Class X

ANSWER KEY

Computer Applications

1. Introduction to Object-Oriented Programming Concepts

MIND DRILL

Unsolved Questions

A. 1. d 2. c 3. a 4. a 5. a

B. 1. programming 2.Procedure-Oriented Programming
3. low-level 4. inheritance 5. object-oriented

C. 1. Inheritance is used to declare characteristics of classes inheriting it,without giving its implementation. It is one of the most important concept of OOPS. After creating one super class you can use its features to create several sub classes that inherits some features from its parent class and have few additional features. Inheritance enables code reusability and saves time.

2. POP stands for Procedure-Oriented Programming.

3. The word polymorphism comes from the Greek words "Poly" means "many" and "morphe" means "change of forms". It is the ability of an object to take on many forms.

   In object-oriented programming, polymorphism is the feature of being able to allot a different meaning to a variable, a method or an object so that they can have more than one form.

   Let's take an example of polymorphism. A man sometimes is an employee in an office, is a father of a child, is a customer in a shop and also a tourist when visiting a place.

4. Differences between Abstraction and Encapsulation are:

Abstraction	Encapsulation
Issues at the design level can be solved.	Issues at the implementation level can be solved.

Abstraction is about hiding unwanted details and showing only the essential information.	In encapsulation the methods and data are kept in a single unit.
Abstraction focuses on what the information object must contain.	It hides the internal details of how an object does something for security reasons.

5. Differences between POP and OOP are:

POP	OOP
It divides the programs into small parts known as methods.	It divides the program into objects.
It follows top-down approach.	It follows bottom-up approach.
It deals with algorithm.	It deals with data.
It is less secure.	It is more secure.
Examples: C, Fortran	Examples: C++, Java

2. Elementary Concept of Objects and Classes

MIND DRILL

Unsolved Questions

A. 1. d 2. a 3. a 4. b 5. a

B. 1. A class in Java are non-primitive data types that act as a blueprint for creating objects of the same type. It may be viewed as a factory that produces similar objects. A class may also be considered as a new data type created by the user, that has its own functionality. Class comprises of characteristics and behaviour.

2. Occurrence of a class which contains characteristics and behaviour of the same class are called objects. In other words, objects are the instance of a class. Thus, an object implements a class. The different components of an object are:

   • Characteristics or attributes • Behaviour or methods

   • Name of the object

3. Instance of a class is also called an object and creating an object of a class is called instantiation. Syntax of creating an object:

   [class name] [space][object name]= new [space][constructor];

3. Values and Types

MIND DRILL

Unsolved Questions

A. 1. b 2. c 3. a 4. b 5. d

B. 1. special 2. compatible 3. reference 4. smaller 5. null literal is

C. 1. **String Literals:** A string literal is a sequence of characters enclosed within double quotes. For example, "India" and "Computer Application of Class 10".

Boolean Literals: They allow only two values either true or false.

2. Declaration is to declare the type of the variable, whereas Initialization is the assignment of a value to a variable at the time of declaration.

Example: int a; // simple declaration

where as a = 10; // simple assignment

3. There are various types of tokens that are used by the Java compiler which are as follows:

- Keywords
- Literals
- Punctuators
- Identifiers
- Operators

4. The \n character is the newline character. It is used to print the characters which are encountered after \n in the next line.

5. Variable is the name of an area reserved in computer memory for an identifier to store a value, whereas Identifiers are the names given to different components of a Java program like class, variables and methods.

4. Operators in Java

MIND DRILL

Unsolved Questions

A. 1. c 2. b 3. c 4. a 5. c

B. 1. ++, %, +, < 2. a*a+b*b+2*a*b
3. 5 4. true 5. 1

C. 1. 32 50

2. 8.0

3. An operator that works with only one operand is called unary operator, whereas an operator that works with three operands or expressions is called ternary operator. Example of unary operator: If a = 20 and b = 4 then

   ++a = 21

   ++b = 5

   Example of ternary operator: int a=10,b=20,c;

   c = (a > b) ? a : b;

   = (10 > 20) ? 10 : 20;

   = 20;

4. • A = ((B + C) / 2) * h
   • V = 3.14 * r * r * h

5. a. Greater than or Equal To
   b. Not Equal To
   c. Unary decrement
   d. Assignment including shorthand
   e. Modulus operator
   f. logical OR

6. 6

   20

5. Input in Java

MIND DRILL

Unsolved Questions

A. 1. d 2. a 3. a 4. c 5. d

B. 1. Syntax 2. Exception 3. Logical errors 4. Multiline 5. Command Line

C. 1. Multiline comments help to write more than one line comments so that the logic of the code can be explained in details, whereas Documentation comments are used to write the documentation part of the program such as question of the program, name of the programmer, etc. in the beginning of the program.

2. Scanner sc =new Scanner(System.in); short s= sc.nextShort();

3. There are three types of errors: syntax, logical and runtime errors.

4. Sometimes, there may be some errors in the logic of the program due to which the program will not give appropriate output. These type of errors is called logical errors.

5. "try" is a block where those statements are written which may produce some error and Java will throw an exception for those errors, whereas "catch" block is used to handle the exception that has been generated in the try block. The catch block appears just after the try block.

6. Mathematical Library Methods

MIND DRILL

Unsolved Questions

A. 1. a 2. b 3. a 4. c 5. d
6. c 7. a 8. c 9. a 10. d

B. 1. 5.0 2. 16.0 3. double 4. 10.0
5. (Math.sqrt(Math.pow(a,2)+Math.pow(b,3)))
6. 2*a*b*c*Math.sqrt(a*b) 7. 3.0 8. 2 9. -5.5 10. double

C. 1. **Library Methods:** These methods are already defined in the Java compiler and kept in some classes. Classes are further grouped in some packages. You just need to import the desired package before using its classes and their methods. Java provides a wide variety of packages that contain a huge library of built-in classes. These classes provide different types of pre-defined methods which are also known as library methods. For example, string methods, mathematical methods, graphics methods, etc.

2. There are two types of methods in Java:
   - User-Defined Methods
   - Library/System Methods

3. **Math.max( ):** The Math.max( ) method is used to find the maximum number between two arguments passed to it. Similar to the Math.min( ) method, the return type of the Math.max( ) method depends on the types of arguments passed to it.

Following are some examples of using the Math.max( ) method:

```
double m = Math.max(3.4, 4.2);                  // output: 4.2
int i = Math.max(3, 6);                         // output: 6
double d = Math.max(3, 2.6);       // output: 3.0
```

Math.pow( ): The Math.pow( ) Method The Math.pow( ) method is used to calculate the nth power of a number m in the format of mn. It returns the value in double data type and works on both positive and negative numbers.

Following are some examples of using the Math.pow( ) method:

```
double d = Math.pow(3, 2);                      // Output: 9.0
double d = Math.pow(3, -2);                     // Output: 0.1111111111111111
double d = Math.pow(-3, -2);   // Output: 0.1111111111111111
```

4. one argument
5. A = p * Math.pow(1 + (r / n), n * t)
6. a.

```
import java.util.*;
public class Example
{
    public static void main()
    {
        double p=1000,r=2,n=5;
        System.out.println(p*(Math.pow(1+(r/100),n)));
    }
}
```

b.

```
class Surface_Area_Volume
{
    public static void main(String args[])
    {
        float PI = 3.14159f;
        float radius = 5;
        float slant_height = 13;
        float height = 12;
        float Volume, Surface_Area;
        Surface_Area = (PI * radius * slant_height) + (PI *
        radius * radius);
        Volume = PI * radius * radius * height / 3;
```

```
            System.out.println("Surface Area Of Cone : " + Surface_
            Area);
            System.out.println("Volume Of Cone : "+ Volume);
        }
    }
```

c.
```
    import java.util.*;
    public class three_numbers
    {
        public static void main(String []args)
        {
            double a, b, c, r;
            Scanner sc = new Scanner(System.in);
            System.out.println("Enter the value of a");
            a = sc.nextDouble();
            System.out.println("Enter the value of b");
            b = sc.nextDouble();
            System.out.println("Enter the value of c");
            c = sc.nextDouble();
            r = Math.cbrt(a) + (b * b) + Math.cbrt(c);
            System.out.println("Result = "+ r);
        }
    }
```

d.
```
    import java.util.Scanner;
    class area_circumference
    {
        public static void main(String args[])
        {
           float PI = 3.14159f;
           Scanner sc = new Scanner(System.in);
           System.out.println("Enter the diameter");
           float radius = sc.nextInt();
           float Circumference_of_circle, Area_of_circle;
           Area_of_circle = PI * radius * radius;
           Circumference_of_circle = 2 * PI * radius * radius;
```

```
            System.out.println("Area of circle : " + Area_of_circle);
            System.out.println("Circumference of circle : "+
            Circumference_of_circle);
        }
    }
```

e.

```
import java.util.*;
public class population
{
  public static void main(String args[])
    {
        double p, p0, r, t, e = 2.71828;
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter the  starting population");
        p0 = sc.nextDouble();
        System.out.println("Enter the percentage rate of
        population");
        r = sc.nextDouble();
        System.out.println("Enter the time in years");
        t = sc.nextDouble();
        p = p0 * Math.pow(e, (r * t));
        System.out.println("total population = "+ p);
    }
}
```

7. Conditional Construct in Java

MIND DRILL

Unsolved Questions

A. 1. a. 2. b. 3. c. 4. b. 5. c. 6. c.
7. b. 8. b. 9. d. 10. a. 11. c.

B. 1. conditional operator 2. Switch 3. conditional 4. false 5. boolean

C.

1. If the condition evaluates to true, the block will execute else will be ignored and the control of the program is transferred to the statement next to the if statement, whereas the if...else statement allows us to execute one block of code out of two at a time depending on the condition provided. If the condition is satisfied, then the first set of statements will execute, and if it does not satisfy then the set of statements after else block will execute.
2. A group of statements within curly brackets together is called compound statement.
3. The break statement is optional to use with every case in the switch statement. You can omit the break statement, if you want to execute more than one case of switch statement. So, if the break statement is not written inside any case, then the control goes to the next case and starts executing the case after executing the current case. This continues as long as Java compiler does not find the break statement. This type of situation is called fall-through situation.
4. The break statement will terminate the statement block associated with the case statement and send the control out of the switch block.
5.
```
import java.util.Scanner;
public class Division
{
    public static void main(String args[]) {
        Scanner in = new Scanner(System.in);
        System.out.print("Enter a number: ");
        int num = in.nextInt();

        if (num % 7 == 0 && num % 8 == 0)
            System.out.println("Divisible by 7 and 8");
        else
            System.out.println("Not Divisible");
    }
}
```
6.
```
import java.util.*;
 public class leap_year
 {
     public static void main(String args[])
     {
        int year;
        Scanner sc= new Scanner(System.in);
        year=sc.nextInt();
       if (( year%400 == 0)|| (( year%4 == 0 ) &&( year%100 != 0)))
         {
```

```
            System.out.println(year+ " is a Leap Year.");
            }
           else
            {
            System.out.println(year+ " is NOT a Leap Year.");
               }
    }
}
```

7.
```
import java.util.*;
public class largest_smallest
{
    public static void main(String args[])
    {
       int a,b,c;
       Scanner sc= new Scanner(System.in);
       System.out.println("Enter the First number:");
       a=sc.nextInt();
       System.out.println("Enter the Second number:");
       b=sc.nextInt();
       System.out.println("Enter the Third number:");
       c=sc.nextInt();
       if(a<=b && a<=c)
       {
         System.out.println(a+ " is Smallest number");
       }
       else if(b<=a && b<=c)
       {
         System.out.println(b+ " is smallest number");
       }
       else
       {
         System.out.println(c+ " is smallest number");
       }
       if(a>=b && a>=c)
       {
         System.out.println(a+ " is largest number");
       }
       else if(b>=a && b>=c)
       {
```

```
            System.out.println(b+ " is largest number");
        }
        else
        {
            System.out.println(c+ " is largest number");
        }
    }
}
```

8.
```
import java.util.*;
public class discount_on_purchase
{
    public static void main(String args[])
    {
        double totalamount,discount=0;
        Scanner sc= new Scanner(System.in);
        System.out.println("Enter the Total amount:");
        totalamount=sc. nextDouble ();
        if(totalamount<=2000)
        {
            discount=(totalamount*2.5)/100;
        }
        else if(totalamount>=2001&&totalamount<=4000)
        {
            discount=(totalamount*4)/100;
        }
        else if(totalamount>=4001&&totalamount<=7000)
        {
            discount=(totalamount*7)/100;
        }
        else
        {
            discount=(totalamount*10)/100;
        }
        System.out.println("Total amount is: "+totalamount);
        System.out.println("Discount is: "+discount);
    }
}
```

9.
```
import java.util.*;
public class consumer_details
{
    public static void main(String args[])
    {
       String cname;
       int cnumber,calls;
       double amount,surcharge;
       Scanner sc= new Scanner(System.in);
       System.out.println("Enter consumer name: ");
       cname=sc.nextLine();
       System.out.println("Enter consumer number: ");
       cnumber=sc.nextInt();
       System.out.println("Enter number of calls: ");
       calls=sc.nextInt();
       if(calls>=250)
       {
           amount=calls*5;
       }
       else if(calls>=150&&calls<=249)
       {
           amount=calls*4;
       }
       else if(calls>=75&&calls<=149)
       {
          amount=calls*3;
       }
       else
       {
           amount=calls*2;
       }
       System.out.println("Name of consumer: "+cname);
       System.out.println("Consumer Number: "+cnumber);
       System.out.println("Number of calls: "+calls);
          System.out.println("Bill amount before surcharge added:
"+amount);
       surcharge=(amount*2.5)/100;
       amount=amount+surcharge;
       System.out.println("Bill amount with surcharge: "+amount);
    }
}
```

10.
```
import java.util.*;
public class mode_of_payment
{
    public static void main(String args[])
    {
       int choice;
       double amount,dis;
       Scanner sc= new Scanner(System.in);
       System.out.println("Enter the amount of bill");
       amount=sc.nextDouble();
       System.out.println("Enter the mode of payment");
       System.out.println("Enter 1 for Credit Card");
       System.out.println("Enter 2 for Debit Card");
       System.out.println("Enter 3 for E wallet");
       System.out.println("Enter 4 for Cash");
       choice=sc.nextInt();
       switch(choice)
       {
           case 1:
               {
                 dis=(amount*1.5)/100;
                 amount=amount-dis;
                 System.out.println("Amount to be paid: "+amount);
                 break;
               }
           case 2:
               {
                 amount=amount-10;
                 System.out.println("Amount to be paid: "+amount);
                 break;
               }
           case 3:
               {
                 amount=amount-20;
                 System.out.println("Amount to be paid: "+amount);
                 break;
               }
           case 4:
               {
                 System.out.println("Amount to be paid: "+amount);
               }
```

```
            default:
               System.out.println("You selected wrong payment mode");
        }
    }
}
```

11.
```
import java.util.*;
class meter_reading
{
    public static void main(String args[])
    {
        Scanner sc= new Scanner(System.in);
        int punit,cunit;
        double amount;
        System.out.println("Enter the previous month units:");
        punit=sc.nextInt();
        System.out.println("Enter the previous month units:");
        cunit=sc.nextInt();
        cunit=cunit-punit;
        if(cunit<=100)
        {
            System.out.println("Total unit consumed: "+cunit);
            amount=cunit*2;
            System.out.println("Total amount to be paid: "+amount);
        }
        else if(cunit<=150)
        {
            System.out.println("Total unit consumed: "+cunit);
            amount=cunit*3.5;
            System.out.println("Total amount to be paid: "+amount);
        }
        else if(cunit<=400)
        {
            System.out.println("Total unit consumed: "+cunit);
            amount=cunit*5;
            System.out.println("Total amount to be paid: "+amount);
        }
        else
        {
            System.out.println("Total unit consumed: "+cunit);
            amount=cunit*7.5;
            System.out.println("Total amount to be paid: "+amount);
```

```
        }
    }
}
```

12.
```
import java.util.*;
class sales_personals
{
    public static void main(String args[])
    {
        Scanner sc= new Scanner(System.in);
        int products;
        double commission,samount;
        System.out.println("Enter the products:");
        products=sc.nextInt();
        System.out.println("Enter the selling amount");
        samount=sc.nextDouble();
        if(products<=50)
        {
            commission=(samount*5)/100;
            System.out.println("Commission: "+commission);
            System.out.println("Gift: A Parker pen");
        }
        else if(products>=51&&products<=75)
        {
            commission=(samount*7.5)/100;
            System.out.println("Commission: "+commission);
            System.out.println("Gift: A Micro SD card");
        }
        else if(products>=76&&products<=100)
        {
            commission=(samount*10)/100;
            System.out.println("Commission: "+commission);
            System.out.println("Gift: A Mobile");
        }
        else
        {
            commission=(samount*15)/100;
            System.out.println("Commission: "+commission);
            System.out.println("Gift: A Laptop");
        }
    }
}
```

