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Sec: A

Subject Code: MCA292

Subject.: Object-Oriented Programming with Java Lab

Department.: Department of Computer Application(MCA)

Week: 1

1. Write a Java program to print your name.

```
Code: public class name {  
    public static void main(String[] args){  
        System.out.println("Sutirtha Samanta ");  
    }  
}  
  
Sutirtha Samanta  
PS C:\Users\User\Desktop\Java\practice> █
```

2. Write a Java program to add two numbers.

```
Code: import java.util.*;  
public class sum {  
    public static void main(String[] args) {  
        Scanner reader = new Scanner(System.in);  
        System.out.print("Enter a number:: ");  
        int num1 = reader.nextInt();  
        System.out.print("Enter another number:: ");  
        int num2 = reader.nextInt();  
        int sum = num1+num2;  
        System.out.println("Sum is :: "+sum);  
    }  
}  
  
Enter a number:: 24  
Enter another number:: 55  
Sum is :: 79  
PS C:\Users\User\Desktop\Java\practice> █
```

3. Write a Java program to change temperature from Celsius to Fahrenheit.

```
Code: import java.util.*;  
public class conversion {  
    public static void main(String[] args) {  
        Scanner reader = new Scanner(System.in);  
        System.out.print("Enter temperature in Celcius:: ");  
        double temp = reader.nextDouble();  
    }  
}
```

```

double fer = (temp*1.8)+32;
System.out.println("Temperature in Fahrenheit:: "+fer);
}
}
Enter temperature in Celcius:: 25
Temperature in Fahrenheit:: 77.0
PS C:\Users\User\Desktop\Java\practice> █

```

4. Write a Java program to change temperature from Fahrenheit to Celsius.

Code: import java.util.Scanner;
public class HelloWorld {

public static void main(String[] Strings) {

Scanner input = new Scanner(System.in);

System.out.print("Input a degree in Fahrenheit: ");
double fahrenheit = input.nextDouble();

double celsius = ((5 *(fahrenheit - 32.0)) / 9.0);
System.out.println(fahrenheit + " degree Fahrenheit is equal to " +
celsius + " in Celsius");
}
}

```

Input a degree in Fahrenheit: 95
95.0 degree Fahrenheit is equal to 35.0 in Celsius

```

```

PS C:\Users\User\Desktop\Java\practice> █

```

5. Write a Java program to find area and perimeter of a rectangle.

Code: import java.util.*;

public class rectangle {

public static void main(String[] args) {

Scanner obj = new Scanner(System.in);

System.out.print("Enter Length::");

int len = obj.nextInt();

System.out.print("Enter Width::");

int wid = obj.nextInt();

double peri = 2*(len+wid);

double area = len*wid;

System.out.println("Perimeter of rectangle is:: "+peri);

```
    System.out.println("Area of rectangle is:: "+area);
}
}
```

```
Enter Length::9
Enter Width::4
Perimeter of rectangle is:: 26.0
Area of rectangle is:: 36.0
PS C:\Users\User\Desktop\Java\practice> █
```

6. Write a Java program to find area and perimeter of a circle.

Code: import java.util.*;

```
public class circle {
    public static void main(String[] args) {
        Scanner reader = new Scanner(System.in);
        System.out.print("Enter radius:: ");
        double r = reader.nextDouble();
        double peri = 2*3.14*r;
        double area = 3.14*r*r;
        System.out.println("Perimeter of Circle is :: " +peri);
        System.out.println("Area of Circle is :: " +area);
    }
}
```

```
Enter radius:: 5
Perimeter of Circle is :: 31.400000000000002
Area of Circle is :: 78.5
PS C:\Users\User\Desktop\Java\practice> █
```

7. Write a Java Program to display whether a number is odd or even.

Code: import java.util.*;

```
public class oddeven {
    public static void main(String[] args) {
        Scanner obj = new Scanner(System.in);
        System.out.print("Enter a number :: ");
        int num1 = obj.nextInt();
        if (num1 % 2 == 0){
            System.out.println(num1 + " is even!" );
        }else{
            System.out.println(num1 + "is Odd!");
        }
    }
}
```

```
Enter a number :: 55
55is Odd!
PS C:\Users\User\Desktop\Java\practice> █
```

8. Write a Java Program to check if a number is Positive or Negative.

Code: import java.util.*;

```
public class positivenegative {
    public static void main(String[] args) {
        Scanner read = new Scanner(System.in);
        System.out.print("Enter number:: ");
        int num1 = read.nextInt();
        if (num1<0){
            System.out.println(num1 + " is negative!");
        }else if(num1 == 0){
            System.out.println(num1 + " is Zero!");
        }else {
            System.out.println(num1 + " is positive!");
        }
    }
}
```

```
Enter number:: -7
-7 is negative!
PS C:\Users\User\Desktop\Java\practice> █
```

9. Write a Java program to find maximum of three numbers.

Code: import java.util.*;

```
public class max {
    public static void main(String[] args) {
        Scanner reader = new Scanner(System.in);
        System.out.print("Enter 1st number = ");
        int num1 = reader.nextInt();
        System.out.print("Enter 2nd number = ");
        int num2 = reader.nextInt();
        System.out.print("Enter 3rd number = ");
        int num3 = reader.nextInt();
        if(num1>num2 && num1>num3){
            System.out.println(num1 + " is Greater from "+ num2 + " "+ num3);
        }else if (num2>num1 && num2>num3){
            System.out.println(num2 + " is Greater from "+ num1 + " "+ num3);
        }else {
            System.out.println(num3 + " is Greater from "+ num1 + " "+ num2);
        }
    }
}
```

```
}  
}  
Enter 1st number = 60  
Enter 2nd number = 43  
Enter 3rd number = 89  
89 is Greater from 60 43  
PS C:\Users\User\Desktop\Java\practice> █
```

10. Write a Java program to swap two numbers.

Code: import java.util.*;
public class swap {
 public static void main(String[] args) {
 Scanner reader = new Scanner(System.in);
 System.out.print("Enter 1st number = ");
 int num1 = reader.nextInt();
 System.out.print("Enter 2nd number = ");
 int num2 = reader.nextInt();
 int temp = num1;
 num1 = num2;
 num2 = temp;
 System.out.println("After Swap :: "+ num1 + " " + num2);
 }
}
Enter 1st number = 37
Enter 2nd number = 68
After Swap :: 68 37
PS C:\Users\User\Desktop\Java\practice> █

