / b, and a % b + c. Please also understand the precedence of the operators.

Hint =>

1. Create variables a, b, and c of int data type.
2. Take user input for a, b, and c.
3. Compute 3 integer operations and assign the result to a variable
4. Finally, print the result and try to understand operator precedence.

I/P => fee, discountPrecent

O/P => The results of Int Operations are ___, ___, and ___

8 Similarly, write the ***DoubleOpt*** program by taking double values and doing the same operations.

Level 3 Practice Programs

1. Write a TemperaturConversion program, given the temperature in Celsius as input outputs the temperature in Fahrenheit

Hint =>

1. Create a ***celsius*** variable and take the temperature as user input
2. Use the Formulae Celsius to Fahrenheit: (°C × 9/5) + 32 = °F and assign to ***farenheitResult*** and print the result

I/P => celcius

O/P => The ____ celsius is _____ fahrenheit

2. Write a TemperaturConversion program, given the temperature in Fahrenheit as input outputs the temperature in Celsius

Hint =>

1. Create a ***fahrenheit*** variable and take the user's input
2. User the formulae to convert Fahrenheit to Celsius: (°F − 32) x 5/9 = °C and assign the result to ***celsiusResult*** and print the result

I/P => fahrenheit

O/P => The ____ fahrenheit is _____ celsius

3. Create a program to find the total income of a person by taking salary and bonus from user

Hint =>

1. Create a variable named salary and take user input.
2. Create another variable bonus and take user input.
3. Compute income by adding salary and bonus and print the result

I/P => salary, bonus

O/P => The salary is INR ___ and bonus is INR ___. Hence Total Income is INR ___

4. Rewrite the Sample Program 2 with user inputs

Hint =>

1. Create variables and take user inputs for name, fromCity, viaCity, toCity
2. Create variables and take user inputs for distances fromToVia and viaToFinalCity in Miles
3. Create Variables and take user input for the time taken: From City to Via City and Via City to Final Destination
4. Finally, print the result and try to understand operator precedence.

I/P => name, fromCity, viaCity, toCity, fromToVia, viaToFinalCity, timeFromToVia, timeViaToFinalCity

O/P => The Total Distance travelled by ___ from ___ to ___ via ___ is ___ km and the Total Time taken is ___ minutes

5. Create a program to swap two numbers

Hint =>

1. Create a variable number1 and take user input.
2. Create a variable number2 and take user input.

3. Swap number1 and number2 and print the swapped output

I/P => number1, number2

O/P => The swapped numbers are ___ and ___

6. An athlete runs in a triangular park with sides provided as input by the user in meters. If the athlete wants to complete a 5 km run, then how many rounds must the athlete complete

Hint => The perimeter of a triangle is the addition of all sides and the number of rounds is the distance/ perimeter

I/P => side1, side2, side3

O/P => The total number of rounds the athlete will run is ___ to complete 5 km

7. Create a program to divide N number of chocolates among M children.

Hint =>

1. Get an integer value from user for the numberOfchocolates and numberOfChildren.
2. Find the number of chocolates each child gets and number of remaining chocolates
3. Display the results

I/P => numberOfchocolates, numberOfChildren

O/P => The number of chocolates each child gets is ___ and the number of remaining chocolates are ___

8. Write a program to input the Principal, Rate, and Time values and calculate Simple Interest.

Hint => Simple Interest = Principal * Rate * Time / 100

I/P => principal, rate, time

O/P => The Simple Interest is ___ for Principal ___, Rate of Interest ___ and Time ___

9. Create a program to convert weight from pounds to kilograms.

Hint => 1 pound = 2.2 kg

I/P => weight

O/P => The weight of the person in pounds is ___ and in kg is ___

10. Create a program to find the maximum number of handshakes among N number of students.

Hint =>

1. Get integer input for numberOfStudents variable.
2. Use the combination = (n * (n - 1)) / 2 formula to calculate the maximum number of possible handshakes.
3. Display the number of possible handshakes.