13.
```
public class ECSale
{
    public static void main(String args[])
    {
      java.util.Scanner in = new java.util.Scanner(System.in);
      System.out.print("Enter customer name: ");
      String name = in.nextLine();
      System.out.print("Enter customer address: ");
      String address = in.nextLine();
      System.out.print("Enter amount: ");
      double amount = in.nextDouble();
      System.out.println("Enter type of purchase: ");
      System.out.print("'L'- Laptop  'D'- Desktop: ");
      char type = in.next().charAt(0);
      type = Character.toUpperCase(type);
      double discount = 0.0;
      if (amount <= 25000)
            discount = type == 'L' ? 0.0 : 5.0;
        else if (amount <= 50000)
            discount = type == 'L' ? 5.0 : 7.0;
        else if (amount <= 100000)
            discount = type == 'L' ? 7.5 : 10.0;
        else
            discount = type == 'L' ? 10.0 : 15.0;
        double amountToPay = amount - (discount * amount / 100);
        System.out.println("Customer name: " + name);
        System.out.println("Customer address: " + address);
        System.out.println("Amount to pay: " + amountToPay);
    }
}
```

14.
```
import java.util.Scanner;
public class Volume
{
    public static void main(String args[]) {
        Scanner in = new Scanner(System.in);
        System.out.println("1. Volume of Sphere");
        System.out.println("2. Volume of Cylinder");
        System.out.println("3. Volume of Cone");
        System.out.print("Enter your choice: ");
        int choice = in.nextInt();
```

```
            double pie=3.14285714286;
            switch(choice) {
                case 1:
                    System.out.print("Enter radius of sphere: ");
                    double radius = in.nextDouble();
                    double vs=(4/3.0) * (22/7.0) * Math.pow(radius, 3);
                    System.out.println("Volume of sphere is: " + vs);
                    break;
                case 2:
                    System.out.print("Enter radius of the cylinder: ");
                   double cRadius = in.nextDouble();
                    System.out.print("Enter height of the cylinder: ");
                    double cHeight = in.nextDouble();
                    double vc =  pie * cRadius * cRadius * cHeight;
                    System.out.println("Volume of cylinder is: " + vc);
                    break;
                case 3:
                    System.out.print("Enter radius of the cone: ");
                    double conRadius = in.nextDouble();
                    System.out.print("Enter height of the cone: ");
                    double conHeight = in.nextDouble();
                    double vco = pie * conRadius * conRadius * conHeight/3;
                   System.out.println("Volume of cylinder is: " + vco);
                    break;
                default:
                    System.out.println("Incorrect choice!");
            }
        }
    }
```

15.
```
class Temp
{
    public static void main(String arg[ ])
    {
        java.util.Scanner sc=new java.util.Scanner(System.in);
        int choice;
        double f=0, c=0;
        System.out.println("1. Fahrenheit to Celsius");
        System.out.println("2. Celsius to Fahrenheit");
        System.out.println("Enter your choice: ");
        choice=sc.nextInt();
        switch(choice) {
```

```
                case 1:
                 System.out.println("Enter temperature in Fahrenheit");
                 f=sc.nextDouble();
                 c = (f - 32) * 5/9;
                 //c = ((f-32)*5)/9;
                 System.out.println("Temperature in Celsius is: "+c);
                 System.out.println(f);
                 break;
                case 2:
                 System.out.println("Enter temperature in Celsius");
                   c=sc.nextDouble();
                   f=1.8*(c+32);
                   System.out.println("Temperature  in  Fahrenheit  is:
                   "+f);
                   break;
                default:
                   System.out.println("Wrong choice");
                   break;
            }
        }
    }
```

16.
```
class Palin_Perfect
{
    public static void main(String args[])
    {
        java.util.Scanner sc = new java.util.Scanner(System.in);
        System.out.println("1 for Palindrome number");
        System.out.println("2 for Prefect number");
        System.out.println("Enter your choice: ");
        int ch=sc.nextInt();
        if(ch==1)
        {
                System.out.println("Enter a number to check for
                Palindrome number");
                int num=sc.nextInt();
                int d;
                int rev=0;
                int num1=num;
                do
                {
                    d=num%10;
```

```
                    rev=(rev*10)+d;
                    num=num/10;
                } while(num!=0);
                if(num1==rev)
               System.out.println(num1+ " is a Palindrome number");
                else
                System.out.println(num1+ " is not a Palindrome
                number");
        }
        else if(ch==2)
            {
        System.out.println("Enter a number to check for perfect
        number");
                int num=sc.nextInt();
                int i=1;
                int sum=0;
                while(i<num)
                {
                    if(num%i==0)
                    sum=sum+i;
                    i++;
                }
                if(sum==num)
                   System.out.println(num + " is a Prefect number");
                else
                   System.out.println(num + " is not a Prefect
                   number");
            }
            else
                    System.out.println("invalid choice");
            }
    }
```

17.
```
import java.util.*;
public class BuzzGCD
{
    public static void main()
    {
        Scanner sc = new Scanner(System.in);
        System.out.println("1. for BUZZ number");
        System.out.println("2. for GCD");
        System.out.println("Enter your choice: ");
```

```
int ch = sc.nextInt();
if (ch == 1)
{
    System.out.println("Enter a number: ");
    int num = sc.nextInt();
    if ( num % 7 ==0 || num % 10 == 7)
        System.out.println(num+" is a BUZZ number");
    else
        System.out.println(num+" is not a BUZZ number");
}
else if(ch == 2)
{
    System.out.println("Enter two numbers: ");
    int num1 = sc.nextInt();
    int num2 = sc.nextInt();
    int num, den, GCD = 0, r ;
    if (num1 > num2)
    {
        num = num1;
        den = num2;
    }
    else
    {
        num = num2;
        den = num1;
    }
    while(den > 1)
    {
        r = num % den;
        if(r == 0) {
            GCD = den;
            break;
        }
        else {
            num = den;
            den = r;
        }
    }
    if (den == 1)
        GCD = 1;
```

```
                System.out.println("GCD of "+num1+" and "+num2+" is: "+GCD);
            }
            else
                System.out.println("Wrong Choice!!");
        }
    }
```

8. Iterative Constructs in Java

MIND DRILL

Unsolved Questions

A. 1. a 2. d 3. a 4. c 5. d

B. 1. 19 2. Condition for Testing 3. Increment 4. Outside 5. 4

C. 1. i.

```
import java.util.*;
class C1_1
{
    public static void main()
    {
      int i=1;
      for(i=1;i<=10;i++)
      {
            System.out.print(" "+i);
      }
    }
}
```

ii.

```
import java.util.*;
class C1_2
{
    public static void main()
```

```
    {
      for(int i=1;i<=20;i=i+2)
      {
        System.out.print(i+" ");
      }
    }
}
```

iii.

```
import java.util.*;
class C1_3
{
    public static void main()
    {
        int i,a=0,b=3;
        for(i=0;i< 10;i++)
        {
            System.out.print(" "+a);
            a=a+b;
            b=b+2;
        }
    }
}
```

iv.

```
import java.util.*;
class C1_4
{
    public static void main()
    {
        int i;
        for(i=1;i<=10;i++)
        {
            System.out.print(" "+ i*5);
```

```
        }
    }
}
```

v.

```
import java.util.*;
class C1_5
{
    public static void main()
    {
        int i;
        for(i=1;i<=10;i++)
        {
            System.out.print(" "+ i+"/"+ i*3);
        }
    }
}
```

vi.

```
import java.util.*;
class C1_6
{
    public static void main()
   {
        int i;
        for(i=2;i<=10;i=i+2)
        {
            System.out.print(" "+ i+"/"+ (i+2));
        }
    }
}
```

2. i.

```
import java.util.*;
class c2_1
{
    public static void main()
```

```
    {
    int sum=0;
    int i=1;
    for(i=1;i<=20;i++)
    {
        sum=sum+i;
    }
    System.out.print("The Result of the following series is: "+ sum);
    }
}
```

ii.

```
import java.util.*;
class C2_2
{
    public static void main()
    {
      System.out.print("Please Enter the Number of term: ");
      Scanner sc=new Scanner(System.in);
      int n=sc.nextInt();
      int result=1;
      n=n*2;
      for(int i=1;i<=n;i=i+2)
      {
        result=result*i;
        System.out.println(i);
        System.out.println(result);
      }
    }
}
```

iii.

```
import java.util.*;
class C2_3
{
    public static void main()
```

```
    {
      System.out.print("Please Enter the Number of terms: ");
      Scanner sc=new Scanner(System.in);
      int n=sc.nextInt();
      int s = 0, c;
      int result=0;
      for (c = 1; c <= n; c++)
      {
        s = s * 10 + 1;
        result=result+s;
        System.out.println(s + " ");
        System.out.println(result);
      }
    }
}
```

iv.

```
import java.util.*;
class C2_4
{
    public static void main()
    {
      int i = 2,n=100,result=1;
      while(i<=n)
      {
        result = result * i;
        System.out.println(i + " ");
        System.out.println(result);
        i=i*2;
      }
    }
}
```

v.

```
public class C2_5
{
```

```
    public static void main(String []args)
    {
       int s = 0;
       for(int i = 1; i <= 5;i++)
       {
           int p=1;
           for(int j = 1; j <= i; j++)
           {
               p = p*j;
           }
           s = s + p;
       }
       System.out.println("s = "+s);
    }
}
```

vi.

```
public class C2_6
{
    public static void main(String []args)
    {
       double s = 0;
       for(int i = 1; i <= 4;i++)
       {
           double p = 1,s1 = 0;
           for(int j = 1; j <= i; j++)
           {
               s1 = s1 + j;
               p = p * j;
           }
           p = s1 / p;
           s = s + p;
       }
```

```
            System.out.println(s);
        }
    }
```

vii.

```
public class C2_7
{
    public static void main(String []args)
    {
        double p = 1;
        for (int i = 1; i <= 19; i = i + 2)
        p *= i / (double)(i + 1);
        System.out.println("p = " + p);
    }
}
```

3.

```
import java.util.*;
class LCM
{
    public static void main()
    {
      int a, b, max, step, lcm = 0;
      Scanner sc = new Scanner(System.in);
      System.out.println("Enter first number ::");
      a = sc.nextInt();
      System.out.println("Enter second number ::");
      b = sc.nextInt();
      if(a > b)
      {
         max = step = a;
      }
      else
      {
         max = step = b;
      }
      while(a!= 0)
```

```
        {
            if(max % a == 0 && max % b == 0)
            {
                lcm = max;
                break;
            }
            max += step;
        }
        System.out.println("LCM of given numbers is :: "+lcm);
    }
}
```

4.
```
import java.util.*;
public class Number_in_reverse_order
{
    public static void main()
    {
        int num,r,sum=0,t;
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter number :");
        num = sc.nextInt();
        System.out.println("The number in reverse order is: ");
        for(t=num;num!=0;num=num/10)
        {
            r=num % 10;
            System.out.print(r+", ");
        }
    }
}
```

5.
```
import java.util.*;
public class Even_old
{
    public static void main()
    {
        Scanner sc=new Scanner(System.in);
```

```
        int num, evenSum=0, oddProd=1, rem, temp;
        System.out.println("Enter the number ");
        num=sc.nextInt();
        while(num>0)
        {
           rem = num%10;
           if(rem%2==0)
               evenSum = evenSum + rem;
           else
               oddProd = oddProd * rem;
           num = num/10;
        }
        System.out.println("Sum of Even Digit:"+evenSum);
        System.out.println("Product of Odd Digit" +oddProd);
    }
}
```

6. i.

```
import java.util.*;
public class C6_1
{
    public static void main(String[] args)
    {
        double sum = 0;
        int a, n;
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter the value of a");
        a = sc.nextInt();
        System.out.println("Enter the value of n");
        n = sc.nextInt();
        for(int i = 1; i <= n; i++)
        {
            sum = sum + Math.pow(a,i);
        }
        System.out.println("Result of the series is :"+sum);
    }
}
```

ii.

```
import java.util.*;
public class C6_2
{
    public static void main(String[] args)
    {
        double s = 0;
        int x, n;
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter the value of x");
        x = sc.nextInt();
        System.out.println("Enter the value of n");
        n = sc.nextInt();
        for(int i = 1; i <= n; i++)
        {
            s = s + i * Math.pow(x,2);
        }
        System.out.println("s = "+s);
    }
}
```

iii.

```
import java.util.*;
public class C6_3
{
    public static void main(String[] args)
    {
        double p = 1;
        int n;
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter the value of n");
        n = sc.nextInt();
        for(int i = 1; i <= n; i++)
        {
            p = p * Math.pow(i,i);
        }
        System.out.println("p = "+p);
    }
}
```

iv.

```
import java.util.*;
public class C6_4
{
    public static void main(String[] args)
    {
        double s = 0;
        for(int i = 1; i <= 10; i++)
        {
            if(i%2 == 0)
            {
                 s = s + 1/Math.sqrt(i);
            }
        }
        System.out.println("s = "+s);
    }
}
```

v.

```
import java.util.*;
class C6_5
{
    public static void main(String args[])
    {
        int i,j;
        float fact = 1, s = 0;
        for(i = 1;i <= 10;i++)
        {
            if(i%2 == 0)
            {
                for(j = 1; j <= i ;j++)
                {
                    fact = fact * j;
                }
                s = s + 1/fact;
            }
        }
        System.out.println("s = "+s);
    }
}
```

vi.

```
import java.util.*;
public class C6_6
{
    public static void main(String[] args)
    {
        Scanner sc = new Scanner(System.in);
        double p = 1;
        System.out.println("Enter the value of a");
        int a = sc.nextInt();
        for(int i = 1; i <= 10; i++)
        {
            if(i%2 == 0)
            {
                p = p * a/Math.sqrt(i);
            }
  }
        System.out.println("p = "+p);
    }
}
```

vii.

```
import java.util.*;
public class C6_7
{
    public static void main(String[] args)
    {
        double s = 0;
        int a, n;
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter the value of a");
        a = sc.nextInt();
        System.out.println("Enter the value of n");
        n = sc.nextInt();
        for (int i = 1; i <= n; i++)
        {
            double term = Math.pow(a, i);
            if (i % 2 == 0)
                s -= term;
            else
                s += term;
```

```
        }
        System.out.println("s = "+s);
    }
}
```

viii.

```
import java.util.*;
public class C6_8
{
    public static void main(String[] args)
    {
        double p = 1;
        int x, n;
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter the value of x");
        x = sc.nextInt();
        System.out.println("Enter the value of n");
        n = sc.nextInt();
        n=n*2;
        for(int i = 1; i <= n; i = i+2)
        {
                p = p * (x + i);
        }
        System.out.println("p = "+p);
    }
}
```

7.

```
import java.util.Scanner;
public class Niven_number
{
    public static void main(String[] args)
    {
        int n, num, r,
        sum = 0;
        Scanner sc = new Scanner(System.in);
        System.out.print("Enter number = ");
        n = sc.nextInt();
        num = n;
        while (num > 0)
        {
```

```
            r = num % 10;
            sum = sum + r;
            num = num / 10;
        }
        if (n % sum == 0)
        {
            System.out.println(n+ " is niven number");
        }
        else
        {
            System.out.println(n+ " is not Niven Number");
        }
    }
}
```

8.
```
import java.util.*;
class Automorphic
{
    public static void main(String[] args)
    {
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter a number ");
        int n = sc.nextInt();
        int a,s,c = 1;
        a = n;
        s = n * n;
        while (n!=0)
        {
            c = c * 10;
            n = n / 10;
        }
        if(s % c == a)
        System.out.println("Automorphic Number");
        else
```

```
            System.out.println("Not Automorphic Number");
        }
    }
```

9.
```
import java.util.*;
class KrishnamurtiNumber
{
    public static void main(String[] args)
    {
        Scanner sc=new Scanner(System.in);
        System.out.println("Enter any Number :");
        int num = sc.nextInt();
        int temp = num;
        int digit,sum=0;
        int fact = 1;
        while(num >= 1)
        {
            fact = fact * num;
            num--;
        }
        while(num > 0)
        {
            digit = num % 10;
            sum = sum + fact;
            num = num / 10;
        }
        if(temp == sum)
        {
           System.out.println("Number is a Krishnamurti Number ");
        }
        else
        {
           System.out.println(" Number is a Krishnamurti Number ");
        }
    }
```

```
    }
```

10.
```
import java.util.Scanner;
public class spy_number
{
    public static void main(String[] args)
    {
        Scanner sc = new Scanner(System.in);
        System.out.print("Enter Number: ");
        int num = sc.nextInt();
        int digit, sum = 0;
        int orgNum = num;
        int prod = 1;
        while (num > 0)
        {
            digit = num % 10;
            sum += digit;
            prod *= digit;
            num /= 10;
        }
        if (sum == prod)
            System.out.println(orgNum + " is Spy Number");
        else
            System.out.println(orgNum + " is not Spy Number");
    }
}
```