11. Write a Java program to convert miles to kilometers.

Code: import java.util.*;
public class distance {
 public static void main(String[] args) {
 Scanner reader = new Scanner(System.in);
 System.out.print("Enter Distance in mile:: ");
 double dist = reader.nextDouble();
 double kilo = dist*1.609;
 System.out.print(dist + " mile = " + kilo +"km.");
 }
}
Enter Distance in mile:: 13
13.0 mile = 20.917km.
PS C:\Users\User\Desktop\Java\practice> █

12. Write a Java program to check whether a year is leap year or not.

Code: import java.util.*;

```
public class leapyear {  
    public static void main(String[] args) {  
        Scanner reader = new Scanner(System.in);  
        System.out.print("Enter a Year :: ");  
        int year = reader.nextInt();  
        boolean leap = false;  
        if (year % 4 == 0) {  
            if (year % 100 == 0) {  
                leap = (year % 400 == 0);  
            } else {  
                leap = true;  
            }  
        }  
        if (leap) {  
            System.out.println(year + " is a leap year!");  
        } else {  
            System.out.println(year + " is not a leap year!");  
        }  
        reader.close();  
    }  
}
```

Enter a Year :: 2025

2025 is not a leap year!

PS C:\Users\User\Desktop\Java\practice> █

13. Write a Java program for following grading system. Note:

Percentage >= 90% : **Grade A** Percentage >= 80% : **Grade B**

Percentage >= 70% : **Grade C** Percentage >= 60% : **Grade D**

Percentage >= 40% : **Grade E** Percentage < 40% : **Grade F**

Code: import java.util.*;

```
public class grade {  
    public static void main(String[] args) {  
        Scanner reader = new Scanner(System.in);  
        System.out.print("Enter Percentage :: ");  
        double percent = reader.nextDouble();  
        char grade;  
        if (percent >= 90) {  
            grade = 'A';  
        } else if (percent >= 80) {
```

```

        grade = 'B';
    }else if (percent>=70) {
        grade = 'C';
    }else if (percent>=60) {
        grade = 'D';
    }else if (percent>=40) {
        grade = 'E';
    }else{
        grade = 'F';
    }
    System.out.println("Grade :: " + grade);
}
}

```

```

Enter Percentage :: 85
Grade :: B

```

14. Write a Java program to check whether a number is divisible by 5 or not.

Code: import java.util.*;

```

public class divisibility {
    public static void main(String[] args) {
        Scanner reader = new Scanner(System.in);
        System.out.print("Enter a number:: ");
        int num = reader.nextInt();
        if (num%5 == 0) {
            System.out.println("Number is divisible!");
        }else{
            System.out.println("Number is not divisible!");
        }
    }
}

```

```

Enter a number:: 77
Number is not divisible!
PS C:\Users\User\Desktop\Java\practice>

```

Week 2

1. Write a Java program to check whether a number is Buzz or not.

Code: import java.util.*;

```

public class Buzz {
    public static void main(String[] args) {

```

```

Scanner reader = new Scanner(System.in);
System.out.print("Enter a Number:: ");
int num = reader.nextInt();

boolean buzz = (num%7 == 0 || num%10 == 7);

if (buzz){
    System.out.println(num+ " is Buzz Number!");
}else{
    System.out.println(num+ " is not a Buzz Number!");
}
}
}

```

Enter a Number:: 77
77 is Buzz Number!
PS C:\Users\User\Desktop\Java\practice> █

2. Write a Java program to calculate factorial of 12.

Code:

```

public class factorial {
    public static void main(String[] args) {
        long fact = factorial(12);
        System.out.println("Factorial of 12 is :: " + fact);
    }
    public static long factorial (int n){
        if (n==0||n==1) {
            return 1;
        }else{
            long result = 1;
            for(int i = 2; i<=n; i++){
                result = result*i;
            }
            return result;
        }
    }
}

```

Factorial of 12 is :: 479001600
PS C:\Users\User\Desktop\Java\practice>

3. Write a Java program for Fibonacci series.

Code:

```

import java.util.*;
public class fibonacci {

```



```

public static void main(String[] args) {
    Scanner reader = new Scanner(System.in);
    System.out.print("Enter a number :: ");
    int num = reader.nextInt();
    System.out.print(num + " Fibonacci series:: ");
    fibo(num);
}
public static void fibo (int n){
    int first = 0, second = 1;
    for (int i = 1; i<=n; i++){
        System.out.print(first + " ");
        int temp = first+second;
        first = second;
        second = temp;
    }
}
}
Enter a number :: 7
7 Fibonacci series:: 0 1 1 2 3 5 8
PS C:\Users\User\Desktop\Java\practice>

```

4. Write a Java program to reverse a number.

Code: import java.util.*;

```

public class reverse {
    public static void main(String[] args) {
        Scanner reader = new Scanner(System.in);
        System.out.print("Enter a number:: ");
        int num = reader.nextInt();
        int reversenum = reverse(num);
        System.out.println("Reversed number :: "+reversenum);
    }
    public static int reverse(int n){
        int reversenum = 0;
        while (n!=0) {
            int digit = n%10;
            reversenum = reversenum*10+digit;
            n= n/10;
        }
        return reversenum;
    }
}

```

```
Enter a number:: 12345
Reversed number :: 54321
```

5. Admission to a professional course is subject to the following conditions: (a) marks in Mathematics ≥ 60 (b) marks in Physics ≥ 50 (c) marks in Chemistry ≥ 40 (d) Total in all 3 subjects ≥ 200 (Or) Total in Maths & Physics ≥ 150 Given the marks in the 3 subjects of n (user input) students, write a program to process the applications to list the eligible candidates.

```
Code: import java.util.*;;
public class eligibility {
    public static void main(String[] args) {
        Scanner reader = new Scanner(System.in);
        System.out.print("Enter number of students:: ");
        int num = reader.nextInt();
        for(int i = 1; i <= num ; i++){
            System.out.println("Enter marks for student " + i + ":");
            System.out.print("Math:: ");
            int num1 = reader.nextInt();
            System.out.print("Physics :: ");
            int num2 = reader.nextInt();
            System.out.print("Chemistry :: ");
            int num3 = reader.nextInt();
            int total = num1+num2;
            if ((num1>=60 && num2>= 50 && num3>=40)&&( total>= 150)){
                System.out.println("Eligable!");
            }else{
                System.out.println("Not Eligable!");
            }
        }
    }
}

Enter number of students:: 2
Enter marks for student 1:
Math:: 100
Physics :: 97
Chemistry :: 97
Eligable!
Enter marks for student 2:
Math:: 26
Physics :: 40
Chemistry :: 30
Not Eligable!
PS C:\Users\User\Desktop\Java\practice> █
```