11. Create a program to convert weight in pounds to kilograms.

Hint => 1 pound = 2.2 kg

I/P => weight

O/P => The weight of the person in pound is ___ and in kg is ___

Answers

Level_pr1:

```
class Level_pr1 extends BaseProgram {

    public void showMenu() {

        char choice;

        do {
            printHeader("LEVEL 1 ");

            System.out.println("1. Age Calculator");
            System.out.println("2. Average PCM Calculator");
            System.out.println("3. Distance Converter");
```

```
System.out.println("4. Profit Calculator");
System.out.println("5. Pen Distribution");
System.out.println("6. Fee Discount Calculator");
System.out.println("7. Earth Volume Calculator");
System.out.println("0. Exit Level 1");

System.out.print("Select Program: ");
int option = input.nextInt();

switch(option) {

    case 1:
        int age = 2024 - 2000;
        System.out.println("Harry's age in 2024 is " + age);
        break;

    case 2:
        double avg = (94 + 95 + 96) / 3.0;
        System.out.println("Average PCM is " + avg + "%");
        break;

    case 3:
        double miles = 10.8 / 1.6;
        System.out.println("10.8 km in miles is " + miles);
        break;

    case 4:
        double profit = 191 - 129;
        double percent = (profit / 129) * 100;
        System.out.println("Profit = " + profit +
            " | Profit % = " + percent);
        break;

    case 5:
        System.out.println("Each student gets " + (14/3) +
            " pens, Remaining: " + (14%3));
        break;

    case 6:
        double discount = 125000 * 10 / 100.0;
        System.out.println("Discount = " + discount +
            " | Final Fee = " + (125000 - discount));
        break;

    case 7:
        double volume = (4.0/3) * Math.PI *
            Math.pow(6378,3);
        System.out.println("Earth Volume (km³): " + volume);
        break;

    case 0:
        System.out.println("Exiting Level 1...");
        return;

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

System.out.print("\nRun another Level 1 program? (Y/N): ");
choice = input.next().charAt(0);
```

```
        } while(choice == 'Y' || choice == 'y');

        printFooter();
    }
}
```

Level_pr2 :

```
import java.util.Scanner;

class Level_pr2 extends BaseProgram {

    public void showMenu() {

        char choice;

        do {
            printHeader("LEVEL 2 - APPLIED OPERATIONS");

            System.out.println("1. Basic Calculator");
            System.out.println("2. Triangle Area Calculator");
            System.out.println("3. Square Side Finder");
            System.out.println("4. Feet to Yards & Miles Converter");
            System.out.println("5. Total Purchase Calculator");
            System.out.println("6. Quotient & Remainder Finder");
            System.out.println("7. Integer Operations");
            System.out.println("8. Double Operations");
            System.out.println("0. Exit Level 2");

            System.out.print("Select Program: ");
            int option = input.nextInt();

            switch(option) {

                case 1:
                    System.out.print("Enter number1: ");
                    double n1 = input.nextDouble();
                    System.out.print("Enter number2: ");
                    double n2 = input.nextDouble();

                    System.out.println("Addition: " + (n1+n2));
                    System.out.println("Subtraction: " + (n1-n2));
                    System.out.println("Multiplication: " + (n1*n2));
                    System.out.println("Division: " + (n1/n2));
                    break;

                case 2:
                    System.out.print("Enter base (cm): ");
                    double base = input.nextDouble();
                    System.out.print("Enter height (cm): ");
                    double height = input.nextDouble();

                    double areaCm = 0.5 * base * height;
                    double areaIn = areaCm / (2.54 * 2.54);

                    System.out.println("Area in sq cm: " + areaCm);
                    System.out.println("Area in sq in: " + areaIn);
                    break;
```

```
case 3:
    System.out.print("Enter perimeter: ");
    double perimeter = input.nextDouble();
    System.out.println("Side length is " + (perimeter/4));
    break;

case 4:
    System.out.print("Enter distance in feet: ");
    double feet = input.nextDouble();

    double yards = feet / 3;
    double miles = yards / 1760;

    System.out.println("Distance in yards: " + yards);
    System.out.println("Distance in miles: " + miles);
    break;

case 5:
    System.out.print("Enter unit price: ");
    double price = input.nextDouble();
    System.out.print("Enter quantity: ");
    int quantity = input.nextInt();

    System.out.println("Total purchase price is INR " + (price*quantity));
    break;

case 6:
    System.out.print("Enter number1: ");
    int a = input.nextInt();
    System.out.print("Enter number2: ");
    int b = input.nextInt();

    System.out.println("Quotient: " + (a/b));
    System.out.println("Remainder: " + (a%b));
    break;

case 7:
    System.out.print("Enter a, b, c: ");
    int x = input.nextInt();
    int y = input.nextInt();
    int z = input.nextInt();

    System.out.println("a + b * c = " + (x + y*z));
    System.out.println("a * b + c = " + (x*y + z));
    System.out.println("c + a / b = " + (z + x/y));
    System.out.println("a % b + c = " + (x%y + z));
    break;

case 8:
    System.out.print("Enter a, b, c: ");
    double d1 = input.nextDouble();
    double d2 = input.nextDouble();
    double d3 = input.nextDouble();

    System.out.println("a + b * c = " + (d1 + d2*d3));
    System.out.println("a * b + c = " + (d1*d2 + d3));
    System.out.println("c + a / b = " + (d3 + d1/d2));
    System.out.println("a % b + c = " + (d1%d2 + d3));
    break;
```

```
            case 0:
                System.out.println("Exiting Level 2...");
                return;

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

        System.out.print("\nRun another Level 2 program? (Y/N): ");
        choice = input.next().charAt(0);

    } while(choice == 'Y' || choice == 'y');

    printFooter();
  }
}
```

