# Level 2 Practice Programs

1. Create a program to find the bonus of 10 employees based on their years of service and the total bonus amount the company Zara has to pay, along with the old and new salary.

**Hint =>**

1. Zara decides to give a bonus of 5% to employees whose year of service is more than 5 years or 2% if less than 5 years
2. Define a double array to save salary and years of service for each of the 10 employees
3. Also define a double array to save the new salary and the bonus amount as well as variables to save the total bonus, total old salary, and new salary
4. Define a loop to take input from the user. If salary or year of service is an invalid number then ask the use to enter again. Note in this case you will have to decrement the index counter
5. Define another loop to calculate the bonus of 10 employees based on their years of service. Save the bonus in the array, compute the new salary, and save in the array. Also, the total bonus and total old and new salary can be calculated in the loop
6. Print the total bonus payout as well as the total old and new salary of all the employees

**PROGRAM-**

**import java.util.Scanner;**

**class Bonus**

**{**

**public static void main(String[] args)**

**{**

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

**//Creating Arrays as required:**

**double[] salary=new double[10];**

**int[] yearsofservice=new int[10];**

**double[] newsalary=new double[10];**

**double[] bonusamount=new double[10];**

**//Creating new variables:**

**double totalbonus=0.0;**

**double totaloldsalary=0.0;**

**double totalnewsalary=0.0;**

**//Loops:**

**//Taking salary and yearsofservice**

**for(int j=0;j<10;j++)**

**{**

**System.out.print("\nEnter Salary of Employee "+(j+1)+": ");**

**salary[j]=input.nextDouble();**

**System.out.print("Enter Number of Years of Service of Employee "+(j+1)+": ");**

**yearsofservice[j]=input.nextInt();**

**//Checking if input is valid or not:**

**if(salary[j]<0.0||yearsofservice[j]<0)**

**{**

**System.out.println("Enter input again.");**

**j--;**

**continue;**

**}**

**}**

**//Calculating and Storing the Bonus of Employees:**

**for(int i=0;i<10;i++)**

**{**

**if(yearsofservice[i]<5)**

**{**

**bonusamount[i]=0.02\*salary[i];**

**}**

**else**

**{**

**bonusamount[i]=0.05\*salary[i];**

**}**

**}**

**//Computing New Salary of Employees:**

**for(int i=0;i<10;i++)**

**{**

**newsalary[i]=salary[i]+bonusamount[i];**

**}**

**//Computing Total of old salaries:**

**for(int i=0;i<10;i++)**

**{**

**totaloldsalary+=salary[i];**

**}**

**//Computing Total of new salaries:**

**for(int i=0;i<10;i++)**

**{**

**totalnewsalary+=newsalary[i];**

**}**

**//Computing Total Bonus of all Employees:**

**for(int i=0;i<10;i++)**

**{**

**totalbonus+=bonusamount[i];**

**}**

**//Displaying Details:**

**System.out.println("\nOLD SALARIES:");**

**for(int i=0;i<10;i++)**

**{**

**System.out.println("Employee "+(i+1)+": "+salary[i]);**

**}**

**System.out.println("\nBONUSES OF EMPLOYEES:");**

**for(int i=0;i<10;i++)**

**{**

**System.out.println("Employee "+(i+1)+": "+bonusamount[i]);**

**}**

**System.out.println("\nNEW SALARIES:");**

**for(int i=0;i<10;i++)**

**{**

**System.out.println("Employee "+(i+1)+": "+newsalary[i]);**

**}**

**input.close();**

**}**

**}**

**OUTPUT-**

**Enter Salary of Employee 1: 287.28**

**Enter Number of Years of Service of Employee 1: 5**

**Enter Salary of Employee 2: 273.283**

**Enter Number of Years of Service of Employee 2: 7**

**Enter Salary of Employee 3: 379.932**

**Enter Number of Years of Service of Employee 3: 7**

**Enter Salary of Employee 4: 27930.0**

**Enter Number of Years of Service of Employee 4: 4**

**Enter Salary of Employee 5: 23238.82**

**Enter Number of Years of Service of Employee 5: 2**

**Enter Salary of Employee 6: 2000267.721**

**Enter Number of Years of Service of Employee 6: 20**

**Enter Salary of Employee 7: 8493.37**

**Enter Number of Years of Service of Employee 7: 9**

**Enter Salary of Employee 8: 2834.83**

**Enter Number of Years of Service of Employee 8: 1**

**Enter Salary of Employee 9: 38402.9**

**Enter Number of Years of Service of Employee 9: 9**

**Enter Salary of Employee 10: 283902.43739**

**Enter Number of Years of Service of Employee 10: 10**

**OLD SALARIES:**

**Employee 1: 287.28**

**Employee 2: 273.283**

**Employee 3: 379.932**

**Employee 4: 27930.0**

**Employee 5: 23238.82**

**Employee 6: 