6. Write a Java program to find all roots of a quadratic equation.

Code: import java.util.*;

```
public class roots {  
    public static void main(String[] args) {  
        Scanner scanner = new Scanner(System.in);  
        System.out.print("Enter coefficient a: ");  
        double a = scanner.nextDouble();  
        System.out.print("Enter coefficient b: ");  
        double b = scanner.nextDouble();  
        System.out.print("Enter coefficient c: ");  
        double c = scanner.nextDouble();  
        double discriminant = b * b - 4 * a * c;  
        if (discriminant > 0) {  
            double root1 = (-b + Math.sqrt(discriminant)) / (2 * a);  
            double root2 = (-b - Math.sqrt(discriminant)) / (2 * a);  
            System.out.println("Root 1: " + root1);  
            System.out.println("Root 2: " + root2);  
        } else if (discriminant == 0) {  
            double root = -b / (2 * a);  
            System.out.println("Roots are real and equal: " + root);  
        } else {  
            double realPart = -b / (2 * a);  
            double imaginaryPart = Math.sqrt(-discriminant) / (2 * a);  
            System.out.println("Root 1: " + realPart + " + " + imaginaryPart + "i");  
            System.out.println("Root 2: " + realPart + " - " + imaginaryPart + "i");  
        }  
        scanner.close();  
    }  
}
```

```
Enter coefficient a: 3  
Enter coefficient b: 2  
Enter coefficient c: 1  
Root 1: -0.3333333333333333 + 0.47140452079103173i  
Root 2: -0.3333333333333333 - 0.47140452079103173i  
PS C:\Users\User\Desktop\Java\practice> █
```

7. Write a Java program to calculate the sum of natural numbers up to a certain range.

Code: import java.util.*;

```
public class sum_natural {  
    public static void main(String[] args) {  
        Scanner reader = new Scanner(System.in);  
        System.out.print("Enter the range of natural number:: ");
```

```

    int num = reader.nextInt();
    int sum = total(num);
    System.out.println("Sum is :: "+sum);
}
public static int total(int num){
    int sum = 0;
    for(int i = 0; i<=num ; i++){
        sum= sum+i;
    }
    return sum;
}
}

```

```

Enter the range of natural number:: 5
Sum is :: 15

```

8. Write a Java program to print all multiple of 10 between a given interval.

Code: import java.util.*;

```

public class multiple {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter the starting number : ");
        int start = scanner.nextInt();
        System.out.print("Enter the ending number : ");
        int end = scanner.nextInt();
        System.out.println("Multiples of 10 within the interval [" + start + ", " + end
+ "]:");
        mul(start, end);
        scanner.close();
    }
    public static void mul(int start, int end) {
        if (start % 10 != 0) {
            start += 10 - (start % 10);
        }
        for (int i = start; i <= end; i += 10) {
            System.out.println(i);
        }
    }
}

```

```
Enter the starting number : 25
Enter the ending number : 35
Multiples of 10 within the interval [25, 35]:
30
```

9. Write a Java program to generate multiplication table.

Code: import java.util.*;

```
public class multiplication {
    public static void main(String[] args) {
        Scanner reader = new Scanner(System.in);
        System.out.print("Enter number:: ");
        int num = reader.nextInt();
        table(num);
    }
    public static void table(int n){
        System.out.println("Multiplication table " + n + ":");
        for (int i = 1; i <= 10; i++) {
            System.out.println(n + " x " + i + " = " + (n * i));
        }
    }
}
```

```
Enter number:: 19
Multiplication table 19:
19 x 1 = 19
19 x 2 = 38
19 x 3 = 57
19 x 4 = 76
19 x 5 = 95
19 x 6 = 114
19 x 7 = 133
19 x 8 = 152
19 x 9 = 171
19 x 10 = 190
```

10. Write a Java program to find HCF of two Numbers.

Code: import java.util.*;

```
public class HCFOftwonumber {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter the first number: ");
        int num1 = scanner.nextInt();
        System.out.print("Enter the second number: ");
        int num2 = scanner.nextInt();
        int hcf = findHCF(num1, num2);
        System.out.println("The HCF of " + num1 + " and " + num2 + " is: " + hcf);
        scanner.close();
    }
}
```

```

public static int findHCF(int num1, int num2) {
    int small = Math.min(num1, num2);
    int hcf = 1;
    for (int i = 1; i <= small; i++) {
        if (num1 % i == 0 && num2 % i == 0) {
            hcf = i;
        }
    }
    return hcf;
}
}

```

```

Enter the first number: 25
Enter the second number: 55
The HCF of 25 and 55 is: 5

```

11. Write a Java program to find LCM of two Numbers.

Code: import java.util.*;

```

public class LCMofTwoNumber {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter the first number: ");
        int num1 = scanner.nextInt();
        System.out.print("Enter the second number: ");
        int num2 = scanner.nextInt();

        int lcm = findLCM(num1, num2);
        System.out.println("The LCM of " + num1 + " and " + num2 + " is: " +
lcm);

        scanner.close();
    }

    public static int findLCM(int num1, int num2) {
        int max = Math.max(num1, num2);
        while (true) {
            if (max % num1 == 0 && max % num2 == 0) {
                return max;
            }
            max++;
        }
    }
}

```

```
}  
}
```

```
Enter the first number: 25  
Enter the second number: 55  
The LCM of 25 and 55 is: 275
```

12. Write a Java program to count the number of digits of an integer.

Code: import java.util.*;

```
public class count_digit {  
    public static void main(String[] args){  
        Scanner read = new Scanner(System.in);  
        System.out.print("Enter an integer::");  
        int num = read.nextInt();  
        int count = 0;  
        int temp = num;  
        while (temp!=0) {  
            temp = temp/10;  
            count ++;  
        }  
        System.out.println("Number of Digits:: " +count);  
    }  
}
```

```
Enter an integer::12345  
Number of Digits:: 5
```

13. Write a Java program to calculate the exponential of a number.

Code: import java.util.*;

```
public class exponent {  
    public static void main(String[] args) {  
        Scanner scanner = new Scanner(System.in);  
        System.out.print("Enter the base: ");  
        double base = scanner.nextDouble();  
        System.out.print("Enter the exponent: ");  
        int exponent = scanner.nextInt();  
  
        double result = calculate(base, exponent);  
  
        System.out.println("Exponential of " + base + " raised to the power " +  
exponent + " is: " + result);  
    }  
}
```

```

public static double calculate(double base, int exponent) {
    double result = 1;
    for (int i = 0; i < Math.abs(exponent); i++) {
        result *= base;
    }
    if (exponent < 0) {
        result = 1 / result;
    }
    return result;
}
}
Enter the base: 5
Enter the exponent: 3
Exponential of 5.0 raised to the power 3 is: 125.0
PS C:\Users\User\Desktop\Java\practice> █