11.
```
import java.util.*;
public class perfect_trimorphic
{
    public static void main()
    {
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter 1 for Palindrome number");
        System.out.println("Enter 2 for Perfect number");
        System.out.print("Enter your choice: ");
```

```
int ch = sc.nextInt();
System.out.print("Enter number: ");
int num = sc.nextInt();
switch (ch)
{
    case 1:
    int cNum = num;
    int rNum = 0;
    while(cNum != 0)
    {
        int digit = cNum % 10;
        cNum /= 10;
        rNum = rNum * 10 + digit;
    }
    if (rNum == num)
        System.out.println(num + " is palindrome");
    else
        System.out.println(num + " is not palindrome");
    break;
    case 2:
    int f = 0;
    int c_power = num*num*num;
    while(num!=0)
    {
        if(num%10!=c_power%10)
        {
            f=1;
            break;
        }
        num/=10;
        c_power/=10;
    }
    if(f == 0)
     System.out.println("Number is a Trimorphic Number.");
```

```
                else
                    System.out.println("Number is not a Trimorphic
                    Number.");
                break;
                default:
                System.out.println("Incorrect Choice");
                break;
            }
        }
    }
```

12.
```
import java.util.*;
public class menu_driven_series
{
    public static void main()
    {
        Scanner sc = new Scanner(System.in);
      System.out.println("Enter 1 for print s=1+12+123+1234+12345");
        System.out.println("Enter 2 for print p= 1/1*2/4*3/9*....
        nth term");
        System.out.print("Enter your choice: ");
        int ch = sc.nextInt();
        switch(ch)
        {
            case 1:
                for(int i = 1; i <= 5;i++)
                {
                    for(int j = 1; j <= i; j++)
                    {
                        System.out.print(j);
                    }
                    if(i<5)
                    {
                        System.out.print("+");
                    }
```

```
                }
                break;
            case 2:
                System.out.println("Enter the value of n");
                int n = sc.nextInt();
                for(int i = 1; i <= n;i++)
                {
                    System.out.print(i+"/"+i*i);
                    if(i<n)
                    {
                        System.out.print("*");
                    }
                }
                break;
        }
    }
}
```

13.
```
import java.util.*;
public class squares_cubes
{
    public static void main()
    {
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter 1 for:\nPrint 1st n natural numbers
        and their squares and cubes in tabular form");
        System.out.println("Enter 2 for:\nprint the series :s =
        1/1^3-1/2^3+1/3^3...1/n^3");
        int ch = sc.nextInt();
        System.out.println("Enter the value of n");
        int n = sc.nextInt();
        switch(ch)
        {
            case 1:
                int s = 1,c = 1;
```

```
                System.out.println("Numbers\tSquares\tCubes");
                for(int i = 1; i <= n; i++)
                {
                    s = i * i;
                    c = i * i * i;
                    System.out.println(i+"\t"+s+"\t"+c);
                }
                break;
            case 2:
                System.out.print("s = ");
                for(int i = 1; i <= n; i++)
                {
                    System.out.print("1/"+i+"^3");
                    if(i<n)
                    {
                        if(i % 2 == 0)
                        {
                            System.out.print("+");
                        }
                        else
                        {
                            System.out.print("-");
                        }
                    }
                }
                break;
            default:
                System.out.println("incorrect input");
        }
    }
}
```

14.
```
import java.util.*;
public class sum_series
{
```

```
    static int fact(int n)
    {
        if (n == 0)
          return 1;
        else
        return n * fact(n-1);
    }
    public static void main()
    {
        double s = 0;
        Scanner sc = new Scanner(System.in);
        System.out.print("Enter the value of x ");
        int x = sc.nextInt();
        System.out.print("Enter the value of N ");
        int N = sc.nextInt();
        for(int i = 1; i <= N;i++)
        {
            s = ((x+Math.pow(x,i))/fact(i));
        }
        System.out.print("s = "+s);
    }
}
```

15.
```
import java.util.*;
public class employee_salary
{
    public static void main(String[] args)
    {
        double total_tax = 0;
        Scanner sc = new Scanner(System.in);
        double salary[] = new double[5];
        double tax[] = new double[5];
        for(int i = 0; i < 5; i++)
        {
            System.out.println("Enter the salary of Employee");
```

```
            salary[i] = sc.nextDouble();
        }
        for(int i = 0; i < 5; i++)
        {
            if(salary[i] <= 20000)
                tax[i] = 0;
            else if(salary[i] <= 35000)
                tax[i] = 5.5/100.0*(salary[i]-20000);
            else if(salary[i] <= 65000)
                tax[i] = 825 + 7.5/100.0*(salary[i]-35000);
            else
                tax[i] = 3075 + 10/100.0*(salary[i]-65000);
            total_tax = total_tax + tax[i];
        }
        System.out.println("Total tax collected : "+total_tax);
    }
}
```

9. Nested Loop

MIND DRILL

Unsolved Questions

1.
```
import java.util.*;
public class Neon_number
{
    public static void main(String args[])
    {
        Scanner in = new Scanner(System.in);
        int num[]=new int[10];
        System.out.println("Enter a number");
```

```
            for(int i=1;i<=10;i++)
            {
                System.out.println("Enter a number");
                num[i] = in.nextInt();
                int sum =0, sqr = num[i]*num[i];
                while(sqr>0)
                {
                    sum += sqr%10;
                    sqr = sqr/10;
                }
                if(sum == num[i])
                    System.out.println("Neon Number");
                else
                    System.out.println("Not a Neon Number");
            }
        }
    }
```

2.
```
    import java.util.*;
    public class Magic_number
    {
        public static void main(String args[])
        {
            Scanner sc = new Scanner(System.in);
            System.out.print("Enter number to check: ");
            int num = sc.nextInt();
            int n = num;
            while (n > 9)
            {
                int sum = 0;
                while (n != 0)
                {
                    int d = n % 10;
```

```
                n /= 10;
                sum += d;
            }
            n = sum;
        }
        if (n == 1)
            System.out.println(num + " is Magic Number");
        else
            System.out.println(num + " is not Magic Number");
    }
}
```

3.
```
import java.util.*;
public class Palindromic_number
{
    public static void main(String[] args)
    {
      Scanner sc=new Scanner(System.in);
      int m,n;
     System.out.println("Enter a range in numbers(m and n (m<n)):");
      System.out.println("Please enter m:");
      m=sc.nextInt();
      System.out.println("Please enter n:");
      n=sc.nextInt();
      int num1=0;
      int num2=0;
      System.out.println(m+" to "+n+" palindrome numbers are");
      for(int i=m;i<=n;i++)
      {
        num1=i;
        num2=0;
        while(num1!=0)
        {
          int rem=num1%10;
```

```
            num1/=10;
            num2=num2*10+rem;
          }
              if(i==num2)
                  System.out.print(i+" ");
        }
     }
    }
```

4.
```
import java.util.*;
public class Armstrong_number
{
    public static void main(String[] args)
     {
        int m, n, count = 0, a, b, c, sum1=0, sum = 0;
        Scanner sc=new Scanner(System.in);
       System.out.println("Armstrong numbers from 1 to n numbers:");
        System.out.println("Enter the value of n");
        n=sc.nextInt();
        for(int i = 1; i <= n; i++)
        {
            m = i;
            while(m > 0)
            {
                b = m % 10;
                sum = sum + (b * b * b);
                m = m / 10;
            }
            if(sum == i)
            {
                System.out.println(i+" ");
                sum1=sum1+i;
            }
            sum = 0;
        }
```

```
            System.out.println("Sum of all the Armstrong Number between
            0 to "+n+" is "+sum1);
        }
    }
```

5.
```
    import java.util.*;
    public class Twin_prime
    {
        public static void main()
        {
            Scanner sc = new Scanner(System.in);
            System.out.print("Enter first number: ");
            int a = sc.nextInt();
            System.out.print("Enter second number: ");
            int b = sc.nextInt();
            boolean isAPrime = true;
            for (int i = 2; i <= a / 2; i++)
            {
                if (a % i == 0)
                {
                    isAPrime = false;
                    break;
                }
            }
            if (isAPrime && Math.abs(a - b) == 2)
            {
                boolean isBPrime = true;
                for (int i = 2; i <= b / 2; i++)
                {
                    if (b % i == 0)
                    {
                        isBPrime = false;
                        break;
                    }
                }
```

```
                if (isBPrime)
                 System.out.println(a + " and " + b + " are twin prime");
                else
                 System.out.println(a + " and " + b + " are not twin prime");
              }
              else
             System.out.println(a + " and " + b + " are not twin prime");
          }
    }
```

6. a.
```
public class Pattern_a
{
    public static void main()
    {
        for(int i=1;i<=4;i++)
        {
            for(int j=1;j<=i;j++)
            {
                System.out.print(i*j+" ");
            }
            System.out.println();
        }
    }
}
```

b.
```
public class Pattern_b
{
    public static void main()
    {
        for(int i=1;i<=5;i++)
        {
            for(int j=i;j<=5;j++)
            {
                System.out.print(j);
            }
            System.out.println();
```

```
            }
        }
    }
```

c.
```
class Pattern_c
{
    public static void main()
    {
      int i,j,k=10;
      for(i=1;i<=4;i++)
      {
      for(j=i;j<=4;j++)
      {
           System.out.print(k--+" ");
      }
      System.out.println();
    }
  }
}
```

d.
```
public class Pattern_d
{
       public static void main()
    {
        int temp=2;
        for(int i=1;i<=5;i++)
        {
            for(int j=1;j<=i;j++)
            {
                System.out.print(" ");
            }
            for(int k=i;k<=5;k++)
            {
                if(i>3)
                {
                    System.out.print(k-temp);
```

```
                    temp++;
                }
                else
                {
                    System.out.print(i);
                }
            }
            System.out.println();
        }
    }
}
```

e.
```
public class Pattern_e
{
    public static void main()
    {
        for (int i = 1; i <= 5; i++)
        {
            int num;
            if(i%2 == 0)
            {
                num = 0;
                for (int j = 1; j <= i; j++)
                {
                    System.out.print(num);
                    num = (num == 0)? 1 : 0;
                }
            }
            else
            {
                num = 1;
                for (int j = 1; j <= i; j++)
                {
                 System.out.print(num);
                 num = (num == 0)? 1 : 0;
```

```
                    }
                }
                System.out.println();
            }
        }
    }
```

f.
```
class Pattern_f
{
    public static void main()
    {
      int i,j;
      for(i = 5; i >=1; i--)
      {
        for(j = 1; j<=i ; j++)
        {
          if(j%2==0)
          System.out.print('#');
          else
          System.out.print('x');
        }
        System.out.println();
      }
    }
}
```

g.
```
public class Pattern_g
{
    public static void main()
    {
        int k = 65;
        for( int i = 1; i <= 4; i++)
        {
            for(int j = 1; j <= i; j++)
```

```
                {
                    System.out.print((char)k + " ");
                    k++;
                }
                System.out.println();
               }
            }
        }
```

10. Class as the Basis of all Computation

MIND DRILL

Unsolved Questions

1.
```
import java.util.*;
public class Employee
{
    String name;
    double basic,da,hra,pf,np,gp;
    void input()
    {
        Scanner sc=new Scanner(System.in);
        System.out.println("Enter the name of the employee");
        name=sc.nextLine();
        System.out.println("Enter the basic salary of the employee");
        basic=sc.nextDouble();
    }
    void cal()
    {
        da = 25 * basic / 100;
        hra = 15 * basic / 100;
        pf = 8.33 * basic / 100;
```

```
            np = basic + da + hra;
            gp = np - pf;
        }
        void display()
        {
            System.out.println("Name of the employee is "+ name);
            System.out.println("Basic salary of the employee is "+ basic);
            System.out.println("Dearness Allowance = "+ da);
            System.out.println("House Rent Allowance = "+ hra);
            System.out.println("Provident Fund = "+ pf);
            System.out.println("Net Pay = "+ np);
            System.out.println("Gross Pay = "+ gp);
        }
        public static void main(String[] args)
        {
            Employee emp=new Employee();
            emp.input();
            emp.cal();
            emp.display();
        }
    }
```

2.
```
    import java.util.*;
    public class tax
    {
        String Name, Department;
        double Monthly_Salary, Income_Tax;
        void accept_details()
        {
            Scanner sc = new Scanner(System.in);
            System.out.println("Enter the name of the teacher");
            Name = sc.nextLine();
            System.out.println("Enter the Monthly salary of the teacher");
            Monthly_Salary = sc.nextDouble();
        }
```

```
    void compute()
    {
        if(Monthly_Salary > 200000)
        {
            Income_Tax = 12 * Monthly_Salary / 100;
        }
        else
        {
            Income_Tax = 0;
        }
        Monthly_Salary = Monthly_Salary - Income_Tax;
    }
    void display_details()
    {
       System.out.println("Name of the teacher is "+ Name);
       System.out.println("Monthly Salary of teacher is "+
 Monthly_Salary);
       System.out.println("Income Tax = "+ Income_Tax);
    }
    public static void main(String[] args)
    {
        tax t = new tax();
        t.accept_details();
        t.compute();
        t.display_details();
    }
}
```

3.
```
import java.util.*;
public class Bill
{
    String name;
    int cons_no;
    double unit_con, Bill_amount;
    void getdata()
```

```
{
    Scanner sc = new Scanner(System.in);
    System.out.println("Enter the Name of the consumer");
    name = sc.nextLine();
    System.out.println("Enter the consumer number");
     cons_no = sc.nextInt();
    System.out.println("Enter the unit consumed by consumer");
    unit_con = sc.nextDouble();
}
void compute()
{
    if(unit_con < 120)
    {
        Bill_amount = unit_con * 1.20;
    }
    else if(unit_con >= 120 && unit_con <= 250)
    {
        Bill_amount = unit_con * 2.20;
    }
    else if(unit_con >= 250 && unit_con <= 400)
    {
        Bill_amount = unit_con * 3.20;
    }
    else
    {
        Bill_amount = unit_con * 4.00;
    }
}
void display()
{
  System.out.println("Consumer Name"+"\t"+"Consumer No"+"\t"+"Unit
  Consumed"+"\t"+"Bill Amount");
  System.out.println(name+"\t\t"+cons_no+"\t\t"+unit_con+"\t\
  t"+Bill_amount);
```

```
    }
    public static void main(String[] args)
    {
        Bill b=new Bill();
        b.getdata();
        b.compute();
        b.display();
    }
}
```

4.
```
import java.util.*;
public class School_book
{
    String name, author_name;
    int price_book, number_book, total_cost;
    void accept()
    {
         Scanner sc = new Scanner(System.in);
         System.out.println("Enter the Name of the book");
         name = sc.nextLine();
         System.out.println("Enter the author Name of the book");
         author_name = sc.nextLine();
         System.out.println("Enter the price of the book");
         price_book = sc.nextInt();
         System.out.println("Enter the number of books to be bought");
         number_book = sc.nextInt();
    }
    void cal_cost()
    {
        total_cost = price_book * number_book;
    }
    void display()
    {
        System.out.println("Name of the book : "+ name);
         System.out.println("Author Name of the book : "+ author_name);
```

```
        System.out.println("Price of the book :"+ price_book);
        System.out.println("Number of books to be bought"+
        number_book);
        System.out.println("Total cost : "+ total_cost);
    }
    public static void main(String[] args)
    {
        School_book sb = new School_book();
        sb.accept();
        sb.cal_cost();
        sb.display();
    }
}
```

5.
```
import java.util.*;
public class BookFair
{
    String Bname;
    double price;
    void input()
    {
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter the name of the book");
        Bname = sc.nextLine();
        System.out.println("Enter the price of book");
        price = sc.nextDouble();
    }
    void calculate()
    {
        if(price <= 1000)
        {
            price = price - (2 * price / 100);
        }
        else if(price > 1000 && price <= 3000)
        {
```

```
            price = price - (10 * price / 100);
        }
        else
        {
            price = price - (15 * price / 100);
        }
    }
    void display()
    {
        System.out.println("Name of book : "+ Bname);
        System.out.println("Price of book : "+ price);
    }
    public static void main(String[] args)
    {
        BookFair b=new BookFair();
        b.input();
        b.calculate();
        b.display();
    }
}
```

6.
```
import java.util.*;
public class RailwayTicket
{
    String name, coach;
    long mobno;
    int amt, totalamt;
    void accept()
    {
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter the name of customer");
        name = sc.nextLine();
        System.out.println("Enter the Coach like First_AC, Second_AC,
        Third_AC, Sleeper");
        coach = sc.next();
```

```
        System.out.println("Enter the mobile no of customer");
        mobno = sc.nextLong();
        System.out.println("Enter the basic amount of ticket");
        amt = sc.nextInt();
    }
    void update()
    {
        switch(coach)
        {
            case "First_AC":
                totalamt = amt + 700;
                break;
            case "Second_AC":
                totalamt = amt + 500;
                break;
            case "Third_AC":
                totalamt = amt + 250;
                break;
            case "Sleeper":
                totalamt = amt;
                break;
            default:
                System.out.println("Please select right coach");
        }
    }
    void display()
    {
       System.out.println("Name of the customer : "+ name);
       System.out.println("coach selected by customer : "+ coach);
       System.out.println("Mobile no of the customer : "+ mobno);
       System.out.println("Total amount after updating :"+ totalamt);
     }
     public static void main(String[] args)
    {
```

```
            RailwayTicket rt = new RailwayTicket();
            rt.accept();
            rt.update();
            rt.display();
        }
    }
```