2000267.721**

**Employee 7: 8493.37**

**Employee 8: 2834.83**

**Employee 9: 38402.9**

**Employee 10: 283902.43739**

**BONUSES OF EMPLOYEES:**

**Employee 1: 14.363999999999999**

**Employee 2: 13.664150000000001**

**Employee 3: 18.9966**

**Employee 4: 558.6**

**Employee 5: 464.7764**

**Employee 6: 100013.38605**

**Employee 7: 424.66850000000005**

**Employee 8: 56.6966**

**Employee 9: 1920.1450000000002**

**Employee 10: 14195.121869499999**

**NEW SALARIES:**

**Employee 1: 301.64399999999995**

**Employee 2: 286.94715**

**Employee 3: 398.9286**

**Employee 4: 28488.6**

**Employee 5: 23703.5964**

**Employee 6: 2100281.1070499998**

**Employee 7: 8918.0385**

**Employee 8: 2891.5266**

**Employee 9: 40323.045**

**Employee 10: 298097.5592595**

1. Create a program to find the youngest friends among 3 Amar, Akbar, and Anthony based on their ages and the tallest among the friends based on their heights

**Hint =>**

1. Take user input for age and height for the 3 friends and store it in two arrays each to store the values for age and height of the 3 friends
2. Loop through the array and find the youngest of the 3 friends and the tallest of the 3 friends
3. Finally display the youngest and tallest of the 3 friends

**PROGRAM-**

**import java.util.Scanner;**

**class AmarAkbarAnthony**

**{**

**public static void main(String[] args)**

**{**

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

**//Storing Ages and Heights in arrays:**

**//Index:**

**//0=Amar**

**//1=Akbar**

**//2=Anthony**

**int[] ages=new int[3];**

**double[] heights=new double[3];**

**//Taking Ages and storing it in Array:**

**for(int i=0;i<3;i++)**

**{**

**if(i==0)**

**{**

**System.out.print("Enter Age of Amar: ");**

**ages[i]=input.nextInt();**

**}**

**if(i==1)**

**{**

**System.out.print("Enter Age of Akbar: ");**

**ages[i]=input.nextInt();**

**}**

**if(i==2)**

**{**

**System.out.print("Enter Ages of Anthony: ");**

**ages[i]=input.nextInt();**

**}**

**}**

**//Taking Heights and storing it in Array:**

**for(int i=0;i<3;i++)**

**{**

**if(i==0)**

**{**

**System.out.print("Enter Height of Amar: ");**

**heights[i]=input.nextDouble();**

**}**

**if(i==1)**

**{**

**System.out.print("Enter Height of Akbar: ");**

**heights[i]=input.nextDouble();**

**}**

**if(i==2)**

**{**

**System.out.print("Enter Height of Anthony: ");**

**heights[i]=input.nextDouble();**

**}**

**}**

**//Finding youngest and tallest of them:**

**int youngest=ages[0];**

**double tallest=heights[0];**

**for(int i=1;i<3;i++)**

**{**

**if(ages[i]<youngest)**

**{**

**youngest=ages[i];**

**}**

**if(heights[i]>tallest)**

**{**

**tallest=heights[i];**

**}**

**}**

**//Printing Youngest**

**if(youngest==ages[0])**

**{**

**System.out.println("Youngest is Amar.")**

**}**

**if(youngest==ages[1])**

**{**

**System.out.println("Youngest is Akbar.")**

**}**

**if(youngest==ages[2])**

**{**

**System.out.println("Youngest is Anthony.")**

**}**

**//Printing Tallest**

**if(tallest=heights[0])**

**{**

**System.out.println("Tallest is Amar.")**

**}**

**if(tallest=heights[1])**

**{**

**System.out.println("Tallest is Akbar.")**

**}**

**if(tallest=heights[2])**

**{**

**System.out.println("Tallest is Anthony.")**

**}**

**}**

**}**

**OUTPUT-**

**Enter Age of Amar: 20**

**Enter Age of Akbar: 27**

**Enter Ages of Anthony: 38**

**Enter Height of Amar: 289**

**Enter Height of Akbar: 28.3**

**Enter Height of Anthony: 100.82**

**Youngest is Amar.**

**Tallest is Amar.**

1. Create a program to store the digits of the number in an array and find the largest and second largest element of the array.

**Hint =>**

1. Create a number variable and Take user input.
2. Define an array to store the digits. Set the size of the array to maxDigit variable initially set to 10
3. Create an integer variable index with the value 0 to reflect the array index.
4. Use a loop to iterate until the number is not equal to 0.
5. Remove the last digit from the number in each iteration and add it to the array.
6. Increment the index by 1 in each iteration and if the index count equals maxDigit then break out of the loop and the remaining digits are not added to the array
7. Define variable to store largest and second largest digit and initialize it to zero
8. Loop through the array and use conditional statements to find the largest and second largest number in the array
9. Finally display the largest and second-largest number