```

14. Write a Java program to check whether a number is palindrome or not.

Code: import java.util.*;

```

public class palindrome {
    public static void main(String[] args) {
        Scanner read = new Scanner(System.in);
        System.out.print("Enter a number :: ");
        int num = read.nextInt();
        boolean palin = check(num);
        if (palin) {
            System.out.println(num+ " is a palindrome!");
        }else{
            System.out.println(num+ " is not a palindrome!");
        }
    }
    public static boolean check (int n){
        int temp = n;
        int rev = 0;
        while (n!=0) {
            int digit = n%10;
            rev = rev*10+digit;
            n = n/10;
        }
        return temp==rev;
    }
}

```



```
}  
Enter a number :: 131  
131 is a palindrome!
```

15. Write a Java program to check whether a number is prime or not.

Code: import java.util.*;

```
public class prime {  
    public static void main(String[] args) {  
        Scanner scanner = new Scanner(System.in);  
        System.out.print("Enter a number: ");  
        int num = scanner.nextInt();  
        boolean isPrime = checkPrime(num);  
        if (isPrime) {  
            System.out.println(num + " is a prime number.");  
        } else {  
            System.out.println(num + " is not a prime number.");  
        }  
        scanner.close();  
    }  
    public static boolean checkPrime(int num) {  
        if (num <= 1) {  
            return false;  
        }  
        for (int i = 2; i <= Math.sqrt(num); i++) {  
            if (num % i == 0) {  
                return false;  
            }  
        }  
        return true;  
    }  
}
```

```
Enter a number: 89  
89 is a prime number.  
PS C:\Users\User\Desktop\Java\practice> █
```

16. Write a Java program to convert a Binary Number to Decimal and Decimal to Binary. Code: import java.util.*;

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

```

System.out.print("Enter a binary number: ");
String binary = scanner.nextLine();
int decimal = binary_decimal(binary);
System.out.println("Decimal equivalent: " + decimal);
System.out.print("Enter a decimal number: ");
int number = scanner.nextInt();
String binaryEquivalent = decimal_binary(number);
System.out.println("Binary equivalent: " + binaryEquivalent);
scanner.close();
}
public static int binary_decimal(String binary) {
    int decimal = 0;
    int power = 0;
    for (int i = binary.length() - 1; i >= 0; i--) {
        if (binary.charAt(i) == '1') {
            decimal += Math.pow(2, power);
        }
        power++;
    }
    return decimal;
}
public static String decimal_binary(int number) {
    StringBuilder binary = new StringBuilder();
    while (number > 0) {
        binary.insert(0, number % 2);
        number /= 2;
    }
    return binary.toString();
}
}

```

Enter a binary number: 1011

Decimal equivalent: 11

Enter a decimal number: 34

Binary equivalent: 100010

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17. Write a Java program to find median of a set of numbers.

Code: import java.util.Arrays;

import java.util.*;

public class median {

public static void main(String[] args) {

Scanner scanner = new Scanner(System.in);

```

System.out.print("Enter the number of elements: ");
int n = scanner.nextInt();
double[] numbers = new double[n];
System.out.println("Enter the elements:");
for (int i = 0; i < n; i++) {
    numbers[i] = scanner.nextDouble();
}
Arrays.sort(numbers);
double median;
if (n % 2 == 0) {
    median = (numbers[n / 2 - 1] + numbers[n / 2]) / 2;
} else {
    median = numbers[n / 2];
}
System.out.println("Median: " + median);
}
Enter the number of elements: 4
Enter the elements:
19
53
34
27
Median: 30.5
} PS C:\Users\User\Desktop\Java\practice> █

```

18. Write a program to compute the value of Euler's number that is used as the base of natural logarithms. Use the following formula. $e = 1 + \frac{1}{1!} + \frac{1}{2!} + \frac{1}{3!} + \dots + \frac{1}{n!}$

Code: import java.util.Scanner;

```

public class EulerNumber {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter the value of n: ");
        int n = scanner.nextInt();
        double e = calculateEulerNumber(n);
        System.out.println("Euler's number (e) with n = " + n + " is: " + e);
        scanner.close();
    }
    public static double calculateEulerNumber(int n) {
        double e = 1;
        double factorial = 1;
        for (int i = 1; i <= n; i++) {

```

```

        factorial *= i;
        e += 1.0 / factorial;
    }
    return e;
}
}

```

```

Enter the value of n: 5
Euler's number (e) with n = 5 is: 2.7166666666666663

```

19. Write a Java program to generate all combination of 1, 2, or 3 using loop.

Code:

```

public class combinations_123 {
    public static void main(String[] args) {
        generateCombinations();
    }
    public static void generateCombinations() {
        for (int i = 1; i <= 3; i++) {
            for (int j = 1; j <= 3; j++) {
                for (int k = 1; k <= 3; k++) {
                    System.out.println(i + " " + j + " " + k);
                }
            }
        }
    }
}

```

```

1 1 1
1 1 2
1 1 3
1 2 1
1 2 2
1 2 3
1 3 1
1 3 2
1 3 3
2 1 1
2 1 2
2 1 3
2 2 1

```

20. Write a Java program to read two integer values m and n and to decide and print whether m is multiple of n.

Code:

```

import java.util.Scanner;
public class multiple_checker {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
    }
}

```

```

System.out.print("Enter two integers (m and n): ");
int m = scanner.nextInt();
int n = scanner.nextInt();
if (m % n == 0) {
    System.out.println(m + " is a multiple of " + n);
} else {
    System.out.println(m + " is not a multiple of " + n);
}
scanner.close();
}
}

```

```

Enter two integers (m and n): 12 4
12 is a multiple of 4

```

21. Write a Java program to display prime numbers between a given interval.

Code: import java.util.Scanner;

```

public class prime_interval {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter the lower bound of the interval: ");
        int lowerBound = scanner.nextInt();
        System.out.print("Enter the upper bound of the interval: ");
        int upperBound = scanner.nextInt();
        System.out.println("Prime numbers between " + lowerBound + " and " +
upperBound + ":");
        for (int i = lowerBound; i <= upperBound; i++) {
            if (isPrime(i)) {
                System.out.print(i + " ");
            }
        }
        scanner.close();
    }
    public static boolean isPrime(int number) {
        if (number <= 1) {
            return false;
        }
        for (int i = 2; i <= Math.sqrt(number); i++) {
            if (number % i == 0) {
                return false;
            }
        }
    }
}