7.
```
    import java.util.*;
    public class Discount
    {
        String item;
        double cost, dis, amt;
        void input()
        {
            Scanner sc = new Scanner(System.in);
            System.out.println("Enter the name of item");
            item = sc.nextLine();
            System.out.println("Enter the price of item");
            cost = sc.nextDouble();
        }
        void cal()
        {
            if(cost <= 2000)
            {
                dis = 0;
                amt = cost - dis;
            }
            else if(cost >= 2001 && cost <=5000)
            {
                dis = 10 * cost / 100;
                amt = cost - dis;
            }
            else if(cost >= 5001 && cost <=7000)
             {
                 dis = 15 * cost / 100;
                 amt = cost - dis;
```

```
            }
            else
            {
                dis = 20 * cost / 100;
               amt = cost - dis;
            }
        }
        void display()
        {
            System.out.println("Item"+"\t"+"Price"+"\t"+"Discount"+"\
            t"+"Amount");
            System.out.println(item+"\t"+cost+"\t"+dis+"\t\t"+amt);
        }
        public static void main(String[] args)
        {
            Discount d = new Discount();
            d.input();
            d.cal();
            d.display();
        }
    }
```

8.
```
    import java.util.*;
    public class interest
    {
        double p, r, si, amt;
        int t;
        void input()
        {
            Scanner sc = new Scanner(System.in);
            System.out.println("Enter the principal amount");
            p = sc.nextDouble();
           System.out.println("Enter the rate");
           r = sc.nextDouble();
           System.out.println("Enter the time");
```

```
        t = sc.nextInt();
    }
    void calculate()
    {
        si = p * r * t / 100;
        amt = p + si;
    }
    void show()
    {
        System.out.println("Simple Interest = "+ si);
        System.out.println("Amount = "+ amt);
    }
    public static void main(String[] args)
    {
        interest i = new interest();
        i.input();
        i.calculate();
        i.show();
    }
}
```

9.
```
import java.util.*;
public class School_Library
{
    String name;
    int day_late = 0;
    double fine = 0;
    void accept()
    {
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter the Name of the book");
        name = sc.nextLine();
        System.out.println("Enter the No. of days late");
        day_late = sc.nextInt();
```

```
    }
    void calculate()
    {
        if (day_late <= 5)
        {
            fine = day_late * 5;
        }
        else if (day_late >= 6 && day_late <= 15)
        {
            fine = (5 * 5) + ((day_late - 5) * 7);
        }
        else if (day_late >=16 && day_late <= 30)
        {
            fine = (5 * 5) + (7 * 10) + ((day_late - 15) * 10);
        }
        else
        {
            fine = (5 * 5) + (7 * 10) + (10 * 15) + ((day_late - 30) * 15);
        }
    }
    void display()
    {
        System.out.println("Name of Book"+"\t"+"Number of days"+"\
        t"+"Total Fine");
        System.out.println(name+"\t\t"+day_late+"\t\t"+fine);
    }
    public static void main(String[] args)
    {
        School_Library sl = new School_Library();
        sl.accept();
        sl.calculate();
        sl.display();
    }
}
```

10.
```
import java.util.*;
public class loan
{
    int principal, time;
    double rate, si;
    void accept()
    {
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter the principal amount");
        principal = sc.nextInt();
        System.out.println("Enter the time in years");
        time = sc.nextInt();
    }
    double cal_interest()
    {
        if(time <= 1)
        {
             si = principal * 4.5 * time / 100;
        }
        else if(time > 1 && time <= 2)
        {
             si = principal * 5 * time / 100;
        }
        else if(time > 2 && time <= 3)
        {
             si = principal * 7.5 * time / 100;
        }
        else
        {
            si = principal * 10 * time / 100;
        }
        return si;
    }
```

```
    void display()
    {
        System.out.println("Principal amount = "+principal);
        System.out.println("Simple Interest = "+si);
    }
    public static void main()
    {
        loan ln = new loan();
        ln.accept();
        ln.cal_interest();
        ln.display();
    }
}
```

11.
```
import java.util.*;
public class Automorphic
{
    int n, c = 0;
    void accept()
    {
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter the number");
        n = sc.nextInt();
    }
    int count()
    {
        int num = n;
        while(num!=0)
        {
            num = num / 10;
            c++;
        }
        return c;
    }
    void display()
```

```
    {
        Automorphic a = new Automorphic();
        a.accept();
        int square = n * n;
        int lastDigit = (int) (square%(Math.pow(10, c)));
        if(n == lastDigit)
        {
            System.out.println(n+ " is an automorphic number.");
        }
        else
         {
          System.out.println(n+ " is not an automorphic number.");
        }
    }
    public static void main(String []args)
    {
        Automorphic a1 = new Automorphic();
        a1.display();
    }
}
```

12.
```
import java.util.*;
public class palindrome
{
    int m, n;
    void accept(int a, int b)
    {
        m=a;
        n=b;
    }
    void display()
    {
       System.out.println(m + " to " + n + " palindrome numbers are");
        int num1 = 0;
        int num2 = 0;
```

```
            for (int i = m; i <= n; i++)
            {
                num1 = i;
                num2 = 0;
                while (num1 != 0)
                {
                    int rem = num1 % 10;
                    num1 /= 10;
                    num2 = num2 * 10 + rem;
                }
                if (i == num2)
                    System.out.print(i + " ");
            }
        }
        public static void main(String[] args)
        {
            palindrome p = new palindrome();
            Scanner sc = new Scanner(System.in);
            System.out.println("Enter num1");
            int n1 = sc.nextInt();
            System.out.println("Enter num2");
            int n2 = sc.nextInt();
            p.accept(n1, n2);
            p.display();
        }
    }
```

13.
```
    import static java.lang.Math.*;
    import java.util.*;
    public class quadratic
    {
  double a, b, c, d, r1, r2;
  void accept()
  {
      Scanner sc = new Scanner(System.in);
```

```
    System.out.print("Enter the value of a: ");
 a = sc.nextDouble();
    System.out.print("Enter the value of b: ");
    b = sc.nextDouble();
    System.out.print("Enter the value of c: ");
    c = sc.nextDouble();
}
void calculateRoots()
{
    if (a == 0)
    {
        System.out.println("The value of a cannot be 0.");
        return;
    }
    d = b * b - 4 * a * c;
    double sqrtval = sqrt(abs(d));
    if (d > 0)
    {
        System.out.println("The roots of the equation are real and
        different. \n");
        System.out.println((double)(-b + sqrtval) / (2 * a) + "\n"+
        (double)(-b - sqrtval) / (2 * a));
    }
    else if (d == 0)
    {
        System.out.println("The roots of the equation are real and
        same. \n");
        System.out.println(-(double)b / (2 * a) + "\n"+ -(double)b /
        (2 * a));
    }
    else
    {
        System.out.println("The roots of the equation are complex and
        different. \n");
        System.out.println(-(double)b / (2 * a) + " + i"+ sqrtval +
```

```
            "\n"+ -(double)b / (2 * a)+ " - i" + sqrtval);
        }
    }
    public static void main(String args[])
    {
        quadratic qua = new quadratic();
        qua.accept();
        qua.calculateRoots();
    }
    }
```

14.
```
    import java.util.*;
    public class reverse_string
    {
        String str, rstr;
        void accept()
        {
            Scanner sc = new Scanner(System.in);
            System.out.println("Enter the Sentence");
            str = sc.nextLine();
        }
        void change()
        {
            for(int i = str.length()-1; i >= 0; i--)
            {
                rstr = rstr + str.charAt(i);
            }
        }
        void show()
        {
            System.out.println("Sentence to be reversed: " + str);
            System.out.println("Reversed sentence: " + rstr);
        }
        public static void main(String[] args)
        {
```

```
            reverse_string rs = new reverse_string();
            rs.accept();
            rs.change();
            rs.show();
        }
    }
15  import java.util.*;
    public class word
    {
        String w;
        int vc = 0, cc = 0;
        void input()
        {
            Scanner sc = new Scanner(System.in);
            System.out.print("Input the sentence: ");
            w = sc.nextLine();
        }
        void count_vowels()
        {
            for (int i = 0; i < w.length(); ++i)
            {
              char ch = w.charAt(i);
              if (ch == 'a' || ch == 'e' || ch == 'i' || ch == 'o' ||
              ch == 'u')
              {
                vc++;
              }
            }
        }
        void count_consonants()
        {
            for (int i = 0; i < w.length(); ++i)
            {
```

```
            char ch = w.charAt(i);
            if (ch == 'a' || ch == 'e' || ch == 'i' || ch == 'o' ||
            ch == 'u')
            {
              continue;
            }
            else if (ch == ' ')
            {
              continue;
            }
            else
            {
              cc++;
            }
          }
    }
    void display()
    {
        System.out.println("Number vowels in sentence: "+ vc);
        System.out.println("Number consonants in sentence: "+ cc);
    }
    public static void main()
    {
        word obj = new word();
        obj.input();
        obj.count_vowels();
        System.out.println();
        obj.count_consonants();
        obj.display();
    }
}
```

11. User-Defined Methods

MIND DRILL

Unsolved Questions

A. 1. a 2. c 3. c 4. a 5. d

B. 1. Methods 2. name 3. predefined 4. return 5. primitive

Unsolved Program

1.
```
import java.util.Scanner;
public class Automorphic_Number
{
    public static void main()
    {
        Scanner in = new Scanner(System.in);
        System.out.print("Enter a number to check: ");
        int num = in.nextInt();
        int count=0;
        int square = num*num;
        int temp = num;
        while(temp>0)
        {
            count++;
            temp=temp/10;
        }
        int lastDigit = (int) (square%(Math.pow(10, count)));
        if(num == lastDigit)
          System.out.println(num+ " is an automorphic number.");
        else
          System.out.println(num+ " is not an automorphic number.");
```

```
        }
    }
```

2.
```
import java.util.*;
public class calculator
{
      void sum(int a ,int b)
      {
          a=a+b;
          System.out.println("a + b = : "+a);
      }
      void subtract(int a , int b)
      {
          a = a - b;
          System.out.println("a - b = : "+a);
      }
      void product(int a , int b)
      {
          a = a * b;
          System.out.println("a * b = : "+a);
      }
      public static void main()
      {
          int ch;
          calculator cal=new calculator();
          Scanner sc= new Scanner(System.in);
          System.out.println("Enter 1 for Sum");
          System.out.println("Enter 2 for difference");
          System.out.println("Enter 3 for product");
          System.out.println("Enter your choice : ");
          ch=sc.nextInt();
          switch(ch)
          {
              case 1:
                  cal.sum(25,14);
```

```
                    break;
                case 2:
                    cal.subtract(35,26);
                    break;
                case 3:
                    cal.product(12,13);
                    break;
                default:
                    System.out.println("Wrong Choice");
            }
        }
    }
```

3.
```
import java.util.*;
public class vowel_consonant
{
    void vowel(String str)
    {
        System.out.print("vowels in sentence: ");
        for (int i = 0; i < str.length(); ++i)
        {
          char ch = str.charAt(i);
          if (ch == 'a' || ch == 'e' || ch == 'i' || ch == 'o' ||
          ch == 'u')
          {
            System.out.print(ch+",");
          }
        }
    }
    void consonant(String str)
    {
        System.out.print("consonants in sentence: ");
        for (int i = 0; i < str.length(); ++i)
        {
          char ch = str.charAt(i);
```

```
            if (ch == 'a' || ch == 'e' || ch == 'i' || ch == 'o' ||
            ch == 'u')
            {
              continue;
            }
            else if (ch == ' ')
            {
              continue;
            }
            else
            {
              System.out.print(ch+",");
            }
          }
      }
      public static void main()
      {
          vowel_consonant vc=new vowel_consonant();
          Scanner sc = new Scanner(System.in);
          System.out.print("Input the sentence: ");
          String str = sc.nextLine();
          vc.vowel(str);
          System.out.println();
          vc.consonant(str);
      }
  }
```

4.
```
  import java.util.*;
  public class reverse_string
  {
      public void rev_string(String s)
      {
          char c[]=s.toCharArray();
          String reverse="";
          for(int i=c.length-1;i>=0;i--)
```

```
        {
            reverse+=c[i];
        }
        System.out.println(reverse);
    }
    public static void main(String[] args)
    {
        String s;
        reverse_string rs=new reverse_string();
        Scanner sc=new Scanner(System.in);
        System.out.println("Enter a sentance");
        s=sc.nextLine();
        rs.rev_string(s);
    }
}
```

5.
```
import java.util.*;
public class Prime_number
{
    static void Prime(int n)
    {
      int i,m=0,flag=0;
      m=n/2;
      if(n==0||n==1)
      {
           System.out.println(n+" is not prime number");
      }
      else
      {
           for(i=2;i<=m;i++)
           {
                if(n%i==0)
                {
                     System.out.println(n+" is not prime number");
                     flag=1;
```

```
                    break;
                }
            }
        if(flag==0)
        {
            System.out.println(n+" is prime number");
        }
       }
    }
    public static void main(String args[])
    {
        Scanner sc=new Scanner(System.in);
        System.out.println("Enter a number");
        int n=sc.nextInt();
        for(int i=1;i<=n;i++)
        {
            Prime(i);
        }
    }
}
```

6.
```
import java.util.*;
class area_perimeter
{
    static int area_Rectangle(int a, int b)
    {
        int area = a * b;
        return area;
    }
    static int perimeter_Rectangle(int a, int b)
    {
        int perimeter = 2*(a + b);
        return perimeter;
    }
    public static void main (String[] args)
```

```
    {
        Scanner sc=new Scanner(System.in);
        int length=sc.nextInt();
        int breadth=sc.nextInt();
      System.out.println("Area = "+ area_Rectangle(length, breadth));
      System.out.println("Perimeter = "+ perimeter_Rectangle(length,
      breadth));
    }
}
```

7.
```
import java.util.Scanner;
public class Time_convert
{
    void time(int inputTime)
    {
        int hrs = inputTime / 3600;
        int mins = (inputTime % 3600) / 60;
        int secs = (inputTime % 3600) % 60;
        System.out.println(hrs + " Hours " + mins + " Minutes " +
        secs + " Seconds");
    }
    public static void main(String args[])
    {
        Scanner sc = new Scanner(System.in);
        System.out.print("Time in seconds: ");
        int sec = sc.nextInt();
        Time_convert tc=new Time_convert();
        tc.time(sec);
    }
}
```

8.
```
import java.util.*;
class Pronic_number
{
    boolean checkPronic(int x)
    {
```

```
        for (int i = 0;i <= (int)(Math.sqrt(x));i++)
        {
            if (x == i * (i + 1))
            {
                return true;
            }
        }
        return false;
    }
    public static void main(String[] args)
    {
        Pronic_number pn=new Pronic_number();
        Scanner sc=new Scanner(System.in);
        System.out.println("Enter a number");
        int num=sc.nextInt();
        if (pn.checkPronic(num))
        {
            System.out.print(num + " is Pronic number");
        }
        else
        {
            System.out.print(num + " is not Pronic number");
        }
    }
}
```

9.
```
import java.util.*;
public class GCM_LCM
{
    static int GCD(int a,int b)
    {
        int gcd=1;
        for(int i = 1; i <= a && i <= b; i++)
        {
            if(a%i==0 && b%i==0)
```

```
            gcd = i;
        }
        return gcd;
    }
    static int LCM(int a,int b,int c)
    {
        int lcm = (a * b) / c;
        return lcm;
    }
    public static void main(String[] args)
    {
        Scanner sc=new Scanner(System.in);
        System.out.println("Enter the number1");
        int num1=sc.nextInt();
        System.out.println("Enter the number2");
        int num2=sc.nextInt();
        int num3= GCD(num1,num2);
        System.out.println("Greatest common divisor of "+num1+" and
        "+num2+" is "+num3);
        System.out.println("Lowest common multiple of "+num1+" and
        "+num2+" is "+LCM(num1,num2,num3));
    }
}
```

10.
```
import java.util.*;
class Employee_tax
{
    static double tax = 0;
    void cal_tax(double annual_salary)
    {
        if(annual_salary <= 100000)
            tax = 0;
        else if(annual_salary <= 200000)
            tax = 5/100.0*(annual_salary-100000);
        else if(annual_salary <= 300000)
```

```
            tax = 5000 + 12/100.0*(annual_salary-200000);
        else
            tax = 7000 + 15/100.0*(annual_salary-300000);
    }
    public static void main(String[] args)
    {
        String name;
        double annual_salary;
        Employee_tax ob=new Employee_tax();
        Scanner sc=new Scanner(System.in);
        System.out.print("Enter your name: ");
        name=sc.nextLine();
        System.out.print("Enter Annual Salary: ");
        annual_salary=sc.nextDouble();
        ob.cal_tax(annual_salary);
        System.out.println("Name\tAnnual Salary\tTax");
        System.out.println(name+"\t"+annual_salary+"\t"+tax);
    }
}
```