**PROGRAM-**

**import java.util.Scanner;**

**class NumberDigits**

**{**

**public static void main(String[] args)**

**{**

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

**System.out.println("Enter Number: ");**

**int Number = input.nextInt();**

**int maxDigit = 10;**

**int[] Digits = new int[maxDigit];**

**int t = Number;**

**int count = 0;**

**while (t > 0 && count < maxDigit)**

**{**

**Digits[count] = t % 10;**

**t /= 10;**

**count++;**

**}**

**for (int i = 0; i < count - 1; i++)**

**{**

**for (int j = 0; j < count - i - 1; j++)**

**{**

**if (Digits[j] < Digits[j + 1])**

**{**

**int temp = Digits[j];**

**Digits[j] = Digits[j + 1];**

**Digits[j + 1] = temp;**

**}**

**}**

**}**

**// Assign largest and second largest**

**int LargestDigit = Digits[0];**

**int SecondLargestDigit = -1;**

**for (int i = 1; i < count; i++)**

**{**

**if (Digits[i] < LargestDigit)**

**{**

**SecondLargestDigit = Digits[i];**

**break;**

**}**

**}**

**// Output results**

**System.out.println("For Number: " + Number);**

**System.out.println("Largest Digit = " + LargestDigit);**

**if (SecondLargestDigit == -1) {**

**System.out.println("No Second Largest Digit Found.");**

**} else {**

**System.out.println("Second Largest Digit = " + SecondLargestDigit);**

**}**

**input.close();**

**}**

**}**

**OUTPUT-**

**Enter Number:**

**2682**

**For Number: 2682**

**Largest Digit = 8**

**Second Largest Digit = 6**

1. Rework the program 2, especially the **Hint** f where if index equals maxDigit, we break from the loop. Here we want to modify to Increase the size of the array i,e maxDigit by 10 if the index is equal to maxDigit. This is done to consider all digits to find the largest and second-largest number

**Hint =>**

1. In Hint f inside the loop if the index is equal to maxDigit, increase maxDigit and make digits array to store more elements.
2. To do this, we need to create a new temp array of size maxDigit, copy from the current digits array the digits into the temp array, and assign the current digits array to the temp array
3. Now the digits array will be able to store all digits of the number in the array and then find the largest and second largest number

**PROGRAM-**

**import java.util.Scanner;**

**public class LargestSecondLargestNumber**

**{**

**public static void main(String[] args)**

**{**

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

**System.out.print("Enter Number:");**

**int Number=input.nextInt();**

**//Creating a variable to set the size of Digits Array**

**int maxDigits=10;**

**//Temporary Variable to store the Number**

**int t=Number;**

**int count=0;**

**//Creating DIGITS Array**

**int[] Digits=new int[maxDigits];**

**//Setting the Digits Array**

**for(int index=0;index<=maxDigits;index++)**

**{**

**if(index==maxDigits)**

**{**

**break;**

**}**

**else**

**{**

**while (t>0 && count<maxDigits)**

**{**

**Digits[count]=t%10;**

**t/=10;**

**count++;**

**}**

**}**

**}**

**// Initialize variables**

**int Largest=-1,SecondLargest=-1;//Incase where 0 is the largest number**

**// Find Largest and Second Largest Digit**

**for(int i=0;i<count;i++)**

**{**

**if (Digits[i]>Largest)**

**{**

**SecondLargest=Largest;**

**Largest = Digits[i];**

**}**

**else if (Digits[i]>SecondLargest &&Digits[i]<Largest)**

**{**

**SecondLargest=Digits[i];**

**}**

**else**

**{**

**continue;**

**}**

**}**

**System.out.println("Number: " + Number);**

**System.out.println("Largest Digit: " + Largest);**

**if(SecondLargest==-1)**

**{**

**System.out.println("No Second Largest Digit Found.");**

**}**

**else**

**{**

**System.out.println("Second Largest Digit: " +SecondLargest);**

**}**

**input.close();**

**}**

**}**

**OUTPUT-**

**Enter Number:28930**

**Number: 28930**

**Largest Digit: 9**

**Second Largest Digit: 8**

1. Create a program to take a number as input and reverse the number. To do this, store the digits of the number in an array and display the array in reverse order

**Hint =>**

1. Take user input for a number.
2. Find the count of digits in the number.
3. Find the digits in the number and save them in an array
4. Create an array to store the elements of the digits array in reverse order
5. Finally, display the elements of the array in reverse order