```

```

    }
    return true;
}
}
Enter the lower bound of the interval: 1 15
Enter the upper bound of the interval: Prime numbers between 1 and 15:
2 3 5 7 11 13
PS C:\Users\User\Desktop\Java\practice>

```

22. Write a Java program to check whether a given number is Armstrong Number or not.

Code:

```

import java.util.Scanner;
public class armstrong_num {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter a number: ");
        int number = scanner.nextInt();
        if (isArmstrongNumber(number)) {
            System.out.println(number + " is an Armstrong number.");
        } else {
            System.out.println(number + " is not an Armstrong number.");
        }
        scanner.close();
    }
    public static boolean isArmstrongNumber(int number) {
        int originalNumber = number;
        int sum = 0;
        int digits = String.valueOf(number).length();
        while (number > 0) {
            int digit = number % 10;
            sum += Math.pow(digit, digits);
            number /= 10;
        }
        return originalNumber == sum;
    }
}

```

```

Enter a number: 151
151 is not an Armstrong number.

```

Write Java programs for the patterns given bellow: (23-25)

23. 1
2 3 4
5 6 7 8 9

Code: public class pattern {
public static void main(String[] args) {
int num = 1;
int count = 1;
for (int i = 1; i <= 3; i++) {
for (int j = 1; j <= count; j++) {
System.out.print(num + " ");
num++;
}
System.out.println();
count += 2;
}
}

1
2 3 4
5 6 7 8 9

PS C:\Users\User\Desktop\Java\practice>

24. 1
2 1 2
3 2 1 2 3
4 3 2 1 2 3 4

Code: public class pattern {
public static void main(String[] args) {
int rows = 4;
for (int i = 1; i <= rows; i++) {
for (int j = rows - i; j >= 1; j--) {
System.out.print(" ");
}
for (int k = i; k >= 1; k--) {
System.out.print(k + " ");
}
for (int l = 2; l <= i; l++) {
System.out.print(l + " ");
}
System.out.println();
}
}

```
class pattern {
```

```
1
```

```
2 1 2
```

```
3 2 1 2 3
```

```
4 3 2 1 2 3 4
```

```
PS C:\Users\User\Desktop\Java\practice>
```

```
25. 1      1
```

```
2    2
```

```
3 3
```

```
4
```

```
Code: public class pattern {  
    public static void main(String[] args) {  
        int rows = 4;  
        for (int i = 1; i <= rows; i++) {  
            for (int j = 1; j < i; j++) {  
                System.out.print(" ");  
            }  
            System.out.print(i);  
            for (int k = 1; k <= 4 * (rows - i); k++) {  
                System.out.print(" ");  
            }  
            if (i < rows) {  
                System.out.println(i);  
            } else {  
                System.out.println();  
            }  
        }  
    }  
}
```

```
1      1
```

```
2    2
```

```
3 3
```

```
4
```

```
PS C:\Users\User\Desktop\Java\practice>
```

Week: 3

1. Write a Java program to calculate Sum & Average of an integer array.

```
Code: public class SumAndAverage {  
    public static void main(String[] args) {  
        int[] array = {7, 10, 22, 29, 33};  
        int sum = 0;
```



```

    for (int num : array) {
        sum += num;
    }
    double average = (double) sum / array.length;
    System.out.println("Sum: " + sum);
    System.out.println("Average: " + average);
}
}
Sum: 101
Average: 20.2
PS C:\Users\User\Desktop\Java\practice>

```

2. Write a Java program to implement stack using array.

Code:

```

public class Stack {
    private int maxSize;
    private int[] stackArray;
    private int top;
    public Stack(int size) {
        maxSize = size;
        stackArray = new int[maxSize];
        top = -1;
    }
    public void push(int value) {
        if (isFull()) {
            System.out.println("Stack is full. Cannot push element.");
            return;
        }
        top++;
        stackArray[top] = value;
    }
    public int pop() {
        if (isEmpty()) {
            System.out.println("Stack is empty. Cannot pop element.");
            return -1;
        }
        int poppedValue = stackArray[top];
        top--;
        return poppedValue;
    }
    public int peek() {
        if (isEmpty()) {
            System.out.println("Stack is empty. Cannot peek element.");

```

```

        return -1;
    }
    return stackArray[top];
}
public boolean isEmpty() {
    return top == -1;
}
public boolean isFull() {
    return top == maxSize - 1;
}
public static void main(String[] args) {
    Stack stack = new Stack(5);
    stack.push(1);
    stack.push(2);
    stack.push(3);
    stack.push(3);
    stack.push(9);
    System.out.println("Stack peek: " + stack.peek());
    System.out.println("Stack pop: " + stack.pop());
    System.out.println("Stack peek after pop: " + stack.peek());
}
}
Stack peek: 3
Stack pop: 3
Stack peek after pop: 9
PS C:\Users\User\Desktop\Java\practice>

```

3. Write a Java program to implement Queue using array.

Code:

```

public class Queue {
    private int maxSize;
    private int[] queueArray;
    private int front;
    private int rear;
    private int size;
    public Queue(int size) {
        maxSize = size;
        queueArray = new int[maxSize];
        front = 0;
        rear = -1;
        size = 0;
    }
}

```

```
public void enqueue(int value) {
    if (isFull()) {
        System.out.println("Queue is full. Cannot enqueue element.");
        return;
    }
    rear = (rear + 1) % maxSize;
    queueArray[rear] = value;
    size++;
}
public int dequeue() {
    if (isEmpty()) {
        System.out.println("Queue is empty. Cannot dequeue element.");
        return -1;
    }
    int dequeuedValue = queueArray[front];
    front = (front + 1) % maxSize;
    size--;
    return dequeuedValue;
}
public int peek() {
    if (isEmpty()) {
        System.out.println("Queue is empty. Cannot peek element.");
        return -1;
    }
    return queueArray[front];
}
public boolean isEmpty() {
    return size == 0;
}
public boolean isFull() {
    return size == maxSize;
}
public static void main(String[] args) {
    Queue queue = new Queue(5);
    queue.enqueue(7);
    queue.enqueue(3);
    queue.enqueue(8);
    queue.enqueue(4);
    queue.enqueue(9);
    System.out.println("Queue peek: " + queue.peek());
}
```

```

        System.out.println("Queue dequeue: " + queue.dequeue());
        System.out.println("Queue peek after dequeue: " + queue.peek());
    }
}
Queue peek: 7
Queue dequeue: 7
Queue peek after dequeue: 3
PS C:\Users\User\Desktop\Java\practice>