11.
```
import java.util.*;
public class Q11
{
    public static void main(String[] args)
    {
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter your sales amount: ");
        double sales = sc.nextInt();
        discount(sales);
    }
    static void discount(double sales)
    {
        if(sales>10000)
        {
            System.out.println("Congratulations, you are eligible
```

```
                for a 10% discount! \nYour updated amount: ");
                double s = sales - (sales/10);
                System.out.println(s);
            }
            else if((sales>6000) && (sales <9999))
            {
                System.out.println("Congratulations, you are eligible
                for a 8% discount! \nYour updated amount: ");
                double s = sales - ((sales*8)/100);
                System.out.println(s);
            }
            else if((sales>2000) && (sales <5999))
            {
                System.out.println("Congratulations, you are eligible
                for a 4% discount! \nYour updated amount: ");
                double s = sales - ((sales*8)/100);
                System.out.println(s);
            }
            else if(sales<2000)
            {
                System.out.println("Sorry! you are not eligible for a
                discount.");
            }
            else
                System.out.println("Please enter a valid amount!");
        }
    }
```

12.
```
    import java.util.*;
    public class Q12
    {
        public static void main(String[] args)
        {
            Scanner sc = new Scanner(System.in);
            System.out.println("Enter your electricity consumption(in
```

```
        units): ");
        int unit = sc.nextInt();
        bill(unit);
    }
    static void bill(int units)
    {
        int bill = 0, Tbill = 0;
        if (units > 0 && units <=100)
        {
            bill = units * 5;
            System.out.println("You will be charged Rs 5 per unit.
            \n Your bill is: "+bill);
        }
        if(units>100 && units <=250)
        {
            units = units-100;
            bill = units * 8;
            Tbill = bill + 500;
            System.out.println("You will be charged Rs 8 per unit
            beyond the consumption of 100 units. \n Your bill is:
            "+Tbill);
        }
        else if(units > 250 && units <= 450)
        {
            units = units - 250;
            bill = units * 10;
            Tbill = bill + 900 + 500;
            System.out.println("You will be charged Rs 10 per unit
            beyond the consumption of 150 units. \n Your bill is:
            "+Tbill);
        }
        else if(units > 450 && units <= 5449)
        {
            units = units - 450;
            Tbill = units * 10;
```

```
            System.out.println("You will be charged Rs 10 per unit
            beyond the consumption of 450 units. \n Your bill is:
            "+Tbill);
        }
        else if(units > 5450)
        {
            Tbill = units * 15;
            System.out.println("You will be charged Rs 15 per unit
            beyond the consumption of 5450 units. \n Your bill is:
            "+Tbill);
        }
        else
        {
            System.out.println("Please provide a valid input!");
        }
    }
}
```

13.
```
import java.util.*;
public class Q13
{
    public static void main(String[] args)
    {
        int s = 0,l = 0, b = 0;
        double r = 0;
        Scanner sc = new Scanner(System.in);
        System.out.println("Whose area do you want to calculate?\
        n1. Square\n2. Rectangle\n3. Circle");
        int n = sc.nextInt();
        Area ob = new Area();
        switch (n)
        {
            case 1:
               System.out.print("Enter the side of the square: ");
                s = sc.nextInt();
                    ob.area(s);
```

```
                break;
            case 2:
                System.out.print("Enter the length and the breadth
                of the rectangle: ");
                l = sc.nextInt();
                b = sc.nextInt();
                ob.area(l, b);
                break;
            case 3:
                System.out.print("Enter the radius of the circle:
                ");
                r = sc.nextInt();
                ob.area(r);
                break;
        }
    }
}
class Area
{
    void area(float x)
    {
        System.out.println("The area of the Square is "+Math.pow(x,
        2)+" sq units");
    }
    void area(float x, float y)
    {
        System.out.println("The area of the Rectangle is "+x*y+"
        sq units");
    }
    void area(double x)
    {
        double z = 3.14 * x * x;
        System.out.println("The area of the Circle is "+z+" sq
        units");
    }
}
```

14.
```
import java.util.*;
public class Q14
{
    public static void main(String[] args)
    {
        int a = 0,b = 0, H = 0;
        double d1 = 0, d2 = 0, h = 0;
        Scanner sc = new Scanner(System.in);
        System.out.println("Whose area do you want to calculate?\
        n1. Parallelogram\n2. Rhombus\n3. Trapezium");
        int n = sc.nextInt();
        Area ob = new Area();
        switch (n)
        {
            case 1:
                System.out.print("Enter the base and height of the
                Parallelogram: ");
                b = sc.nextInt();
                H = sc.nextInt();
                ob.area(b, H);
                break;
            case 2:
                System.out.print("Enter both the diagonals of the
                Rhombus: ");
                d1 = sc.nextDouble();
                d2 = sc.nextDouble();
                ob.area(d1, d2);
                break;
            case 3:
                System.out.print("Enter the values of the parallel
                sides and height of the Trapezium: ");
                a = sc.nextInt();
                b = sc.nextInt();
                h = sc.nextDouble();
```

```
                ob.area(a, b, h);
                break;
            }
        }
    }
    class Area
    {
        void area(int x, int y)
        {
            System.out.println("Area of the parallelogram is: "+(x*y)+"
            sq units.");
        }
        void area(double x, double y)
        {
            System.out.println("Area of the rhombus is: "+(x*y)+" sq
            units.");
        }
        void area(int x, int y, double z)
        {
            System.out.println("Area of the trapezium is: "+(0.5*(x+y)*z)+"
            sq units.");
        }
    }
```

15.
```
    import java.util.*;
    import java.lang.*;
    public class Q15
    {
        public static void main(String[] args)
        {
            Scanner sc = new Scanner(System.in);
            pattern ob = new pattern();
            System.out.println("What type of patttern do you want?\n1.
            Star\n2. Character ");
            int k = sc.nextInt();
```

```
        switch (k)
        {
            case 1:
                System.out.println("Enter the number of rows and
                columns: ");
                int r = sc.nextInt();
                int c = sc.nextInt();
                ob.shape(r, c);
                break;
            case 2:
                System.out.println("Enter the side: ");
                int l = sc.nextInt();
                System.out.println("Enter the character: ");
                char ch =  sc.next().charAt(0);
                ob.shape(l, ch);
                break;
            default:
               System.out.println("Please enter a valid choice!");
        }
    }
}
class pattern
{
    void shape(int x, int y)
    {
        int i = 0, j = 0;
        for(i = 1; i<x; i++)
        {
            for(j = 1; j<y; j++)
            {
                System.out.print("* ");
            }
            System.out.println(" ");
        }
```

```
    }
    void shape(int x, char y)
    {
        int i = 0, j = 0;
        for(i = 1; i<x; i++)
        {
            for(j = 1; j<x; j++)
            {
                System.out.print(y+" ");
            }
            System.out.println(" ");
        }
    }
}
```

16.
```
import java.util.*;
public class menu_driven
{
    String word(String w)
    {
        String rstr = "";
        for(int i = w.length()-1; i >= 0; i--)
        {
            rstr = rstr + w.charAt(i);
        }
        return rstr;
    }
    int word(String w,char ch)
    {
        int vc = 0;
        for (int i = 0; i < w.length(); i++)
        {
          if (ch == w.charAt(i))
          {
```

```
                vc++;
              }
            }
            return vc;
        }
        public static void main(String[] args)
        {
            menu_driven md = new menu_driven();
            Scanner sc = new Scanner(System.in);
            System.out.println("Enter a word : ");
            String w = sc.nextLine();
            System.out.println("Enter 1 for print word in reverse and
            2 for count the character\nEnter your choice : ");
            int choice = sc.nextInt();
            switch(choice)
            {
          case 1:
                    System.out.println(md.word(w));
                    break;
          case 2:
                    System.out.println("Enter a character : ");
                    char ch = sc.next().charAt(0);
                    System.out.println(md.word(w,ch));
                    break;
                default:
                    System.out.println("Wrong choice");
            }
        }
    }
```

17.
```
    import java.util.*;
    public class Q17
    {
```

```
    public static void main(String[] args)
    {
        Scanner sc = new Scanner(System.in);
        string st = new string();
        String f = " ";
        int h = 0;
        System.out.println("Enter your choice: \n1. Palindorme
        String\n2. Palindrome Numbers\n");
        int b = sc.nextInt();
        switch(b)
        {
            case 1:
                st.palindrome(f);
                break;
                  case 2:
                st.palindrome(h);
                break;
            default:
               System.out.println("Please enter a valid option!");
                break;
        }
    }
}
class string
{
    void palindrome(String s)
    {
        String str, rev = "";
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter a string:");
        str = sc.nextLine();
        int length = str.length();
        for ( int i = length - 1; i >= 0; i-- )
            rev = rev + str.charAt(i);
```

```
        if (str.equals(rev))
            System.out.println(str+" is a palindrome");
        else
            System.out.println(str+" is not a palindrome");
    }
    void palindrome(int g)
    {
        Scanner i = new Scanner(System.in);
        int r,sum=0,temp;
        System.out.println("Enter the number: ");
        int n = i.nextInt();
        temp=n;
        while(n>0){
            r=n%10;
            sum=(sum*10)+r;
            n=n/10;
        }
        if(temp==sum)
            System.out.println("The number is a palindrome.");
        else
            System.out.println("The number is not a palindrome");
    }
}
```

18.
```
import java.util.*;
import java.lang.*;
public class Q18
{
    public static void main(String[] args)
    {
        Scanner sc = new Scanner(System.in);
        ser se = new ser();
        int l = 0, m = 0, n = 0;
        double x = 0;
        System.out.println("Enter your choice: \n1. Series 1\n2.
```

```
            Series 2\n3. Series 3");
            int a = sc.nextInt();
            switch(a)
            {
                case 1:
                    se.series(l);
                    break;
                case 2:
                    se.series(m, n);
                    break;
                case 3:
                    se.series(1);
                    break;
                default:
                   System.out.println("Please enter a valid option!");
                    break;
            }
        }
    }
    class ser
    {
        void series(int n)
        {
            Scanner st = new Scanner(System.in);
            double sum = 0;
            System.out.println("Enter the number of terms: ");
            int t = st.nextInt();
            for(int r = 1; r <= t; r++)
            {
                sum = sum + Math.pow(r, r);
            }
            System.out.print("The sum of the series is: "+sum);
        }
        void series(int p, int n)
```

```
    {
        Scanner sr = new Scanner(System.in);
        double sum = 0;
        System.out.println("Enter the number of terms: ");
        int t = sr.nextInt();
        System.out.println("Enter the value of x: ");
        int x = sr.nextInt();
        int v = 0;
              for(int j = 1; j <= t; j ++)
        {
            if(j%2!=0)
            {
                v = v + (x - j);
            }
            else
            {
                continue;
            }
        }
        System.out.print("The sum of the series is: "+v);
    }
    double series(double n)
    {
        Scanner rt = new Scanner(System.in);
        System.out.println("Enter the number of terms: ");
        int f = rt.nextInt();
        for(int i = 1; i<= f; i++)
        {
            System.out.println((i*i)+" ");
        }
        return series(0.0);
    }
}
```

19.
```
import java.util.*;
class overload_show
{
    double show(double n)
    {
        double result = 0.0;
        for(int i = 1;i <= n; i++)
        {
            result = result + (Math.pow(i,2)/(i*4));
        }
        return result;
    }
    double show(double a,double n)
    {
        double sum = 0.0;
        for(int i = 1;i <= n; i++)
        {
            sum = sum + (a/(a*5));
            a = a + 2;
        }
        return sum;
    }
    public static void main(String[] args)
    {
        overload_show os = new overload_show();
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter 1 for find the result of the
        series 1/4 + 4/8 + 9/12 + 16/16 + 20/25.....nth term");
        System.out.println("Enter 2 for find the sum of the series
        2/10 + 4/20 + 6/30 + 8/40..........n/5n");
        System.out.println("Enter your choice");
        int choice = sc.nextInt();
```

```
            switch(choice)
            {
        case 1:
                    System.out.println(os.show(5));
                    break;
        case 2:
                    System.out.println(os.show(2,4));
                    break;
                default:
                    System.out.println("Wrong choice");
            }
        }
    }
```

12. Constructors

MIND DRILL

Unsolved Questions

A. 1. d 2. b 3. c 4. d

B. 1. If a constructor is not defined in a class, then the Java compiler provides a constructor which is known as default constructor. It does not have any parameter and statements in its body. For example:

```
class demo
{
   public demo() //default constructor
   {
   }
}
```

A default constructor is used to initialize the instance variables automatically with default values. For example, int is initialised by 0, double is initialised by 0.0 and String is initialised by null.

2. Syntax to create an object of a class using constructor:

   <name of class> <name of object> = new <constructor> ();

3. A parameterised constructor is a type of constructor with parameters and statements inside its body whereas, A non-parameterised constrictor is a type of constructor without parameters.

Unsolved Program

1.
```
public class Employee
{
    String ename;
    double basicsal, hra, da, pf, gross, net;
    public Employee()
    {
        ename = "";
    basicsal = 0;
        hra = 0;
        da = 0;
        pf = 0;
        gross = 0;
        net = 0;
    }
    public Employee(String name, double bsal)
    {
        ename = name;
        basicsal = bsal;
    }
    void calculate()
    {
        hra = 10 * basicsal / 100;
        da = 55 * basicsal / 100;
        pf = 8.33 * basicsal / 100;
        gross = basicsal + hra + da;
        net = gross - pf;
```

```
    }
    void display()
    {
        System.out.println("ename\tbasicsal\thra\tda\tpf\tgross\
        tnet");
        System.out.println(ename+"\t"+basicsal+"\t\t"+hra+"\t"+da+"\
        t"+pf+"\t"+gross+"\t"+net);
    }
    public static void main(String []args)
    {
        Employee emp1 = new Employee("Anjali", 1200.00);
        emp1.calculate();
        emp1.display();
    }
}
```

2.
```
import java.util.*;
public class salesman
{
    String sname;
    double sales, rate,tot_amt;
    public salesman()
    {
        sname = "";
        sales = 0;
        rate = 0;
        tot_amt = 0;
    }
    void input()
    {
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter the name of salesman");
        sname = sc.nextLine();
        System.out.println("Enter the sales");
        sales = sc.nextDouble();
```

```
        System.out.println("Enter the rate");
        rate = sc.nextDouble();
    }
    void compute()
    {
        tot_amt = sales * rate;
    }
    void display()
    {
        System.out.println("Name of the salesman : "+ sname);
        System.out.println("Sales : "+ sales);
        System.out.println("Rate : "+ rate);
        System.out.println("Total amount of sales : "+ tot_amt);
    }
    public static void main(String []args)
    {
        salesman sal = new salesman();
        sal.input();
        sal.compute();
        sal.display();
    }
}
```

3.
```
import java.util.*;
public class HCF_LCM
{
    int a, b, lcm, hcf;
    public HCF_LCM()
    {
       a = 0;
       b = 0;
       lcm = 0;
       hcf = 1;
    }
```

```
    void input()
    {
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter the value of a");
        a = sc.nextInt();
        System.out.println("Enter the value of b");
        b = sc.nextInt();
    }
    void hcf_cal()
    {
        for(int i = 1; i <= a && i <= b; i++)
        {
            if(a%i==0 && b%i==0)
            hcf = i;
        }
        System.out.println("HCF of "+a+" and " +b+" is : "+hcf);
    }
  void lcm_cal()
    {
        lcm = (a * b) / hcf;
        System.out.println("LCM of "+a+" and " +b+" is : "+lcm);
    }
    public static void main(String []args)
    {
        HCF_LCM hcf_lcm = new HCF_LCM();
        hcf_lcm.input();
        hcf_lcm.hcf_cal();
        hcf_lcm.lcm_cal();
    }
}
```

4.
```
public class computer
{
    String model_name;
    double org_price, inc_amount, total;
```

```
public computer()
{
    model_name = "";
    org_price = 0;
    inc_amount = 0;
    total = 0;
}
computer(String mn,double op)
{
    model_name = mn;
    org_price = op;
}
void cal_price()
{
    if(org_price <= 20000)
    {
        inc_amount = 2.5 * org_price / 100;
  total = org_price + inc_amount;
    }
    else if(org_price >= 20001 && org_price <= 30000)
    {
        inc_amount = 2.7 * org_price / 100;
        total = org_price + inc_amount;
    }
    else if(org_price >= 30001 && org_price <= 40000)
    {
        inc_amount = 4 * org_price / 100;
        total = org_price + inc_amount;
    }
    else
    {
        inc_amount = 6 * org_price / 100;
        total = org_price + inc_amount;
```

```
        }
    }
    void display()
    {
        System.out.println("Model Name\tOriginal Price\tIncreased
        Amount\tTotal ");
        System.out.println(model_name+"\t\t"+org_price+"\t\t"+inc_
        amount+"\t\t\t"+total);
    }
    public static void main(String []args)
    {
        computer com = new computer("Amit", 1200.00);
        com.cal_price();
        com.display();
    }
}
```