**PROGRAM-**

**import java.util.Scanner;**

**public class Reverse**

**{**

**public static void main(String[] args)**

**{**

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

**System.out.print("Enter Number:");**

**int number=input.nextInt();**

**//Counting Digits**

**int t=number;//Temporary Variable**

**int count=0;//Number of Digits**

**while(t>0)**

**{**

**count++;**

**t/=10;**

**}**

**System.out.println("Count:"+count);**

**t=number;**

**//Creating Array to store reverse of number**

**int[] Reverse=new int[count];**

**for(int i=0;i<count;i++)**

**{**

**Reverse[i]=t%10;**

**t/=10;**

**}**

**//Displaying**

**for(int i=0;i<count;i++)**

**{**

**System.out.print(Reverse[i]);**

**}**

**input.close();**

**}**

**}**

**OUTPUT-**

**Enter Number:45678903**

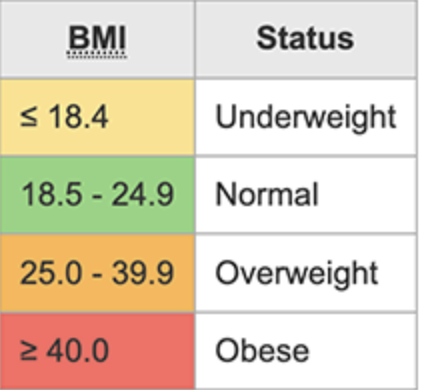
**Count:8**

**30987654**

1. An organization took up an exercise to find the Body Mass Index (BMI) of all the persons in the team. For this create a program to find the BMI and display the height, weight, BMI and status of each individual

**Hint =>**

1. Take input for a number of persons
2. Create arrays to store the weight, height, BMI, and weight status of the persons
3. Take input for the weight and height of the persons
4. Calculate the BMI of all the persons and store them in an array and also find the weight status of the persons
5. Display the height, weight, BMI, and weight status of each person
6. Use the table to determine the weight status of the person



**PROGRAM-**

**import java.util.Scanner;**

**class BMI**

**{**

**public static void main(String[] args)**

**{**

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

**System.out.print("Enter Number of People in a Team:");**

**int number=input.nextInt();**

**//Creating Arrays**

**double[] weight=new double[number];**

**double[] height=new double[number];**

**//Storing Values in Arrays**

**System.out.println("Enter Weights of Person(in kgs):");**

**for(int i=0;i<number;i++)**

**{**

**System.out.print("Weight of Person "+(i+1)+":");**

**weight[i]=input.nextDouble();**

**}**

**System.out.println("Enter Heights of Person(in cms):");**

**for(int i=0;i<number;i++)**

**{**

**System.out.print("Height of Person "+(i+1)+":");**

**height[i]=input.nextDouble();**

**}**

**//Creating BMI Array**

**double[] BMI=new double[number];**

**for(int i=0;i<number;i++)**

**{**

**BMI[i]=weight[i]/((height[i]/100)\*(height[i]/100));**

**}**

**//Displaying Details**

**for(int i=0;i<number;i++)**

**{**

**System.out.println("Height of Player "+(i+1)+": "+height[i]);**

**System.out.println("Weight of Player "+(i+1)+": "+weight[i]);**

**System.out.println("BMI of Player "+(i+1)+": "+BMI[i]);**

**if(BMI[i]<=18.4)**

**{**

**System.out.println("Status:Underweight.");**

**}**

**else if(BMI[i]>=18.5 && BMI[i]<=24.9)**

**{**

**System.out.println("Status:Normal.");**

**}**

**else if(BMI[i]>=25.0 && BMI[i]<=39.9)**

**{**

**System.out.println("Status:Overweight.");**

**}**

**else if(BMI[i]>=40.0)**

**{**

**System.out.println("Status:Obese.");**

**}**

**else**

**{**

**System.out.println("Invalid BMI.");**

**}**

**}**

**input.close();**

**}**

**}**

**OUTPUT-**

**Enter Number of People in a Team:5**

**Enter Weights of Person(in kgs):**

**Weight of Person 1:172.2**

**Weight of Person 2:82.3**

**Weight of Person 3:28.9**

**Weight of Person 4:68.2**

**Weight of Person 5:82.2**

**Enter Heights of Person(in cms):**

**Height of Person 1:168.2**

**Height of Person 2:192.9**

**Height of Person 3:273.90**

**Height of Person 4:92.38**

**Height of Person 5:159.6**

**Height of Player 1: 168.2**

**Weight of Player 1: 172.2**

**BMI of Player 1: 60.866897315211354**

**Status:Obese.**

**Height of Player 2: 192.9**

**Weight of Player 2: 82.3**

**BMI of Player 2: 22.117466590666428**

**Status:Normal.**

**Height of Player 3: 273.9**

**Weight of Player 3: 28.9**

**BMI of Player 3: 3.85224391875311**

**Status:Underweight.**

**Height of Player 4: 92.38**

**Weight of Player 4: 68.2**

**BMI of Player 4: 79.9150285296652**

**Status:Obese.**

**Height of Player 5: 159.6**

**Weight of Player 5: 82.2**

**BMI of Player 5: 32.270525938907426**

**Status:Overweight.**

1. Rewrite the above program using multi-dimensional array to store height, weight, and BMI in 2D array for all the persons

**Hint =>**

1. Take input for a number of persons
2. Create a multi-dimensional array to store weight, height and BMI. Also create an to store the weight status of the persons

double[][] personData = new double[number][3];

String[] weightStatus = new String[number];

1. Take input for weight and height of the persons and for negative values, ask the user to enter positive values
2. Calculate BMI of all the persons and store them in the personData array and also find the weight status and put them in the weightStatus array
3. Display the height, weight, BMI and status of each person