```

4. Write a Java program to calculate Sum of two 2-dimensional arrays.

Code:

```

public class SumOfArrays {
    public static void main(String[] args) {
        int[][] array1 = {{1, 2, 3}, {4, 5, 6}, {7, 8, 9}};
        int[][] array2 = {{9, 8, 7}, {6, 5, 4}, {3, 2, 1}};
        int rows = array1.length;
        int cols = array1[0].length;
        int[][] sumArray = new int[rows][cols];
        for (int i = 0; i < rows; i++) {
            for (int j = 0; j < cols; j++) {
                sumArray[i][j] = array1[i][j] + array2[i][j];
            }
        }
        System.out.println("Sum of the two arrays:");
        for (int i = 0; i < rows; i++) {
            for (int j = 0; j < cols; j++) {
                System.out.print(sumArray[i][j] + " ");
            }
            System.out.println();
        }
    }
}
Sum of the two arrays:
10 10 10
10 10 10
10 10 10
PS C:\Users\User\Desktop\Java\practice>

```

5. Write a Java program to find the range of a 1D array.

Code:

```

public class ArrayRange {
    public static void main(String[] args) {
        int[] array = {8, 16, 15, 26, 25};
        int min = array[0];
        int max = array[0];
    }
}

```

```

for (int i = 1; i < array.length; i++) {
    if (array[i] < min) {
        min = array[i];
    }
    if (array[i] > max) {
        max = array[i];
    }
}
int range = max - min;
System.out.println("Array Range: " + range);
}
}
Array Range: 18
PS C:\Users\User\Desktop\Java\practice>

```

6. Write a Java program to search an element in an array.

Code:

```

public class ElementSearch {
    public static void main(String[] args) {
        int[] array = {35, 13, 17, 32, 25};
        int target = 15;
        boolean found = false;
        for (int i = 0; i < array.length; i++) {
            if (array[i] == target) {
                found = true;
                System.out.println("Element " + target + " found at index " + i);
                break;
            }
        }
        if (!found) {
            System.out.println("Element " + target + " not found in the array.");
        }
    }
}

```

```

Element 17 found at index 2
PS C:\Users\User\Desktop\Java\practice>

```

7. Write a Java program to find the sum of even numbers in an integer array.

Code:

```

public class SumOfEvenNumbers {
    public static void main(String[] args) {
        int[] array = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12};
    }
}

```

```

int sumOfEvens = 0;
for (int num : array) {
    if (num % 2 == 0) {
        sumOfEvens += num;
    }
}
System.out.println("Sum of even numbers: " + sumOfEvens);
}
}
Sum of even numbers: 42
PS C:\Users\User\Desktop\Java\practice>

```

8. Write a Java program to find the sum of diagonal elements in a 2D array.

Code:

```

public class Diagonalsum {
    public static void main(String[] args) {
        int[][] array = {
            {9, 2, 3},
            {4, 10, 6},
            {7, 8, 9}
        };
        int sum = 0;
        for (int i = 0; i < array.length; i++) {
            sum += array[i][i];
        }
        System.out.println("Sum of diagonal elements: " + sum);
    }
}
Sum of diagonal elements: 28
PS C:\Users\User\Desktop\Java\practice>

```

9. Reverse the elements in an array of integers without using a second array.

Code:

```

public class ReverseArray {
    public static void main(String[] args) {
        int[] array = {2, 3, 4, 5, 6, 7, 9};
        System.out.println("Original array:");
        printArray(array);
        int length = array.length;
        for (int i = 0; i < length / 2; i++) {
            int temp = array[i];

```

```

        array[i] = array[length - 1 - i];
        array[length - 1 - i] = temp;
    }
    System.out.println("Reversed array:");
    printArray(array);
}

public static void printArray(int[] arr) {
    for (int num : arr) {
        System.out.print(num + " ");
    }
    System.out.println();
}
}

Original array:
2 3 4 5 6 7 9
Reversed array:
9 7 6 5 4 3 2
PS C:\Users\User\Desktop\Java\practice>

```

10. Write a Java program to enter n elements in an array and find smallest number among them.

Code: import java.util.Scanner;

```

public class SmallestNumber {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter the number of elements in the array: ");
        int n = scanner.nextInt();
        int[] array = new int[n];
        System.out.println("Enter the elements of the array:");
        for (int i = 0; i < n; i++) {
            System.out.print("Element " + (i + 1) + ": ");
            array[i] = scanner.nextInt();
        }
        int smallest = array[0];
        for (int i = 1; i < n; i++) {
            if (array[i] < smallest) {
                smallest = array[i];
            }
        }
        System.out.println("The smallest number in the array is: " + smallest);
        scanner.close();
    }
}

```

```
Enter the number of elements in the array: 5
Enter the elements of the array:
Element 1: 3
Element 2: 9
Element 3: 2
Element 4: 5
Element 5: 7
The smallest number in the array is: 2
PS C:\Users\User\Desktop\Java\practice> █
```

11. Write Java program to find the sum of all odd numbers in a 2D array.

Code:

```
public class SumOfOddNumbers {
public static void main(String[] args) { int[][] array = {
{1, 2, 3},
{4, 5, 6},
{7, 8, 9}
};
int sum = 0;
for (int[] row : array) { for (int num : row) {
if (num % 2 != 0) { sum += num;
}
}
}
System.out.println("Sum of odd numbers in the 2D array: " + sum);
}
}
```

Sum of odd numbers in the 2D array: 25

12. Write a Java program to print transpose of matrix.

Code:

```
public class MatrixTranspose {
public static void main(String[] args) { int[][] matrix = {
{1, 2, 3},
{4, 5, 6},
{7, 8, 9}
};
int rows = matrix.length;
int cols = matrix[0].length;
int[][] transpose = new int[cols][rows];
for (int i = 0; i < cols; i++) {
for (int j = 0; j < rows; j++) {
transpose[i][j] = matrix[j][i];
}
}

System.out.println("Transpose of the matrix:");
```



```

    for (int i = 0; i < cols; i++) {
    for (int j = 0; j < rows; j++) {
    System.out.print(transpose[i][j] + " ");
    }
    System.out.println();
    }
    }

```

```

Transpose of the matrix:
1 4 7
2 5 8
3 6 9

```

```

}

```

13. Write a Java program to check whether a given matrix is sparse or not.

```

Code: public class SparseMatrix {
public static void main(String[] args) { int[][] matrix = {
{1, 0, 0},
{0, 0, 0},
{0, 0, 3}
};
int zeroCount = 0;
int nonZeroCount = 0;
for (int[] row : matrix) {
for (int element : row) {
if (element == 0) {
zeroCount++;
} else {
nonZeroCount++;
}
}
}
if (zeroCount > nonZeroCount) {
System.out.println("The given matrix is sparse.");
} else {
System.out.println("The given matrix is not sparse.");
}
}
}

```

```

The given matrix is sparse.