5.
```
import java.util.*;
public class Palindrome
{
    String word, revword;
  public Palindrome()
    {
        revword = "";
    }
    void input()
    {
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter the string");
        word = sc.nextLine();
    }
    boolean check()
    {
        int l = word.length();
        for(int k = l - 1; k >= 0; k--)
```

```
        {
            revword = revword + word.charAt(k);
        }
        if(word.equalsIgnoreCase(revword))
        {
            return true;
        }
        else
        {
            return false;
        }
    }
    void display()
    {
        Palindrome p = new Palindrome();
        p.input();
        if(p.check())
        {
            System.out.println("The string is palindrome.");
        }
    else
        {
           System. out.println("The string is not a palindrome.");
        }
    }
    public static void main(String []args)
    {
        Palindrome p = new Palindrome();
        p.display();
    }
}
```

6.
```
public class encode
{
    String word, encodeword;
```

```
encode()
{
    encodeword ="";
}
encode(String w)
{
    word = w;
}
void convert()
{
    char[] arr = new char[word.length()];
    for (int i = 0; i < word.length(); i++)
    {
        if((char)word.charAt(i) == 'z')
        {
            arr[i] = 'a';
        }
        else if((char)word.charAt(i) == 'Z')
  {
            arr[i] = 'A';
  }
        else
        {
            arr[i] = (char)(word.charAt(i) + 1);
        }
    }
    encodeword = new String(arr);
    System.out.println("\nEncoded word is : ");
    System.out.println(encodeword);
}
public static void main(String []args)
{
    encode e = new encode("Orange education");
    e.convert();
```

```
        }
    }
```

7.
```
import java.util.*;
public class Pronic
{
    int n;
    public Pronic()
    {
        n = 0;
    }
    void input()
    {
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter the number to check pronic or
        not");
        n = sc.nextInt();
    }
    void check()
    {
        int flag=0;
        for(int i=1; i<n ; i++)
       {
            if(i*(i+1)==n)
            {
                flag=1;
                break;
            }
        }
        if(flag==1)
            System.out.println(n + " is a pronic number");
        else
            System.out.println(n + " is not a pronic number");
    }
```

```
    public static void main(String []args)
    {
        Pronic p = new Pronic();
        p.input();
        p.check();
    }
}
```

8.
```
public class series
{
    double sum, n, x;
    public series()
    {
        sum = 0;
    }
    series(double x1, double n1)
    {
        x = x1;
        n = n1;
    }
    void calculate()
    {
        for(int i=1;i<=n;i++)
    {
            sum = sum + x/Math.pow(i, i);
            System.out.println(sum);
        }
    }
    void display()
    {
        System.out.println("Sum of the series is : "+sum);
    }
    public static void main(String []args)
```

```
    {
        series s = new series(2,3);
        s.calculate();
        s.display();
    }
}
```

9.
```
public class pattern
{
    int n;
    public pattern()
    {
        n = 5;
    }
    void pattern1()
    {
        int i,j;
        for(i=1;i<=n;i++)
        {
            for(j=1;j<=i;j++)
            {
                System.out.print(j);
            }
            System.out.println();
        }
    }
    void pattern2()
    {
        int i,j,k = 1;
        for(i=1;i<=n;i++)
        {
```

```
                for(j=1;j<=i;j++)
                {
                    System.out.print(k);
                    k=k+2;
                }
                System.out.println();
            }
        }
        public static void main(String []args)
        {
            pattern p = new pattern();
            p.pattern1();
            p.pattern2();
        }
    }
```

10.
```
    import java.util.*;
    public class fare
    {
        int dis;
        double bill;
        public fare()
        {
            dis = 0;
            bill = 0;
        }
        public fare(int d)
        {
            dis = d;
        }
        void calculate()
        {
            if(dis <= 10)
```

```
        {
            bill = dis * 5;
        }
        else if(dis >=11 && dis <= 30)
        {
            bill = (10 * 5)+((dis - 10) * 7.5);
        }
        else if(dis >=31 && dis <= 40)
        {
            bill = (10 * 5)+(20 * 7.5)+((dis - 30) * 10);
        }
        else
        {
           bill = (10 * 5)+(20 * 7.5)+(20 * 10)+((dis - 40) * 15);
        }
    }
    void display()
    {
        System.out.println("dis = "+dis);
        System.out.println("bill = "+bill);
    }
     public static void main(String []args)
    {
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter the distance");
        int di = sc.nextInt();
        fare obj = new fare(di);
        obj.calculate();
        obj.display();
    }
}
```

13. Library Classes

MIND DRILL

Unsolved Questions

A. 1. a 2. c 3. b 4. c 5. b

B. 1. false 2. lowercase or not. 3. Double.valueOf(String)
4. parseInt() 5. String

C. 1. a. E : true b. 39.6139.6

2. The parseInt() method is used to convert a value into integer type value. It takes a value as parameter and returns after converting it into int. It converts a value into integer if and only if the passed value does not contain a letter or symbol, whereas the toString() method is used to convert a value into string. It takes a value as parameter and returns after converting it into string.

3. a. The Float.parseFloat() method is used to convert a value into float type value. It takes a value as parameter and returns after converting it into float. It converts a value into float if and only if the passed value does not contain a letter or symbol.

   b. Character.isDigit(): This method is used to check whether the parameter passed is a digit or not. It returns a boolean value. Syntax of the isDigit() method is:

   boolean variable=Character.isDigit(char);
   For example:
   boolean b= Character.isDigit ('7');

4. Wrapper classes are the in-built classes that contain primitive data types. These classes are used to convert primitive data types into objects and vice-versa with the help of their methods.

   All the wrapper classes are part of java.lang package in the Java library.

   For example,

   int a = 12;

   String s = Integer.toString(a);

   System.out.println("Result: " + s);

5. Automatic conversion from primitive data type to its corresponding object class is called autoboxing. In other words, if a primitive data type value is automatically converted into its wrapper class type, then it is called autoboxing. For example, converting float data type to Float class:

   Float F=25.26;

Automatic conversion from object of wrapper class to its primitive data type is called Unboxing. In other words, if an object of a wrapper class is automatically converted into its primitive data type, then it is called unboxing. For example, converting Float class to float data type:

Float F;

float f=F;

14. Encapsulation and Inheritance

MIND DRILL

Unsolved Questions

A. 1. a 2. d 3. b 4. b 5. a

B. 1. child class object 2. Inheritance 3. multiple inheritance 4. sub

15. Arrays

MIND DRILL

Unsolved Questions

A. 1. d 2. b 3. d 4. c 5. c

Unsolved Program

1.
```
import java.util.*;
public class input_array
{
    public static void main()
    {
        int Sum = 0, product = 1;
        Scanner sc= new Scanner(System.in);
        int ar[]=new int[10];
        int i,j,c;
```

```
            for(i=0;i<10;i++)
            {
                System.out.print ("Enter a number : ");
                ar[i] = sc.nextInt();
                if(ar[i] % 6 == 0)
                {
                    Sum = Sum + ar[i];
                }
                if(ar[i] < 0)
                {
                    product = product * ar[i];
                }
            }
            System.out.println("sum of all the multiples by 6 "+ Sum);
            System.out.println("product of all the negative numbers "+
            product);
        }
    }
```

2.
```
    import java.util.*;
    public class palindromic_number
    {
        public static void main(String []args)
        {
            int ar[] = new int[25];
            int r, sum = 0;
            Scanner sc= new Scanner(System.in);
            System.out.print ("Enter number to check for Palindrome
            number : ");
            for(int i = 0; i < 25; i++)
            {
                ar[i] = sc.nextInt();
            }
            for(int i = 0; i < 25; i++)
            {
```

```
            int d;
            int rev = 0;
            int num1 = ar[i];
            do
            {
                d = ar[i] % 10;
                rev = (rev * 10) + d;
                ar[i] = ar[i]/10;
            } while(ar[i] != 0);
            if(num1 == rev)
              System.out.println(num1+ " is a Palindrome number");
            else
                System.out.println(num1+ " is not a Palindrome
                number");
        }
    }
}
```

3.
```
import java.util.*;
public class sum_of_even_numbers
{
    public static void main(String []args)
    {
        Scanner sc = new Scanner(System.in);
        int even = 0, odd = 0;
        int ar[] = new int[10];
        for(int i = 0; i < 10; i++)
        {
            ar[i] = sc.nextInt();
        }
        for (int i = 0; i < 10; i++)
        {
            if (i % 2 == 0)
            {
                continue;
```

```
            }
            else
        {
                if(ar[i] % 2 == 0)
                {
                  even += ar[i];
                }
            }
        }
        System.out.println("sum of even numbers present in odd
        positions " +even);
    }
}
```

4.
```
import java.util.*;
public class three_arrays
{
    public static void main(String []args)
    {
        int i;
        int A[] = new int[5];
        int B[] = new int[5];
        int C[] = new int[5];
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter the element of array A");
        for(i = 0; i < 5; i++)
        {
            A[i] = sc.nextInt();
        }
        System.out.println("Enter the element of array B");
        for(i = 0; i < 5; i++)
        {
            B[i] = sc.nextInt();
        }
        for(i = 0; i < 5; i++)
```

```
            {
                C[i] = A[i] + B[i];
        }
            for(i = 0; i < 5; i++)
            {
                System.out.println(C[i]);
            }
        }
    }
```

5.
```
    import java.util.*;
    public class array5
    {
        public static void main(String []args)
        {
            int ar[] = new int[10];
            int i,p;
            Scanner sc = new Scanner(System.in);
            System.out.print ("Enter number in array: ");
            for(i = 0;i<10;i++)
            {
                ar[i] = sc.nextInt();
            }
            System.out.print ("Enter position number: ");
            p = sc.nextInt();
            for(i = p;i<9;i++)
            {
                ar[i] = ar[i+1];
            }
            for(i = 0;i<9;i++)
            {
                System.out.println (ar[i]);
            }
        }
    }
```

6.
```
import java.util.*;
public class total_amount
{
    public static void main(String []args)
    {
        String item_name[] = new String[10];
        int price[] = new int[10];
        int i, total_amt = 0;
        Scanner sc = new Scanner(System.in);
        for(i = 0; i < 9; i++)
        {
        System.out.println("Enter the item name");
        item_name[i] = sc.next();
        System.out.println("Enter the price of the item");

              price[i] = sc.nextInt();
              total_amt = total_amt + price[i];
      }
      System.out.println("Item Name \t\t Price");
      for(i = 0; i < 9; i++)
      {
              System.out.println(item_name[i] +"\t\t"+ price[i]);
      }
      System.out.println("Total Amount\t\t"+ total_amt);
    }
}
```

7.
```
import java.util.*;
public class array6
{
  public static void main(String []args)
  {
    int ar[] = new int[10];
    int new_ar[] = new int[11];
    int i,p;
```

```
        Scanner sc = new Scanner(System.in);
        System.out.print ("Enter number in array: ");
        for(i = 0; i < 9; i++)
        {
          ar[i] = sc.nextInt();
        }
        System.out.print ("Enter position number: ");
        p = sc.nextInt();
        System.out.print ("Enter new number to be add in array: ");
        int new_num = sc.nextInt();
        for (i = 0; i < 9; i++)
        {
            if (i < p - 1)
                new_ar[i] = ar[i];
            else if (i == p - 1)
                new_ar[i] = new_num;
            else
                new_ar[i] = ar[i - 1];
        }
        for(i = 0; i < 9; i++)
        {
          System.out.println (new_ar[i]);
        }
      }
    }
```

8.
```
    import java.util.*;
    import java.io.*;
    class Selection_Sort
    {
        static void selectionSort(String name[],int n)
        {
            for(int i = 0; i < n - 1; i++)
            {
                int min_index = i;
```

```
            String minStr = name[i];
            for(int j = i + 1; j < n; j++)
            {
                if(name[j].compareTo(minStr) < 0)
                {
                    minStr = name[j];
                    min_index = j;
                }
            }
            if(min_index != i)
            {
                String temp = name[min_index];
                name[min_index] = name[i];
                name[i] = temp;
            }
        }
    }
    public static void main(String args[])
    {
        String name[] = new String[10];
        int n = name.length;
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter 10 names");
        for(int i = 0; i < n; i++)
        {
            name[i] = sc.nextLine();
        }
        System.out.println();
        selectionSort(name, n);
        System.out.println("Names in ascending order using Selection
        Sort");
        for(int i = 0; i < n; i++)
        {
            System.out.println(name[i]);
```

```
        }
    }
}
```

9.
```
import java.util.Scanner;
public class Odd_Even
{
    public static void main(String args[])
    {
        int i, n, e = 0, o = 0;
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter the value of n");
        n = sc.nextInt();
        int ar[] = new int[n];
        int oddar[] = new int[n];
        int evenar[] = new int[n];
        System.out.println("Enter numbers in array");
        for (i = 0; i < ar.length; i++)
        {
            ar[i] = sc.nextInt();
        }
        for (i = 0; i < ar.length; i++)
        {
            if (ar[i] % 2 == 0)
            {
                evenar[e] = ar[i];
                e++;
            }
            else
            {
                oddar[e] = ar[i];
                o++;
            }
        }
        System.out.println("Even array is: ");
```

```
        for(i = 0; i < evenar.length; i++)
            {
                System.out.println(evenar[i]);
            }
            System.out.println("Odd array is: ");
            for(i = 0; i < oddar.length; i++)
            {
                System.out.println(oddar[i]);
            }
        }
    }
```

10.
```
    import java.util.*;
    public class  Niven_numbers
    {
        public static void main(String args[])
        {
            Scanner sc = new Scanner(System.in);
            int i, c, d, sum = 0, sum1 = 0;
            int ar[] = new int[20];
            System.out.print("Enter 20 numbers in array : ");
            for(i = 0; i < 20; i++)
            {
                ar[i] = sc.nextInt();
            }
            for(i = 0; i < 20; i++)
            {
                c = ar[i];
                while(c > 0)
                {
                    d = c % 10;
                    sum = sum + d;
                    c = c/10;
                }
                if(ar[i] % sum == 0)
```

```
                    sum1 = sum1 + ar[i];
                }
                System.out.println("sum of all the Niven numbers "+sum1);
            }
        }
```

11.
```
import java.io.DataInputStream;
import java.io.IOException;
public class computer_science
{
    public static void main() throws IOException
    {
        DataInputStream stdin = new DataInputStream(System.in);
        String n[] = new String[40];
        int m[] = new int[40];
        int i, j, k;
        for(i = 0; i < 40; i++)
        {
            System.out.print ("Enter Name : ");
            n[i] = stdin.readLine() ;
            System.out.print ("Enter Comp. Sc. Marks : ");
            m[i] = Integer.parseInt (stdin.readLine() );
        }
        String x = null;
        for(i = 0; i < 40; i++)
        {
            for(j = i + 1; j < 40; j++)
            {
                if(m[i] < m[j])
                {
                    k = m[i]; m[i] = m[j]; m[j] = k;
                    x = n[i]; n[i] = n[j]; n[j] = x;
                }
            }
      }
```

```
        System.out.println ("Name \t\t Marks");
            for(i = 0; i < 40; i++)
            System.out.println (n[i]+"\t\t"+m[i]);
        }
    }
```

12.
```
import java.util.*;
public class Min_Max
{
    public static void main(String args[])
    {
        int ar[] = new int[25];
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter the elements in array");
        for(int i = 0; i < 25; i++)
        {
            ar[i] = sc.nextInt();
        }
        int max = ar[0];
        int min = ar[0];
        for (int i = 0; i < ar.length; i++)
        {
            if (ar[i] > max)
            {
                max = ar[i];
            }
            else if(ar[i] < min)
            {
                min = ar[i];
            }
        }
        System.out.println("Minimum value: " + min);
        System.out.println("Maximum value: " + max);
    }
}
```

13.
```
import java.util.*;
public class reverse_numbers
{
    public static void main(String []args)
    {
        int ar[] = new int[15];
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter the numbers in array");
        for(int i = 0; i < 15; i++)
        {
            ar[i] = sc.nextInt();
        }
        int reverse[] = new int[15];
        System.out.println("Reversed numbers: ");
        for(int i = 0; i < 15; i++)
        {
            for(;ar[i] != 0; ar[i] /= 10)
            {
                int digit = ar[i] % 10;
                reverse[i] = reverse[i] * 10 + digit;
            }
            System.out.println(reverse[i]);
        }
    }
}
```