**PROGRAM-**

**import java.util.Scanner;**

**public class BmiMultiDimensionalArray**

**{**

**public static void main(String[] args)**

**{**

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

**System.out.print("Enter Number of Persons: ");**

**int number=input.nextInt();**

**//Creating Arrays**

**double[][] personData=new double[number][3];**

**String[] weightStatus=new String[number];**

**//Entering Data into the Arrays**

**for(int i=0;i<number;i++)**

**{**

**System.out.println("\nPERSON "+(i+1)+": ");**

**System.out.print("Enter Weight of Person "+(i+1)+"(in kgs):" );**

**personData[i][0]=input.nextDouble();**

**System.out.print("Enter Height of Person "+(i+1)+"(in cms):" );**

**personData[i][1]=input.nextDouble();**

**if(personData[i][0]<0 || personData[i][1]<0)**

**{**

**System.out.print("Enter Details again");**

**i--;**

**continue;**

**}**

**}**

**//Calculating BMI**

**for(int i=0;i<number;i++)**

**{**

**personData[i][2]=personData[i][0]/((personData[i][1]/100)\*(personData[i][1]/100));**

**}**

**System.out.println("\n\nDETAILS:");**

**for(int i=0;i<number;i++)**

**{**

**System.out.println("PERSON "+(i+1)+":");**

**System.out.println("WEIGHT-->"+personData[i][0]);**

**System.out.println("HEIGHT-->"+personData[i][1]);**

**System.out.println("BMI-->"+personData[i][2]);**

**}**

**input.close();**

**}**

**}**

**OUTPUT-**

**Enter Number of Persons: 3**

**PERSON 1:**

**Enter Weight of Person 1(in kgs):89.2**

**Enter Height of Person 1(in cms):159.8**

**PERSON 2:**

**Enter Weight of Person 2(in kgs):73.7**

**Enter Height of Person 2(in cms):171.9**

**PERSON 3:**

**Enter Weight of Person 3(in kgs):91.5**

**Enter Height of Person 3(in cms):200.5**

**DETAILS:**

**PERSON 1:**

**WEIGHT-->89.2**

**HEIGHT-->159.8**

**BMI-->34.93102297772089**

**PERSON 2:**

**WEIGHT-->73.7**

**HEIGHT-->171.9**

**BMI-->24.941107513770906**

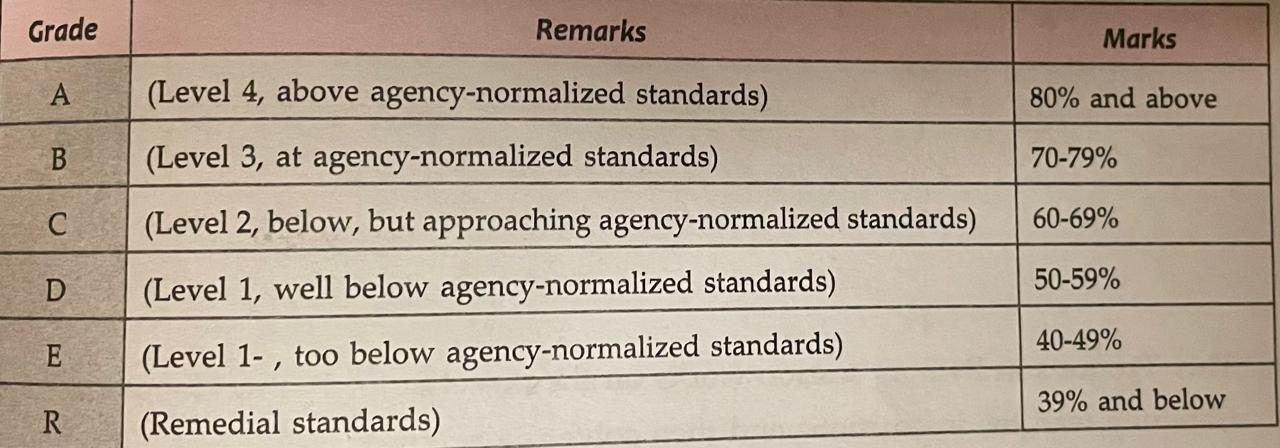
**PERSON 3:**

**WEIGHT-->91.5**

**HEIGHT-->200.5**

**BMI-->22.76105248101691**

1. Create a program to take input marks of students in 3 subjects physics, chemistry, and maths. Compute the percentage and then calculate the grade as per the following guidelines

****

**Hint =>**

1. Take input for the number of students
2. Create arrays to store marks, percentages, and grades of the students
3. Take input for marks of students in physics, chemistry, and maths. If the marks are negative, ask the user to enter positive values and decrement the index
4. Calculate the percentage and grade of the students based on the percentage
5. Display the marks, percentages, and grades of each student