Level_pr3 :

```
class Level_pr3 extends BaseProgram {

  public void showMenu() {

    char choice;

    do {
      printHeader("LEVEL 3 - REAL WORLD APPLICATIONS");

      System.out.println("1. Celsius to Fahrenheit");
      System.out.println("2. Fahrenheit to Celsius");
      System.out.println("3. Total Income Calculator");
      System.out.println("4. Swap Two Numbers");
      System.out.println("5. Athlete 5km Round Calculator");
      System.out.println("6. Chocolate Distribution");
      System.out.println("7. Simple Interest Calculator");
      System.out.println("8. Pounds to Kilograms Converter");
      System.out.println("9. Maximum Handshakes");
      System.out.println("0. Exit Level 3");

      System.out.print("Select Program: ");
      int option = input.nextInt();

      switch(option) {

        case 1:
          System.out.print("Enter Celsius: ");
          double c = input.nextDouble();
          System.out.println(c + " Celsius is " + ((c*9/5)+32) + " Fahrenheit");
          break;

        case 2:
          System.out.print("Enter Fahrenheit: ");
          double f = input.nextDouble();
          System.out.println(f + " Fahrenheit is " + ((f-32)*5/9) + " Celsius");
          break;

        case 3:
          System.out.print("Enter salary: ");
          double salary = input.nextDouble();
```

```
        System.out.print("Enter bonus: ");
        double bonus = input.nextDouble();
        System.out.println("Total Income is INR " + (salary+bonus));
        break;

    case 4:
        System.out.print("Enter number1: ");
        int n1 = input.nextInt();
        System.out.print("Enter number2: ");
        int n2 = input.nextInt();

        int temp = n1;
        n1 = n2;
        n2 = temp;

        System.out.println("Swapped numbers: " + n1 + " and " + n2);
        break;

    case 5:
        System.out.print("Enter 3 sides (meters): ");
        double s1 = input.nextDouble();
        double s2 = input.nextDouble();
        double s3 = input.nextDouble();

        double perimeter = s1 + s2 + s3;
        System.out.println("Rounds needed for 5km: " + (5000/perimeter));
        break;

    case 6:
        System.out.print("Enter chocolates: ");
        int choco = input.nextInt();
        System.out.print("Enter children: ");
        int children = input.nextInt();

        System.out.println("Each child gets: " + (choco/children));
        System.out.println("Remaining chocolates: " + (choco%children));
        break;

    case 7:
        System.out.print("Enter Principal, Rate, Time: ");
        double p = input.nextDouble();
        double r = input.nextDouble();
        double t = input.nextDouble();

        System.out.println("Simple Interest is " + (p*r*t/100));
        break;

    case 8:
        System.out.print("Enter weight in pounds: ");
        double pounds = input.nextDouble();
        System.out.println("Weight in kg: " + (pounds/2.2));
        break;

    case 9:
        System.out.print("Enter number of students: ");
        int n = input.nextInt();
        System.out.println("Maximum handshakes: " + (n*(n-1)/2));
        break;

    case 0:
```

```
                System.out.println("Exiting Level 3...");
                return;

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

        System.out.print("\nRun another Level 3 program? (Y/N): ");
        choice = input.next().charAt(0);

    } while(choice == 'Y' || choice == 'y');

    printFooter();
  }
}
```

MainOrchestrator :

```
class MainOrchestrator {

  public static void main(String[] args) {

    java.util.Scanner input = new java.util.Scanner(System.in);
    char continueChoice;

    do {
      System.out.println("\n========================================");
      System.out.println("       JAVA PROGRAM EXECUTION MENU");
      System.out.println("========================================");
      System.out.println("1. Run Level 1");
      System.out.println("2. Run Level 2");
      System.out.println("3. Run Level 3");
      System.out.println("0. Exit");

      System.out.print("Select Level: ");
      int levelChoice = input.nextInt();

      BaseProgram level = null;

      switch(levelChoice) {

        case 1:
          level = new Level_pr1();
          break;

        case 2:
          level = new Level_pr2();
          break;

        case 3:
          level = new Level_pr3();
          break;

        case 0:
          System.out.println("Exiting System...");
          return;

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

```
            }

            if(level != null)
                level.showMenu();

            System.out.print("\nDo you want to select another Level? (Y/N): ");
            continueChoice = input.next().charAt(0);

        } while(continueChoice == 'Y' || continueChoice == 'y');

        System.out.println("\nSystem Terminated Successfully.");
    }
}
```

BaseProgram:

```
import java.util.Scanner;

abstract class BaseProgram {

    protected Scanner input = new Scanner(System.in);

    protected void printHeader(String title) {
        System.out.println("\n========================================");
        System.out.println("          " + title);
        System.out.println("========================================");
    }

    protected void printFooter() {
        System.out.println("\n----------------------------------------");
        System.out.println(" Level Execution Completed ");
        System.out.println("----------------------------------------");
    }

    public abstract void showMenu();
}
```