14.
```
import java.io.*;
import java.util.*;
class Common_element
    {
   private static void FindCommonElemet(String[] ar1, String[] ar2)
    {
        Set<String> set = new HashSet<>();
        for (int i = 0; i < ar1.length; i++)
        {
```

```
        for (int j = 0; j < ar2.length; j++)
              {
                  if (ar1[i] == ar2[j])
                  {
                      set.add(ar1[i]);
                      break;
                  }
              }
          }
          for (String i : set)
          {
              System.out.print(i + " ");
          }
      }
      public static void main(String[] args)
      {
          String[] ar1 = { "Amit", "Ashutosh", "Ritik", "Anaya",
          "Vansh" };
          String[] ar2 = { "Anaya", "Vansh", "Arohi" };
          System.out.println("Array 1: " + Arrays.toString(ar1));
          System.out.println("Array 2: " + Arrays.toString(ar2));
          System.out.print("Common Elements: ");
          FindCommonElemet(ar1, ar2);
      }
  }
```

15.
```
  import java.util.Scanner;
  public class ExamResult
  {
      public static void main(String args[])
      {
          final int TOTAL_STUDENTS = 50;
          Scanner in = new Scanner(System.in);
          int rollNo[] = new int[TOTAL_STUDENTS];
```

```
int sA[] = new int[TOTAL_STUDENTS];
int sB[] = new int[TOTAL_STUDENTS];
int sC[] = new int[TOTAL_STUDENTS];
double avg[] = new double[TOTAL_STUDENTS];
for (int i = 0; i < TOTAL_STUDENTS; i++)
{
 System.out.println("Enter student " + (i+1) + " details:");
    System.out.print("Roll No: ");
    rollNo[i] = in.nextInt();
    System.out.print("Subject A Marks: ");
    sA[i] = in.nextInt();
    System.out.print("Subject B Marks: ");
    sB[i] = in.nextInt();
    System.out.print("Subject C Marks: ");
    sC[i] = in.nextInt();
    avg[i] = (sA[i] + sB[i] + sC[i]) / 3.0;
}
System.out.println("\nRoll No\tAverage Marks");
for (int i = 0; i < TOTAL_STUDENTS; i++)
{
    System.out.println(rollNo[i] + "\t" + avg[i]);
}
System.out.println("\nStudents with Average above 80:");
for (int i = 0; i < TOTAL_STUDENTS; i++)
{
    if (avg[i] > 80)
        System.out.println(rollNo[i] + "\t" + avg[i]);
}
System.out.println("\nStudents with Average below 40:");
for (int i = 0; i < TOTAL_STUDENTS; i++)
{
    if (avg[i] < 40)
```

```
                System.out.println(rollNo[i] + "\t" + avg[i]);
            }
        }
    }
```

16.
```
import java.util.*;
class diagonal
{
    int diagonalSum(int[][] mat)
    {
        int sum=0;
        for(int i=0;i<3;i++)
        {
            for(int j=0;j<3;j++)
            {
           if(i == j)
                {
                    System.out.print(mat[i][j]);
                    sum += mat[i][j];
                }
                else
                {
                    System.out.print(" ");
                }
            }
            System.out.println();
        }
        return sum;
    }
    public static void main (String[] args)
    {
        int[][] mat= new int[3][3];
    Scanner sc = new Scanner(System.in);
    for(int i=0; i<3; i++)
    {
```

```
            for(int j=0; j<3; j++)
            {
                mat[i][j] = sc.nextInt();
            }
        }
            diagonal d = new diagonal();
        System.out.println(d.diagonalSum(mat));
        }
    }
```

17.
```
    import java.io.*;
    import java.util.*;
    class ques17
    {
        static void row_sum(int arr[][])
        {
            int sum = 0;
            System.out.print("\nFinding Sum of each row:\n\n");
            for (int i = 0; i < 4; ++i)
            {
                for (int j = 0; j < 3; ++j)
                {
                    sum = sum + arr[i][j];
                }
               System.out.println("Sum of the row " + i + " = "+ sum);
                sum = 0;
            }
        }
        static void column_product(int arr[][])
        {
            int pro = 1;
            System.out.print("\nFinding Sum of each column:\n\n");
            for (int i = 0; i < 4; ++i)
```

```
        {
            for (int j = 0; j < 3; ++j)
            {
                pro = pro * arr[i][j];
            }
            System.out.println("Product of the column " +i+ " = "
            +pro);
            pro = 1;
        }
    }
    public static void main(String[] args)
    {
        Scanner sc = new Scanner(System.in);
        int[][] arr = new int[4][3];
        System.out.println("Enter the elements of array : ");
        for (int i = 0; i < 4; i++)
        {
            for (int j = 0; j < 3; j++)
            {
                arr[i][j] = sc.nextInt();
            }
        }
        row_sum(arr);
        column_product(arr);
    }
}
```

18.
```
import java.io.*;
import java.util.*;
 public class sorted_column
{
    static void sort_columnWise(int ar[][])
    {
```

```
        int i,j;
        for(i=0;i<ar.length;i++)
        {
            for(j=1;j<ar.length;j++)
            {
                int temp = ar[i][j];
                ar[i][j] = ar[j][i];
                ar[j][i] = temp;
            }
        }
        for (i = 0; i < ar.length; i++)
        {
            for (j = 0; j < ar[i].length; j++)
                System.out.print(ar[i][j] + " ");
            System.out.println();
        }
    }
    public static void main(String args[])
    {
        Scanner sc = new Scanner(System.in);
        int[][] ar = new int[2][4];
        System.out.println("Enter the elements of array : ");
        for (int i = 0; i < 2; i++)
        {
            for (int j = 0; j < 4; j++)
            {
                ar[i][j] = sc.nextInt();
            }
        }
        sort_columnWise(ar);
    }
}
```

19.
```
import java.util.*;
class Symmetric_Matrix
{
    static int  MAX = 100;
  static void transpose(int mat[][], int tr[][], int N)
    {
        for (int i = 0; i < N; i++)
            for (int j = 0; j < N; j++)
                tr[i][j] = mat[j][i];
    }
    static boolean isSymmetric(int mat[][], int N)
    {
        int tr[][] = new int[N][MAX];
        transpose(mat, tr, N);
        for (int i = 0; i < N; i++)
            for (int j = 0; j < N; j++)
                if (mat[i][j] != tr[i][j])
                    return false;
        return true;
    }
    public static void main (String[] args)
    {
        Scanner sc = new Scanner(System.in);
        int[][] arr = new int[3][3];
        System.out.println("Enter the elements of array : ");
        for (int i = 0; i < 3; i++)
        {
            for (int j = 0; j < 3; j++)
            {
                arr[i][j] = sc.nextInt();
            }
        }
```

```
            if (isSymmetric(arr, 3))
                System.out.println( "Yes");
            else
                System.out.println ( "No");
        }
    }
```

20.
```
    public class ques20
    {
        public static void main(String []args)
      {
            int n = 3, sum = 0, sum1 = 0;
            double result;
            int A[][] = { { 9, 7, 13 },
                          { 6, 12, 18 },
                          { 5, 10, 15 } };
            int B[][] = { { 8, 7, 9 },
                          { 3, 11, 15 },
                          { 2, 9, 14 } };
            int m = A.length;
            for(int i = 0; i < n; i++)
          {
               m = m - 1;
             for(int j = 0; j < n ; j++)
               {
                  if (j == m)
                  {
                      sum = sum + A[i][j];
                  }
               }
          }
          for(int i = 0; i < n; i++)
          {
             for(int j = 0; j < n ; j++)
               {
```

```
                if (i == j)
                {
                    sum1 = sum1 + B[i][j];
                }
            }
        }
        result = sum / sum1;
        System.out.println("Result = " +result);
    }
}
```

21.
```
import java.util.*;
public class even_numbers_rowwise
{
    public static void main()
    {
        int[][] mat= new int[2][3];
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter the element in array");
        for(int i=0; i<2; i++)
        {
            for(int j=0; j<3; j++)
            {
                mat[i][j] = sc.nextInt();
            }
        }
        for(int i=0; i<2; i++)
        {
            for(int j=0; j<3; j++)
            {
                if(mat[i][j] % 2 == 0)
                {
                    System.out.println(mat[i][j]);
                }
```

```
            }
        }
    }
}
```

22.
```
public class pascal
{
    public static void main(int n)
    {
        int pas[] = new int[n+1];
        pas[0] = 1;
        for(int i = 0; i<n; i++)
        {
            for(int j = 0; j<= i;j++)
            {
                System.out.print(pas[j]+" ");
            }
            System.out.println();
            for(int j = i+1; j > 0; j--)
            {
                pas[j] = pas[j]+pas[j-1];
            }
        }
    }
}
```

23.
```
import java.util.*;
public class largest_number_column_wise
{
    public static void largestInColumn(int col, int[][] ar)
    {
        for (int i = 0; i < col; i++)
        {
            int max = ar[0][i];
            for (int j = 1; j < ar[i].length; j++)
```

```
                    if (ar[j][i] > max)
                        max = ar[j][i];
                System.out.println(max);
            }
        }
        public static void main(String[] args)
        {
            int[][] ar = new int[4][4];
            Scanner sc = new Scanner(System.in);
            System.out.print("Enter numbers in array : ");
            for (int i=0; i<4; i++)
            {
                for(int j=0;j<4;j++)
                {
                    ar[i][j] = sc.nextInt();
                }
             }
            largestInColumn(4, ar);
        }
    }
```

16. String Handling

MIND DRILL

Unsolved Questions

A. 1. c 2. a 3. b 4. a 5. c

B. 1. string 2. Concatenation 3. string type
4. leading and trailing spaces 5. valueOf()

C. 1. i.
```
import java.io.*;
public class Letter_A
```

```
{
  public static void main(String[] args) throws IOException
    {
        BufferedReader br = new BufferedReader(new
        InputStreamReader(System.in));
        System.out.print("Enter Sentence: ");
        String str = br.readLine();
        String[] words = str.split(" ");
        int counter = 0;
        for (int i = 0; i < words.length; i++)
        {
            char firstChar = words[i].charAt(0);
            if (firstChar == 'A')
            {
                counter++;
            }
        }
        System.out.println("Number of Words Starting with A = "
        + counter);
    }
}
```

ii.

```
public class VowelConsonant
{
    public static void main(String[] args)
    {
        int vCount = 0, cCount = 0;
        String str = "How are you";
        str = str.toLowerCase();
        for(int i = 0; i < str.length(); i++)
        {
        if(str.charAt(i) == 'a' || str.charAt(i) == 'e' || str.
        charAt(i) == 'i' || str.charAt(i) == 'o' || str.charAt(i)
        == 'u')
            {
```

```
                    vCount++;
                    }
                  else if(str.charAt(i) >= 'a' && str.charAt(i)<='z')
                    {
                cCount++;
                    }
                }
                System.out.println("Number of vowels: " + vCount);
               System.out.println("Number of consonants: " + cCount);
            }
        }
```

2.
```
import java.util.Scanner;
public class  Capital_letters
{
    public static void main(String args[])
    {
        Scanner sc = new Scanner(System.in);
        System.out.print("Enter string: ");
        String s = sc.nextLine();
        String str = s.toUpperCase();
        System.out.println(str);
        int count = 0;
        System.out.print("Enter charector: ");
        char ch = sc.next().charAt(0);
        int len = str.length();
        for (int i = 0; i < len - 1; i++)
        {
            if (str.charAt(i) == ch)
            {
                count++;
            }
        }
```

```
            System.out.println("Number of times "+ch+ " present : "+
            count);
            for (int i = 0; i < len - 1; i++)
            {
                if (str.charAt(i) == ch)
                {
                    str = str.replace(str.charAt(i),'*');
                }
            }
            System.out.println(str);
        }
    }
```

3.
```
    import java.util.*;
    public class longest_Word
    {
        public static void main(String[] args)
        {
            Scanner sc = new Scanner(System.in);
            System.out.println("Enter the sentence");
            String string = sc.nextLine();
            String word = "", large="";
            String[] words = new String[100];
            int length = 0;
            string = string + " ";
            for(int i = 0; i < string.length(); i++)
            {
                if(string.charAt(i) != ' ')
                {
                    word = word + string.charAt(i);
                }
                else
                {
                    words[length] = word;
```

```
                length++;
                word = "";
                  }
            }
            large = words[0];
            for(int k = 0; k < length; k++)
            {
                if(large.length() < words[k].length())
                    large = words[k];
            }
            System.out.println("Largest word: " + large);
        }
    }
```

4.
```
    import java.util.*;
    public class SmallestWord
    {
        public static void main(String[] args)
        {
            Scanner sc = new Scanner(System.in);
            System.out.println("Enter the sentence");
            String string = sc.nextLine();
            String word = "", small = "";
            String[] words = new String[100];
            int length = 0;
            string = string + " ";
            for(int i = 0; i < string.length(); i++)
            {
                if(string.charAt(i) != ' ')
                {
                    word = word + string.charAt(i);
                }
                else
                {
                    words[length] = word;
```

```
                length++;
                word = "";
            }
        }
        small = words[0];
        for(int k = 0; k < length; k++)
        {
            if(small.length() > words[k].length())
                small = words[k];
        }
        System.out.println("Smallest word: " + small);
    }
}
```

5.
```
import java.util.*;
public class  palindromic_form
{
    public static String reverseString(String str)
    {
        char ch[] = str.toCharArray();
        String rev = "";
        for(int i=ch.length-1;i>=0;i--)
        {
            rev+=ch[i];
        }
        return rev;
    }
    public static void main(String args[])
    {
        Scanner sc = new Scanner(System.in);
        System.out.print("Enter string: ");
        String s = sc.nextLine();
        s = s + reverseString(s);
        System.out.print(s);
    }
```

```
}
```

6.
```
import java.util.Scanner;
public class ASCIICode
{
    public static void main(String args[])
    {
        Scanner in = new Scanner(System.in);
        System.out.println("Enter a word:");
        String word = in.nextLine();
        int len = word.length();
        for (int i = 0; i < len; i++)
        {
            char ch = word.charAt(i);
            System.out.println(ch + " = " + (int)ch);
        }
    }
}
```

7.
```
import java.util.*;
public class abbreviated_name
{
   public static void main(String[] args)
   {
      Scanner sc = new Scanner(System.in);
      String name = sc.nextLine();
      System.out.println("The full name is: " + name);
      System.out.print("abbreviated name: ");
      int len = name.length();
      name = name.trim();
      String str1 = "";
      for (int i = 0; i < len; i++)
      {
         char ch = name.charAt(i);
         if (ch != ' ')
         {
```

```
                str1 = str1 + ch;
            }
            else
            {
                System.out.print(Character.toUpperCase(str1.charAt(0))
                + ". ");
                str1 = "";
            }
        }
        String str2 = "";
        for (int j = 0; j < str1.length(); j++)
        {
            if (j == 0)
                str2 = str2 + Character.toUpperCase(str1.charAt(0));
            else
                str2 = str2 + Character.toLowerCase(str1.charAt(j));
        }
        System.out.println(str2);
    }
}
```

8.
```
import java.util.*;
class uppercase_frequency
{
    public static void main()
    {
        char ch;
        String str;
        Scanner sc=new Scanner(System.in);
        System.out.println("Enter any String ");
        str=sc.nextLine();
        str=str.toUpperCase();
        System.out.println("CHARACTER\tFREQUENCY");
        for(ch='A';ch<='Z';ch++)
        {
```

```
                int count=0;
                for(int a=0;a<str.length();a++)
                {
                    if(str.charAt(a)==ch)
                        count++;
                }
                if(count>0)
                {
                        System.out.println(ch+"\t\t"+count);
                }
            }
        }
    }
```

9.
```
import java.util.Scanner;
public class largest_number_of_vowels
{
    public static void main()
    {
        Scanner sc = new Scanner(System.in);
        System.out.print("Enter the sentence : ");
        String sentence = sc.nextLine();
        String wordMostVowels = "";
        int maxVowelCount = 0;
        for (String word : sentence.split(" "))
        {
            int vowelCount = 0;
            for (char c : word.toLowerCase().toCharArray())
            {
                if (c == 'a' || c == 'e' || c == 'i' || c == 'o'
                || c == 'u')
                {
                    vowelCount++;
                }
            }
```

```
                if (vowelCount > maxVowelCount)
                {
                    maxVowelCount = vowelCount;
                    wordMostVowels = word;
                }
            }
            System.out.println("The word with the most vowels (" +
            maxVowelCount + ") is: " + wordMostVowels);
        }
    }
```

10.
```
import java.util.*;
public class ReverseWord
{
   public void reverseWordInMyString(String str)
   {
      String[] words = str.split(" ");
      String reversedString = "";
      for (int i = 0; i < words.length; i++)
        {
           String word = words[i];
           String reverseWord = "";
           for (int j = word.length()-1; j >= 0; j--)
         {
            reverseWord = reverseWord + word.charAt(j);
         }
          reversedString = reversedString + reverseWord + " ";
      }
      System.out.println(str);
      System.out.println(reversedString);
   }
   public static void main(String[] args)
   {
      ReverseWord obj = new ReverseWord();
```

```
        Scanner sc = new Scanner(System.in);
          System.out.print("Enter a string: ");
          String str = sc.nextLine();
        obj.reverseWordInMyString(str);
      }
  }
```