**PROGRAM-**

**import java.util.Scanner;**

**class StudentGrade**

**{**

**public static void main(String[] args)**

**{**

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

**System.out.print("Enter Number of Students in class: ");**

**int StudentNumber=input.nextInt();**

**//Taking Total Marks of Each Subject**

**System.out.print("Total Marks in Physics: ");**

**double physicstotalmarks=input.nextDouble();**

**System.out.print("Total Marks in Chemistry: ");**

**double chemistrytotalmarks=input.nextDouble();**

**System.out.print("Total Marks in Maths: ");**

**double mathstotalmarks=input.nextDouble();**

**//Creating Grade Array**

**String[] grade=new String[StudentNumber];**

**//Creating Subject Arrays to store Marks**

**double[] physicsmarks=new double[StudentNumber];**

**double[] chemistrymarks=new double[StudentNumber];**

**double[] mathsmarks=new double[StudentNumber];**

**//Creating Percentage Array:**

**double[] percentage=new double[StudentNumber];**

**for(int i=0;i<StudentNumber;i++)**

**{**

**System.out.println("Student "+(i+1)+": ");**

**System.out.print("Enter Physics Marks:");**

**physicsmarks[i]=input.nextDouble();**

**System.out.print("Enter Chemistry Marks:");**

**chemistrymarks[i]=input.nextDouble();**

**System.out.print("Enter Maths Marks:");**

**mathsmarks[i]=input.nextDouble();**

**if(physicsmarks[i]<0 || physicsmarks[i]>physicstotalmarks || chemistrymarks[i]<0 || chemistrymarks[i]>chemistrytotalmarks || mathsmarks[i]<0 || mathsmarks[i]>mathstotalmarks)**

**{**

**System.out.println("Invalid Marks Entered or the Marks Entered exceeds the Total Marks of the Subject.");**

**System.out.println("Enter Values again.");**

**i--;**

**continue;**

**}**

**//Calculating Percentages Obtained:**

**percentage[i]=((mathsmarks[i]+physicsmarks[i]+chemistrymarks[i])/(mathstotalmarks+physicstotalmarks+chemistrytotalmarks))\*100;**

**//Storing Grades**

**if(percentage[i]>80.0)**

**{**

**grade[i]="Level 4,above agency-normalised standards.";**

**}**

**else if(percentage[i]>=70.0 && percentage[i]<80.0)**

**{**

**grade[i]="Level 3,at agency-normalised standards.";**

**}**

**else if(percentage[i]>=60.0 && percentage[i]<70.0)**

**{**

**grade[i]="Level 2,below,but approaching agency-normalised standards.";**

**}**

**else if(percentage[i]>=50.0 && percentage[i]<60.0)**

**{**

**grade[i]="Level 1,well below agency-normalised standards.";**

**}**

**else if(percentage[i]>=40.0 && percentage[i]<50.0)**

**{**

**grade[i]="Level 0,too below agency-normalised standards.";**

**}**

**else if(percentage[i]<40.0)**

**{**

**grade[i]="Remedial standards.";**

**}**

**else**

**{**

**System.out.println("Grade not possible.");**

**}**

**}**

**System.out.println("Physics Total Marks: "+physicstotalmarks);**

**System.out.println("Chemistry Total Marks: "+chemistrytotalmarks);**

**System.out.println("Maths Total Marks: "+mathstotalmarks);**

**System.out.println("\n\n");**

**//Displaying Details**

**for(int i=0;i<StudentNumber;i++)**

**{**

**System.out.println("\nStudent "+(i+1)+": ");**

**System.out.println("Grade :"+grade[i]);**

**System.out.println("Percentage: "+percentage[i]);**

**}**

**input.close();**

**}**

**}**

**OUTPUT-**

**Enter Number of Students in class: 5**

**Total Marks in Physics: 50**

**Total Marks in Chemistry: 50**

**Total Marks in Maths: 100**

**Student 1:**

**Enter Physics Marks:20**

**Enter Chemistry Marks:30**

**Enter Maths Marks:50**

**Student 2:**

**Enter Physics Marks:30**

**Enter Chemistry Marks:40**

**Enter Maths Marks:60**

**Student 3:**

**Enter Physics Marks:40**

**Enter Chemistry Marks:45**

**Enter Maths Marks:80**

**Student 4:**

**Enter Physics Marks:10**

**Enter Chemistry Marks:10**

**Enter Maths Marks:100**

**Student 5:**

**Enter Physics Marks:50**

**Enter Chemistry Marks:50**

**Enter Maths Marks:10**

**Physics Total Marks: 50.0**

**Chemistry Total Marks: 50.0**

**Maths Total Marks: 100.0**

**Student 1:**

**Grade :Level 1,well below agency-normalised standards.**

**Percentage: 50.0**

**Student 2:**

**Grade :Level 2,below,but approaching agency-normalised standards.**

**Percentage: 65.0**

**Student 3:**

**Grade :Level 4,above agency-normalised standards.**

**Percentage: 82.5**

**Student 4:**

**Grade :Level 2,below,but approaching agency-normalised standards.**

**Percentage: 60.0**

**Student 5:**

**Grade :Level 1,well below agency-normalised standards.**

**Percentage: 55.00000000000001**

1. Rewrite the above program to store the marks of the students in physics, chemistry, and maths in a 2D array and then compute the percentage and grade