```

14. Write a Java program to count the prime numbers in an array.

```

Code: public class PrimeNumberCount {
public static void main(String[] args) {
int[] array = {2, 3, 4, 5, 6, 7, 8, 9, 10};
int primeCount = 0; for (int num : array) {
if (isPrime(num)) {
primeCount++;}
}
System.out.println("Number of prime numbers in the array: " + primeCount);
public static boolean isPrime(int num) {
if (num <= 1) {
return false;
}
for (int i = 2; i <= Math.sqrt(num); i++) {
if (num % i == 0) {
return false;}
}
return true;
}
}

```

Number of prime numbers in the array: 4

15. Write a Java program to find second highest element of an array.

```

Code: public class SecondHighestElement {
public static void main(String[] args) {
int[] array = {5, 10, 3, 8, 15, 7};
int max = Integer.MIN_VALUE;
int secondMax = Integer.MIN_VALUE;
for (int num : array) {
if (num > max) {
secondMax = max; max = num;
} else if (num > secondMax && num != max) {
secondMax = num;
}
}
if (secondMax != Integer.MIN_VALUE) {
System.out.println("Second highest element in the array: " + secondMax);
} else {
System.out.println("Second highest element does not exist in the array.");
}
}

```

```
}
```

```
Second highest element in the array: 10
```

16. Write a Java program which counts the non-zero elements in an integer array.

```
public class NonZeroElementCount {  
    public static void main(String[] args) {  
        int[] array = {0, 5, 0, 10, 0, 15, 20};  
        int nonZeroCount = 0;  
        for (int num : array) {  
            if (num != 0) {  
                nonZeroCount++;  
            }  
        }  
        System.out.println("Number of non-zero elements in the array: " + nonZeroCount);  
    }  
}
```

```
Number of non-zero elements in the array: 4
```

17. Write a Java program to merge two float arrays.

```
Code: import java.util.Arrays;  
public class MergeFloatArrays {  
    public static void main(String[] args) {  
        float[] array1 = {1.5f, 2.5f, 3.5f};  
        float[] array2 = {4.5f, 5.5f, 6.5f};  
        int mergedLength = array1.length + array2.length;  
        float[] mergedArray = new float[mergedLength];  
        System.arraycopy(array1, 0, mergedArray, 0, array1.length);  
        System.arraycopy(array2, 0, mergedArray, array1.length, array2.length);  
        System.out.println("Merged array: " + Arrays.toString(mergedArray));  
    }  
}
```

```
Merged array: [1.5, 2.5, 3.5, 4.5, 5.5, 6.5]
```

```
}
```

18. Write a Java program where elements of two integer arrays get added index wise and get stored into a third array.

```
Code: import java.util.Arrays;  
public class AddArrays {
```

```
public static void main(String[] args) {  
    int[] array1 = {1, 2, 3, 4, 5};  
    int[] array2 = {6, 7, 8, 9, 10};  
    int[] sumArray = new int[array1.length];  
    for (int i = 0; i < array1.length; i++) {  
        sumArray[i] = array1[i] + array2[i];  
    }  
    System.out.println("Sum array: " + Arrays.toString(sumArray));}}
```

Sum array: [7, 9, 11, 13, 15]

19. Write a Java program to multiply two matrices.

```
Code: public class MatrixMultiplication {  
    public static void main(String[] args) {  
        int[][] matrix1 = {  
            {1, 2, 3},  
            {4, 5, 6},  
            {7, 8, 9}  
        };  
        int[][] matrix2 = {  
            {9, 8, 7},  
            {6, 5, 4},  
            {3, 2, 1}  
        };  
        int rows1 = matrix1.length;  
        int cols1 = matrix1[0].length;  
        int cols2 = matrix2[0].length;  
        int[][] result = new int[rows1][cols2];  
        for (int i = 0; i < rows1; i++) {  
            for (int j = 0; j < cols2; j++) {  
                for (int k = 0; k < cols1; k++) {  
                    result[i][j] += matrix1[i][k] * matrix2[k][j];  
                }  
            }  
        }  
        System.out.println("Result of matrix multiplication:");  
        printMatrix(result);  
    }  
    public static void printMatrix(int[][] matrix) {
```

```
for (int[] row : matrix) {  
    for (int num : row) {  
        System.out.print(num + " ");  
    }  
    System.out.println();  
}  
}
```

```
Result of matrix multiplication:  
30 24 18  
84 69 54  
138 114 90
```

20. Write a Java program to subtract two matrices.

```
Code: public class MatrixSubtraction {  
    public static void main(String[] args) {  
        int[][] matrix1 = {  
            {1, 2, 3},  
            {4, 5, 6},  
            {7, 8, 9}  
        };  
        int[][] matrix2 = {  
            {9, 8, 7},  
            {6, 5, 4},  
            {3, 2, 1}  
        };  
        int rows = matrix1.length;  
        int cols = matrix1[0].length;  
        int[][] result = new int[rows][cols];  
        for (int i = 0; i < rows; i++) {  
            for (int j = 0; j < cols; j++) {  
                result[i][j] = matrix1[i][j] - matrix2[i][j];  
            }  
        }  
        System.out.println("Result of matrix subtraction:");  
        printMatrix(result);  
    }  
    public static void printMatrix(int[][] matrix) {  
        for (int[] row : matrix) {  
            for (int num : row) {  
                System.out.print(num + " ");  
            }  
        }  
    }  
}
```

```

}
System.out.println();
}
}
    Result of matrix subtraction:
    -8 -6 -4
    -2 0 2
    4 6 8
}

```

21. Write a Java program to find duplicate elements in a 1D array and find their frequency of occurrence.

```

Code: import java.util.HashMap;
import java.util.Map;
public class DuplicateElements {
public static void main(String[] args) {
int[] array = {1, 2, 3, 2, 4, 5, 1, 6, 4, 7, 8, 7, 9, 9};
Map<Integer, Integer> frequencyMap = new HashMap<>();
for (int num : array) {
frequencyMap.put(num, frequencyMap.getOrDefault(num, 0) + 1);
}
System.out.println("Duplicate elements and their frequencies:");
for (Map.Entry<Integer, Integer> entry : frequencyMap.entrySet()) {
if (entry.getValue() > 1) {
System.out.println("Element: " + entry.getKey() + ", Frequency: " +
entry.getValue());
}
}
}
}