11.
```
import java.util.*;
class replace_word
 {
      pu     blic static void main()
      {
          Scanner sc= new Scanner(System.in);
          String str, replace_string,new_str,final_str= "";
          int i, l;
          System.out.print("Enter a sentence : ");
          str=sc.nextLine();
          System.out.print("Enter word to replace : ");
          replace_string=sc.next();
          System.out.print("Enter new word : ");
          new_str = sc.next();
          l = str.length();
          for(i=0;i<l;i++)
          {
              final_str = str.replace(replace_string, new_str);
          }
          System.out.println("Original String : "+str);
          System.out.println("Replaced string : "+final_str);
      }
  }
```

12.
```
import java.util.Scanner;
public class  unique_word
{
```

```
    public static void main(String args[])
    {
        Scanner in = new Scanner(System.in);
        System.out.print("Enter a string: ");
        String str = in.nextLine();
        boolean isUnique = true;
        int len = str.length();
        for (int i = 0; i < len; i++)
        {
            char ch = str.charAt(i);
            for (int j = i + 1; j < len; j++)
            {
                if (ch == str.charAt(j))
                {
                    isUnique = false;
                    break;
                }
            }
            if (!isUnique)
            break;
        }
        if (isUnique)
            System.out.println(str+" is a unique word");
        else
            System.out.println(str+" is not a unique word");
    }
}
```

13.
```
import java.util.*;
class encode
{
    public static void main()
    {
        Scanner sc= new Scanner(System.in);
```

```
        String str, wd="" , encodestr="";
        int i, l;
        char ch;
        System.out.print("Enter a sentence: ");
        str=sc.nextLine();
        str= str+ " " ;
        l=str.length();
        for(i=0;i<l;i++)
        {
            ch=str.charAt(i);
            if(ch!=' ')
            {
                if(ch=='A'|| ch == 'a' || ch=='E'|| ch == 'e'
                || ch=='I'|| ch == 'i' || ch=='O'|| ch == 'o' ||
                ch=='U'|| ch == 'u')
                    wd=wd+(char)(ch+1);
                else
                    wd=wd+ ch;
            }
            else
            {
                encodestr=encodestr+wd+" ";
                wd="";
            }
        }
        System.out.println("Encoded Sentence : "+encodestr);
    }
}
```

14.
```
import java.util.*;
public class Removing_vowels_digits
{
    public static void main(String args[])
    {
```

```
            Scanner sc = new Scanner(System.in);
            System.out.print("Enter string: ");
            String s = sc.nextLine();
            s = s.replaceAll("[aeiouAEIOU]", "");
            s = s.replaceAll("[0123456789]", "");
            System.out.print(s);
        }
    }
```

15.
```
    import java.util.*;
    class r_word
    {
        public static void main()
        {
            String str = "India is my country";
            str = str.replace("my", "our");
            System.out.println("Replaced string : "+str);
        }
    }
```

16.
```
    public class Repeated_words
    {
        public static void main(String[] args)
        {
            String string = "NEXT TIME THERE WON'T BE A NEXT TIME";
            int count;
            string = string.toLowerCase();
            String words[] = string.split(" ");
            System.out.print("The repeated words are : ");
            for(int i = 0; i < words.length; i++)
            {
                count = 1;
                for(int j = i+1; j < words.length; j++)
                {
```

```
                    if(words[i].equals(words[j]))
                    {
                        count++;
                        words[j] = "0";
                    }
                }
                if(count > 1 && words[i] != "0")
                    System.out.println(words[i]);
            }
        }
    }
```

17.
```
    public class SmallestBiggestPalindrome
    {
        public static boolean isPalindrome(String a)
        {
            boolean flag = true;
            for(int i = 0; i < a.length()/2; i++)
            {
                if(a.charAt(i) != a.charAt(a.length()-i-1))
                {
                    flag = false;
                    break;
                }
            }
            return flag;
        }
        public static void main(String[] args)
        {
            String string = "MOM AND MADAM BOTH CAN SPEAK MALAYALAM";
            String word = "", smallPalin = "", bigPalin="";
            String[] words = new String[100];
            int temp = 0, count = 0;
```

```
string = string.toLowerCase();
string = string + " ";
for(int i = 0; i < string.length(); i++)
{
    if(string.charAt(i) != ' ')
    {
        word = word + string.charAt(i);
    }
    else
    {
        words[temp] = word;
        temp++;
        word = "";
    }
}
for(int i = 0; i< temp; i++)
{
    if(isPalindrome(words[i]))
    {
        count++;
        if(count == 1)
            smallPalin = bigPalin = words[i];
        else
        {
            if(smallPalin.length() > words[i].length())
                smallPalin = words[i];
            if(bigPalin.length() < words[i].length())
                bigPalin = words[i];
        }
    }
}
if(count == 0)
    System.out.println("No palindrome is present in the
    given string");
```

```
            else{
                System.out.println("Smallest palindromic word: " +
                smallPalin);
                System.out.println("Biggest palindromic word: " +
                bigPalin);
            }
        }
    }
```

18.
```
    import java.util.Scanner;
    public class Q_18
    {
        public static void main(String args[]) {
            Scanner in = new Scanner(System.in);
            System.out.println("Enter a String");
            String n = in.nextLine();
            String[] parts = n.split(" ");
            for(int i = 0; i < parts.length; i++) {
                if(parts[i].charAt(0) == parts[i].charAt(parts[i].
                length()-1))
                {
                 System.out.println(parts[i]);
                 }
            }
        }
 }
```

19.
```
    public class Q_20
    {
        public static void main(String[] args)
        {
            int n;
            String swp;
            String names[] = {"DELHI", "KOLKATA", "JAMSHEDPUR", "LUCKNOW",
            "PATNA"};
```

```
for (int i = 0; i < names.length; i++)
{
    char first=names[i].charAt(0);
    char last = names[i].charAt(names[i].length()-1);
          if ((first != 'A' && first !='E' && first != 'I' &&
          first != 'O' && first != 'U') && (last == 'A' || last
          == 'E' || last == 'I' || last == 'O' || last == 'U'))
          {
              System.out.println(names[i]);
          }
       }
    }
}
```

20.
```
public class Q_19
{
    public static void main(String[] args)
    {
        int n;
        String swp;
        String names[] = new String[10];
        names[0] = "Eshika";
        names[1] = "Anupam";
        names[2] = "Ankit";
        names[3] = "Bhavna";
        names[4] = "Rishi";
        names[5] = "Aadhya";
        names[6] = "Neelam";
        names[7] = "Hemal";
        names[8] = "Nyra";
        names[9] = "Sonu";
        for (int i = 0; i < names.length; i++)
        {
            for (int j = i + 1; j < names.length; j++)
            {
```

```
                if (names[i].compareTo(names[j])>0)
                {
                    swp = names[i];
                    names[i] = names[j];
                    names[j] = swp;
                }
            }
        }
        System.out.println("Names in alphabetical order:");
        for (int i = 0; i < names.length - 1; i++)
        {
            System.out.println(names[i] + ",");
        }
        System.out.println(names[names.length - 1]);
    }
}
```

21. a.

```
import java.util.Scanner;
public class Q_21
{
    public static void main(String args[]) {
     Scanner in = new Scanner(System.in);
           System.out.print("Enter a word: ");
       String w = in.nextLine();
       int len = w.length();
     for (int i = len - 1; i >= 0; i--) {
         for (int j = 0; j <= i; j++) {
             char ch = w.charAt(j);
                System.out.print(ch);
           }
  System.out.println();
       }
    }
}
```

b.
```
import java.util.Scanner;
public class Q_21
{
    public static void main(String args[]) {
        Scanner in = new Scanner(System.in);
        System.out.print("Enter a word: ");
        String w = in.nextLine();
        int len = w.length();
        for (int i = 0; i <= len - 1; i++) {
            for (int j = 0; j <= i; j++) {
                char ch = w.charAt(j);
                System.out.print(ch);
            }
            System.out.println();
        }
    }
}
```

c.
```
import java.util.Scanner;
public class Q_21
{
    public static void main(String args[]) {
        Scanner in = new Scanner(System.in);
        System.out.print("Enter a word: ");
        String word = in.nextLine();
        int len = word.length();
        for (int i = 0; i < len; i++) {
            for (int j = i; j < len; j++) {
                char ch = word.charAt(j);
                System.out.print(ch);
            }
            System.out.println();
        }
    }
}
```

d.
```
import java.util.Scanner;
public class Q_21
{
    public static void main(String args[]) {
        Scanner in = new Scanner(System.in);
        System.out.print("Enter a word: ");
        String w = in.nextLine();
        int len = w.length();
        String n = "";
        for (int k = len-1; k >= 0; k--)
        {
            n+=w.charAt(k);
        }
        for (int i = n.length(); i >= 0; i--) {
            for (int j = 0; j < i; j++) {
                char ch = n.charAt(j);
                System.out.print(ch);
            }
            System.out.println();
        }
    }
}
```

22. a.
```
import java.util.*;
class ques22_a
{
    public static void main(String args[])
    {
        int i,j,n;
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter the no of lines");
        n=sc.nextInt();
        for(i = 1;i <= n;i++)
```

```
            {
                for(j = 1;j <= n-i+1; j++)
                {
                    System.out.print((char)(j+64));
                }
                System.out.println("");
            }
        }
    }
```

b.
```
    import java.util.*;
    class ques22_b
    {
        public static void main()
        {
            int i,j,n;
            Scanner sc = new Scanner(System.in);
            System.out.println("Enter the no of lines");
            n=sc.nextInt();
            for(i=1;i<=n;i++)
            {
                for(j=i;j<=n;j++)
                {
                    System.out.print((char)(j+64));
                }
                System.out.println("");
            }
         }
    }
```

c.
```
    import java.util.*;
    class ques22_c
    {
        public static void main()
        {
```

```
            int i,j,n;
            Scanner sc = new Scanner(System.in);
            System.out.println("Enter the no of lines");
            n=sc.nextInt();
            for(i=1;i<=n;i++)
            {
                for(j=1;j<=i;j++)
                {
                     System.out.print((char)(j+64));
                }
                System.out.println("");
            }
        }
    }
```

d.

```
import java.util.*;
class ques22_d
{
    public static void main(String args[])
    {
        int i,j,k=0,l=1,n;
        Scanner sc =new Scanner(System.in);
        System.out.println("Enter the no of lines");
        n=sc.nextInt();
        for(i=1;i<=n;i++)
        {
             for(j=1;j<=i;j++,k++,l++)
             {
                  System.out.print((char)(l+64));
             }
             System.out.println();
        }
    }
}
```

23.
```
import java.util.Scanner;
public class ques23
{
    public static void main(String args[])
    {
        final int SIZE = 5;
        Scanner in = new Scanner(System.in);
        String names[] = new String[SIZE];
        int marks[] = new int[SIZE];
        System.out.println("Enter " + SIZE + " names and marks");
        for (int i = 0;  i < SIZE; i++)
        {
            System.out.print("Enter Name: ");
            names[i] = in.nextLine();
            System.out.print("Enter marks: ");
            marks[i] = in.nextInt();
            in.nextLine();
        }
        for (int i = 0; i < SIZE - 1; i++)
        {
            int min = i;
            for (int j = i + 1; j < SIZE; j++)
            {
                if (names[j].compareToIgnoreCase(names[min]) < 0)
                {
                    min = j;
                }
            }
            String temp = names[min];
            names[min] = names[i];
            names[i] = temp;
            int t = marks[min];
            marks[min] = marks[i];
            marks[i] = t;
```

```
            }
            System.out.println("Name \t Marks");
            for (int i = 0; i < SIZE; i++)
            {
                System.out.println(names[i] + "\t" + marks[i]);
            }
        }
    }
```

24.
```
    import java.util.*;
    class pattern_choice
    {
        public static void main()
        {
            Scanner sc= new Scanner(System.in);
            String wd,extwd;
            int i,l,j,ch;
            System.out.print("Enter a word : ");
            wd=sc.next();
            wd=wd.toUpperCase();
            l=wd.length();
            System.out.println("Enter 1 for pattern 1 / 2 for pattern
            2 ");
            ch=sc.nextInt();
            switch(ch)
            {
                case 1:
                for(i=0;i<l;i++)
                {
                     extwd=wd.substring(0,l-i);
                     System.out.println(extwd);
                }
                break;
                case 2:
                for(i=l-1;i>=0;i--)
                {
```

```
                    extwd="";
                    for(j=i;j<l;j++)
                    {
                        extwd=extwd+wd.charAt(j);
                    }
                    System.out.println(extwd);
                }
                break;
                default: System.out.println("Wrong choice");
            }
        }
    }
```

25.
```
import java.util.*;
class ques25
{
  public static void main(String[] args)
  {
    Scanner sc = new Scanner(System.in);
    System.out.print("Enter string: ");
    String s = sc.nextLine();
    s = s.toUpperCase();
    for(int i=0;i<s.length();i++)
    {
      int asc=(int)s.charAt(i);
      if(asc>=65 && asc<=88)
        asc+=2;
      else
        if(asc==89)
          asc=65;
        else
          if(asc==90)
            asc=66;
      System.out.print ((char)asc);
    }
```

```
    }
}
```

26.
```
import java.util.Scanner;
public class ques26
{
    public static void main(String args[])
    {
        Scanner in = new Scanner(System.in);
        System.out.println("Enter a sentence:");
        String str = in.nextLine();
        String word = "" + str.charAt(0);
        int len = str.length();
        for (int i = 0; i < len; i++)
        {
            char ch = str.charAt(i);
            if (ch == ' ')
                word += str.charAt(i + 1);
        }
        System.out.println(word);
    }
}
```

27.
```
import java.util.*;
public class ques27
{
    public static void main(String[] args)
    {
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter a sentence:");
        String str = sc.nextLine();
        if(highestOccuredChar(str) != ' ')
            System.out.println("The character that occurs maximum
            numbers of times :" +Character.toString(highestOccure
            dChar(str)));
        else
```

```
            System.out.println("The String doesn't have any character
            whose occurance is more than 1");
    }
    private static char highestOccuredChar(String str)
    {
        int [] count = new int [256];
        for ( int i=0 ;i<str.length() ; i++)
        {
            count[str.charAt(i)]++;
        }
        int max = -1 ;
        char result = ' ' ;
        for(int j =0 ;j<str.length() ; j++)
        {
        if(max < count[str.charAt(j)] && count[str.charAt(j)] > 1)
            {
                max = count[str.charAt(j)];
                result = str.charAt(j);
            }
        }
        return result;
    }
}
```

28.
```
import java.util.*;
class Repeated_letters
{
    public static void main(String args[])
    {
        Scanner sc = new Scanner(System.in);
        System.out.print("Enter string: ");
        String s = sc.nextLine();
        int l = s.length();
        char ch;
```

```
            String ans="";
            for(int i=0; i<l; i++)
            {
                ch = s.charAt(i);
                if(ch!= ' ')
                ans = ans + ch;
                s = s.replace(ch, ' ');
            }
            System.out.println("Word after removing duplicate characters
           : " + ans);
        }
    }
```

29.
```
import java.io.*;
import java.util.*;
public class Demo
{
   static void common_chars(String str_1, String str_2)
   {
      int[] array_1 = new int[26];
      int[] array_2 = new int[26];
      int str_len_1 = str_1.length();
      int str_len_2 = str_2.length();
      for (int i = 0 ; i < str_len_1 ; i++)
      array_1[str_1.charAt(i) - 'a'] += 1;
      for (int i = 0 ; i < str_len_2 ; i++)
      array_2[str_2.charAt(i) - 'a'] += 1;
      for (int i = 0 ; i < 26 ; i++)
      {
         if (array_1[i] != 0 && array_2[i] != 0)
         {
            for (int j = 0 ; j < Math.min(array_1[i], array_2[i])
            ; j++)
            System.out.print(((char)(i + 'a')));
         }
```

```
    }
}
public static void main(String[] args)
{
    Scanner sc = new Scanner(System.in);
    System.out.println("Enter first word");
    String my_str_1 = sc.nextLine();
    System.out.println("Enter second word");
    String my_str_2 = sc.nextLine();
    System.out.println("The common characters between the two
    strings are :");
    common_chars(my_str_1, my_str_2);
      }
    }
```

30.
```
import java.util.*;
class ques30
{
    public static void main()
    {
        Scanner sc= new Scanner(System.in);
        String str, wd, extwd="";
        int i, l,c=0;
        char ch;
        System.out.print("Enter a sentence: ");
        str=sc.nextLine();
        str= str+ " " ;
        System.out.print("Enter word: ");
        wd=sc.next ();
        l=str.length();
        for(i=0;i<l;i++)
        {
            ch=str.charAt(i);
            if(ch!=' ')
                extwd=extwd+ch;
```

```
            else
            {
                if(wd.equalsIgnoreCase(extwd))
                c++;
                extwd="";
            }
        }
        System.out.println("No. of : " + wd + " : " +c);
    }
}
```