**Hint =>**

1. All the steps are the same as the problem 8 except the marks are stored in a 2D array
2. Use the 2D array to calculate the percentages, and grades of the students

**PROGRAM-**

**import java.util.Scanner;**

**class GradeArrayTwoDimension**

**{**

**public static void main(String[] args)**

**{**

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

**System.out.print("Enter Number of Students in the class:");**

**int StudentNumber=input.nextInt();**

**//Creating 2D Array of Marks**

**double[][] Marks=new double[StudentNumber][3];**

**//Taking Total Marks of Each Subject**

**System.out.print("Total Marks in Physics: ");**

**double physicstotalmarks=input.nextDouble();**

**System.out.print("Total Marks in Chemistry: ");**

**double chemistrytotalmarks=input.nextDouble();**

**System.out.print("Total Marks in Maths: ");**

**double mathstotalmarks=input.nextDouble();**

**//Creating Grade Array**

**String[] grade=new String[StudentNumber];**

**System.out.println("Subject 1:Physics");**

**System.out.println("Subject 2:Chemistry");**

**System.out.println("Subject 3:Maths");**

**//Storing Values in the Marks Array**

**for(int i=0;i<StudentNumber;i++)//Outer Loop Represents the Students**

**{**

**System.out.print("\n\nStudent "+(i+1)+":");**

**for(int j=0;j<3;j++)//inner loop represents the Subjects**

**{**

**System.out.print("\nSubject "+(i+1)+":");**

**if(j==0)**

**{**

**System.out.print("Enter Physics Marks:");**

**Marks[i][j]=input.nextDouble();**

**}**

**else if(j==1)**

**{**

**System.out.print("Enter Chemistry Marks:");**

**Marks[i][j]=input.nextDouble();**

**}**

**else**

**{**

**System.out.print("Enter Maths Marks:");**

**Marks[i][j]=input.nextDouble();**

**}**

**}**

**}**

**//Creating Percentage Array**

**double[] percentage=new double[StudentNumber];**

**for(int i=0;i<StudentNumber;i++)**

**{**

**percentage[i]=(Marks[i][0]+Marks[i][1]+Marks[i][2])/(physicstotalmarks+chemistrytotalmarks+mathstotalmarks)\*100;**

**if(Marks[i][0]<0 || Marks[i][0]>physicstotalmarks || Marks[i][1]<0 || Marks[i][1]>chemistrytotalmarks || Marks[i][2]<0 || Marks[i][2]>mathstotalmarks)**