```

```

Duplicate elements and their frequencies:
Element: 1, Frequency: 2
Element: 2, Frequency: 2
Element: 4, Frequency: 2
Element: 7, Frequency: 2
Element: 9, Frequency: 2

```

```

}

```

22. Write a Java program to print every alternate number of a given array.

```

Code: public class AlternateNumbers {
public static void printAlternateNumbers(int[] array) {
for (int i = 0; i < array.length; i += 2) {
System.out.print(array[i] + " ");
}
System.out.println();
}
}

```

```

}
public static void main(String[] args) {
int[] numbers = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10};
System.out.println("Alternate numbers:");
printAlternateNumbers(numbers);
}
}

```

```

Alternate numbers:
1 3 5 7 9

```

23. Given are two one-dimensional arrays A & B, which are sorted in ascending order. Write a Java program to merge them into single sorted array C that contains every item from arrays A & B, in ascending order.

Code: import java.util.Arrays;

```

public class MergeSortedArrays {
public static void main(String[] args) {
int[] arrayA = {1, 3, 5, 7, 9};
int[] arrayB = {2, 4, 6, 8, 10};

int lengthA = arrayA.length;
int lengthB = arrayB.length;
int[] mergedArray = new int[lengthA + lengthB];
int indexA = 0;
int indexB = 0; int indexC = 0;
while (indexA < lengthA && indexB < lengthB) {
if (arrayA[indexA] < arrayB[indexB]) {
mergedArray[indexC++] = arrayA[indexA++];
} else {
mergedArray[indexC++] = arrayB[indexB++];
}
}
while (indexA < lengthA) { mergedArray[indexC++] = arrayA[indexA++];
}
while (indexB < lengthB) { mergedArray[indexC++] = arrayB[indexB++];
}
System.out.println("Merged sorted array: " + Arrays.toString(mergedArray));
}
}

```

```
}
```

```
Merged sorted array: [1, 2, 3, 4, 5, 6, 7, 8, 9, 10]
```

24. Write a Java program to show 0-arguments constructor.

```
Code: public class ZeroArgumentsConstructor {  
private int value;  
public ZeroArgumentsConstructor() {  
    this.value = 0;  
}  
public int getValue() {  
    return this.value;  
}  
public static void main(String[] args) {  
    ZeroArgumentsConstructor obj = new ZeroArgumentsConstructor();  
    System.out.println("Value initialized with zero-arguments constructor: " +  
obj.getValue());  
}  
}
```

```
Value initialized with zero-arguments constructor: 0  
PS C:\Users\User\Desktop\Java\practice>
```

25. Write a Java program to show parameterized constructor.

```
Code: public class ParameterizedConstructor {  
private int value;  
public ParameterizedConstructor(int value) { this.value = value;  
}  
public int getValue() {  
    return this.value;  
}  
public static void main(String[] args) {  
    ParameterizedConstructor obj = new ParameterizedConstructor(10);  
    System.out.println("Value initialized with parameterized constructor: " +  
obj.getValue());  
}  
}
```

```
Value initialized with parameterized constructor: 15  
PS C:\Users\User\Desktop\Java\practice>
```

26. Write a Java program to show constructor overloading.


```

Code: public class ConstructorOverloading {
private int value;
public ConstructorOverloading() {
this.value = 0;
}
public ConstructorOverloading(int value) {

this.value = value;
}
public int getValue() {
return this.value;
}
public static void main(String[] args) {
ConstructorOverloading obj1 = new ConstructorOverloading();
ConstructorOverloading obj2 = new ConstructorOverloading(10);
System.out.println("Value initialized with default constructor: " + obj1.getValue());
System.out.println("Value initialized with parameterized constructor: " +
obj2.getValue());
}
}

```

```

Value initialized with default constructor: 0
Value initialized with parameterized constructor: 10

```

27. Write a class, Grader, which has an instance variable, score, an appropriate constructor and appropriate methods. A method, letterGrade() that returns the letter grade as O/E/A/B/C/F.

Now write a demo class to test the Grader class by reading a score from the user, using it to create a Grader object after validating that the value is not negative and is not greater than 100. Finally, call the letterGrade() method to get and print the grade.

```

Code: import java.util.Scanner; class Grader {
private int score;
public Grader(int score) { this.score = score;
}
public String letterGrade() {
if (score >= 90 && score <= 100) { return "O";
} else if (score >= 80 && score < 90) { return "E";
} else if (score >= 70 && score < 80) { return "A";
} else if (score >= 60 && score < 70) { return "B";
}
}
}

```

```

    } else if (score >= 50 && score < 60) { return "C";
    } else {

return "F";
    }
    }
    }

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

    System.out.print("Enter the score: ");
    int score = scanner.nextInt();
    if (score < 0 || score > 100) {
    System.out.println("Invalid score! Score must be between 0 and 100.");
    } else {
    Grader grader = new Grader(score); String grade = grader.letterGrade();
    System.out.println("Letter grade: " + grade);
    }
    scanner.close();
    }

    Enter the score: 75
    Letter grade: A

    }

```

28. Write a class, Commission, which has an instance variable, sales; an appropriate constructor; and a method, commission() that returns the commission. Now write a demo class to test the Commission class by reading a sale from the user, using it to create a Commission object after validating that the value is not negative. Finally, call the commission() method to get and print the commission. If the sales are negative, your demo should print the message “Invalid Input”.

```

Code: import java.util.Scanner;
    class Commission {
    private double sales;
    public Commission(double sales) {
    this.sales = sales;
    }

```

```
public double commission() { if (sales < 0) {
return -1; // Invalid input
} else if (sales <= 1000) {
return 0.05 * sales; // 5% commission
} else if (sales <= 5000) { return 0.08 * sales;
} else {
return 0.1 * sales;
}
}
}

public class CommissionDemo {
public static void main(String[] args) {
Scanner scanner = new Scanner(System.in);
System.out.print("Enter the sales amount: ");
double sales = scanner.nextDouble();
if (sales < 0) {

System.out.println("Invalid Input");
} else {
Commission commission = new Commission(sales);
double commissionAmount = commission.commission();
if (commissionAmount == -1) {
System.out.println("Invalid Input");
} else {
System.out.println("Commission: $" + commissionAmount);
}
}
scanner.close();
}
}
```

Enter the sales amount: 1875

Commission: \$150.0

PS C:\Users\User\Desktop\Java\practice> █