**{**

**System.out.println("Invalid Marks Entered or the Marks Entered exceeds the Total Marks of the Subject.");**

**System.out.println("Enter Values again.");**

**i--;**

**continue;**

**}**

**//Storing Grades**

**if(percentage[i]>80.0)**

**{**

**grade[i]="Level 4,above agency-normalised standards.";**

**}**

**else if(percentage[i]>=70.0 && percentage[i]<80.0)**

**{**

**grade[i]="Level 3,at agency-normalised standards.";**

**}**

**else if(percentage[i]>=60.0 && percentage[i]<70.0)**

**{**

**grade[i]="Level 2,below,but approaching agency-normalised standards.";**

**}**

**else if(percentage[i]>=50.0 && percentage[i]<60.0)**

**{**

**grade[i]="Level 1,well below agency-normalised standards.";**

**}**

**else if(percentage[i]>=40.0 && percentage[i]<50.0)**

**{**

**grade[i]="Level 0,too below agency-normalised standards.";**

**}**

**else if(percentage[i]<40.0)**

**{**

**grade[i]="Remedial standards.";**

**}**

**else**

**{**

**System.out.println("Grade not possible.");**

**}**

**}**

**System.out.println("Physics Total Marks: "+physicstotalmarks);**

**System.out.println("Chemistry Total Marks: "+chemistrytotalmarks);**

**System.out.println("Maths Total Marks: "+mathstotalmarks);**

**System.out.println("\n\n");**

**//Displaying Details**

**for(int i=0;i<StudentNumber;i++)**

**{**

**System.out.println("\nStudent "+(i+1)+": ");**

**System.out.println("\nPhysics Marks:"+Marks[i][0]);**

**System.out.println("\nChemistry Marks:"+Marks[i][1]);**

**System.out.println("\nMaths Marks:"+Marks[i][2]);**

**System.out.println("\nGrade :"+grade[i]);**

**System.out.println("Percentage: "+percentage[i]);**

**}**

**input.close();**

**}**

**}**

**OUTPUT-**

**Enter Number of Students in the class:5**

**Total Marks in Physics: 50**

**Total Marks in Chemistry: 50**

**Total Marks in Maths: 100**

**Subject 1:Physics**

**Subject 2:Chemistry**

**Subject 3:Maths**

**Student 1:**

**Subject 1:Enter Physics Marks:30**

**Subject 1:Enter Chemistry Marks:20**

**Subject 1:Enter Maths Marks:70**

**Student 2:**

**Subject 2:Enter Physics Marks:40**

**Subject 2:Enter Chemistry Marks:30**

**Subject 2:Enter Maths Marks: 65**

**Student 3:**

**Subject 3:Enter Physics Marks:45**

**Subject 3:Enter Chemistry Marks:45**

**Subject 3:Enter Maths Marks:60**

**Student 4:**

**Subject 4:Enter Physics Marks:40**

**Subject 4:Enter Chemistry Marks:40**

**Subject 4:Enter Maths Marks:80**

**Student 5:**

**Subject 5:Enter Physics Marks:25**

**Subject 5:Enter Chemistry Marks:30**

**Subject 5:Enter Maths Marks:100**

**Grade not possible.**

**Physics Total Marks: 50.0**

**Chemistry Total Marks: 50.0**

**Maths Total Marks: 100.0**

**Student 1:**

**Physics Marks:30.0**

**Chemistry Marks:20.0**

**Maths Marks:70.0**

**Grade :Level 2,below,but approaching agency-normalised standards.**

**Percentage: 60.0**

**Student 2:**

**Physics Marks:40.0**

**Chemistry Marks:30.0**

**Maths Marks:65.0**

**Grade :Level 2,below,but approaching agency-normalised standards.**

**Percentage: 67.5**

**Student 3:**

**Physics Marks:45.0**

**Chemistry Marks:45.0**

**Maths Marks:60.0**

**Grade :Level 3,at agency-normalised standards.**

**Percentage: 75.0**

**Student 4:**

**Physics Marks:40.0**

**Chemistry Marks:40.0**

**Maths Marks:80.0**

**Grade :null**

**Percentage: 80.0**

**Student 5:**

**Physics Marks:25.0**

**Chemistry Marks:30.0**

**Maths Marks:100.0**

**Grade :Level 3,at agency-normalised standards.**

**Percentage: 77.5**

1. Create a program to take a number as input find the frequency of each digit in the number using an array and display the frequency of each digit

**Hint =>**

1. Take the input for a number
2. Find the count of digits in the number
3. Find the digits in the number and save them in an array
4. Find the frequency of each digit in the number. For this define a frequency array of size 10, Loop through the digits array, and increase the frequency of each digit
5. Display the frequency of each digit in the number

**PROGRAM-**

**import java.util.Scanner;**

**public class FrequencyDigits**

**{**

**public static void main(String[] args)**

**{**

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

**System.out.print("Enter Number:");**

**int Number=input.nextInt();**

**//Creating Temporary Variable**

**int t=Number;**

**//Creating a Variable to Store the Number of Digits**

**int count=0;**

**//Counting the Number of Digits of the Number**

**while(t>0)**

**{**

**count++;**

**t/=10;**

**}**

**//Creating an Array to Store the Digits of The Number**

**int[] Digits=new int[count];**

**t=Number;**

**//Storing Digits into the Array**

**for(int i=0;i<count;i++)**

**{**

**Digits[i]=t%10;**

**t/=10;**

**}**

**//Before Sorting the Array:**

**System.out.println("Digits of the Number "+Number+" :");**

**for(int i=0;i<count;i++)**

**{**

**System.out.print(Digits[i]+" ");**

**}**

**//Creating an Array to store the frequency of digits**

**int[] frequency=new int[count];**

**//Sorting the Digits Array**

**for(int i=0;i<count-1;i++)**

**{**

**for (int j=0;j<count-1-i;j++)**

**{**

**if(Digits[j]>Digits[j+1])**

**{**

**// Swap Digits[j] and Digits[j+1]**

**int temp=Digits[j];**

**Digits[j]=Digits[j+1];**

**Digits[j+1]=temp;**

**}**

**}**

**}**

**//Working on the Frequency Array**

**int currentDigit=Digits[0],FREQUENCY=1,startIndex=0;**

**for (int i = 1; i <= count; i++)**

**{**

**if (i<count && Digits[i]==currentDigit)**

**{**

**FREQUENCY++;**

**}**

**else**

**{**

**// Fill frequency for all occurrences of the digit**

**for (int j=startIndex;j<i;j++)**

**{**

**frequency[j]=FREQUENCY;**

**}**

**// Reset for next digit**

**if (i<count)**

**{**

**currentDigit=Digits[i];**

**FREQUENCY=1;**

**startIndex=i;**

**}**

**}**

**}**

**System.out.println("Digits of the Number and its Frequencies:");**

**for(int i=0;i<count;i++)**

**{**

**System.out.println("Digit "+(i+1)+" :"+Digits[i]+"------>"+frequency[i]);**

**}**

**input.close();**

**}**

**}**

**OUTPUT-**

**Enter Number:37593**

**Digits of the Number 37593 :**

**3 9 5 7 3 Digits of the Number and its Frequencies:**

**Digit 1 :3------>2**

**Digit 2 :3------>2**

**Digit 3 :5------>1**

**Digit 4 :7------>1**

**Digit 5 :9------>1**