Class IX

ANSWER KEY

Computer Applications

1. Principles of Object-Oriented Programming

Unsolved Exercise

Section A

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

B. 1. Procedure oriented programming 2. JVM
3. Procedure oriented programming 4. data members
5. Object-oriented language

C. 1.

Procedure-Oriented Programming	Object-Oriented Programming
Programs are divided into small parts known as functions or methods.	Programs are divided into small parts known as objects.
It uses the concept of Top-Down approach.	It uses the concept of 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. Polymorphism refers to the art of assigning different names to one method and use them in different scenario. For example, you can create a method area and used that same method to find the area of a square or a circle or a triangle, while all of them having different number of parameter and functionality.
3. The disadvantages of object oriented programming are:
   - Object-oriented program needs more lines of codes than Procedure-oriented program.
   - It needs more memory to execute at a high speed. Thus, its execution is slower than the conventional encoding system.
4. Polymorphism refers to the usability of one method with different parameters whereas encapsulation refers to wrapping up of data in one single.
5. A real-life example of polymorphism can be a women who might be a mother, sister or an employee all at the same time.

6. Assembly language is a low level language that uses mnemonics for coding whereas, Machine-level language uses binary digits for coding.
7. Advantages of polymorphism are:
   - Codes can be reused which reduces the size of the program.
   - It makes the program run faster as it reduces the number of comparisons needed to look for a method.
8. Disadvantages of machine level language:
   - Code in machine language is in the form of binary, which makes it difficult to debug.
   - Machine language is machine dependent. Hence, it won't perform consistently over different machines

2. Introduction to JAVA

Unsolved Exercise

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

B. 1. .class 2. application, applet 3. JAVA
4. independent 5. println()

C. 1. BlueJ is an IDE designed for beginners. It was designed and implemented by the BlueJ team at Deakin University, Melbourne, Australia and University of Kent at Canterbury, UK.

2. Java application is a program that runs independently on a computer (Client or Server) without any external help and Internet connections whereas, Applets are Java programs which are downloaded from a website on a client computer and can only be executed within a web browser.

3. To create a new project, follow the given steps:

   Step 1: Click Project menu from Menu Bar.

   Step 2: Select the New Project option from the drop-down menu.

   Step 3: Type a name for your project in the Name text box.

   Step 4: Choose a location by clicking the choose button.

   Step 5: Click OK button. A project is created in the BlueJ application window.

4. Disadvantages of Java are as follows:
   - Time-consuming
   - Unattractive look

5. Java was developed by James Gosling and Patrick Naughton at Sun Microsystems in 1995. It was originally called OAK.

3. Elementary Concept of Objects and Classes

Unsolved Exercise

A. 1. a 2. a 3. a 4. b 5. b 6. d

B. 1. object 2. collection 3. Class
4. characteristics 5. object factory
6. a. sub_name
   b. behaviour
   c. book_name, sub_name
   d. subject
   e. many
   f. computer
   g. new

C. 1. A class "Car" will have objects such as: Maruti, BMW, Volkswagen, etc.

2. Some components of a class are, objects, methods and data members.

3. The syntax to define a class in java is given below:

```
public class <class_name>
{
     \\Data members;
     \\Member methods;
}
```

4. Object is an instance of class because object represents a specific state of the class at any given time, this is why it is known as an instance of a class.

5. Class is a user-defined data type because it contains data and methods as integrated components. Hence, it is a composite data type.

6. Instance of a class which contains characteristics and behavior of the same class are called object. Thus, they are the basic units of Object-Oriented Programming and we can say an object implements a class. The different components of an object are:
   - Characteristics or attributes: they differentiate an object from another.
   - Behaviour or methods: they are different operations that are performed by objects.
   - Name of the object: each object has different name.

7. A class can create objects of itself with different characteristics and common behaviours just like a factory. For example, a class 'car' can have objects like BMW or Honda which will have same characteristics like, four wheels, doors, windows, etc. Similarly, a class 'student' can have a variety of objects like Grade 1, 2, etc. which will have different attributes like, Roll no, name, subjects etc.

8. Classes are called user defined data type because the definition of an object is very similar to the definition of a variable of primitive class. For example, if you define a class car, then the statement, car maruti; will create an object of the class car.

4. Values and Types

Unsolved Exercise

A.

1. c	2. a	3. b	4. d	5. c	6. a
7. c	8. a	9. b	10. b	11. a	12. c
13. a					

B.

1. compatible	2. user-defined	3. larger	4. NULL	5. -128 to 128
6. 0, 1	7. char ch = A	8. global	9. fixed	10. data

C.

1. Literals or Constants are values cannot be changed once assigned and used by programmers.
2. Declaration refers to the process of assigning a variable and initialisation refers to the process of assigning it a value for the first time.
3. \t is used to add a horizontal tab and \n is used to go to the next line.
4. Operators are special symbol that signifies the compiler to perform some specific mathematical or non-mathematical operations on one or more operands. Three types of operators are: arithmetic, logical and relational operators.
5. Separators are used to define the structure of a program in Java whereas, punctuators are signs used as special characters in Java.
6. a. 16 bits
   b. 64 bits
   c. 32 bits
   d. 16 bits
7. Java escape sequences are characters that have special meaning, for example, \n is an escape sequence that means new line. \b is another escape sequence which means backspace.
8. a. Explicit
   b. Implicit
9. Example of primitive data type: int a = 0;
   composite data type: int[] ar;
10. Composite Data types contain a memory address of a variable value because the reference types won't store the variable value directly in memory. They are defined by the programmer according to the requirement of the program. Different types of Non-Primitive data Types are strings, objects, arrays and interfaces.

5. Operators in JAVA

Unsolved Exercise

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

B. 1. ++, +, %, < 2. a*a+b*b+2*a*b 3. 5
4. boolean 5. one, different

C. 1. * 2
*16

2. Arithmetic operators are used to perform arithmetic calculations such as addition, subtraction, multiplication and division.

3. * A = ((B+C)/2)*h
* V = Pi*r*r*h

4. * 6
* 20

5. i. Less than operator
ii. increment operator
iii. and operator
iv. ternary operator

6. 75 F

7. Operator precedence refers to the order of the evaluation of each operator as they appear in an expression.

8. a. Arithmetic operators are used to perform mathematic operations whereas logical operators are used to check conditions in a program to make logical decisions.
b. Logical AND is used to check a logical decision based on the truth of the given condition, if all the conditions are true then only the AND operator returns true otherwise it returns false whereas logical OR returns true even if one of the conditions are true. If all the conditions are false, only then the OR operator returns False.

9. The postfix increment operator is written after the operand. First the operand's value is used in the expression, and then the value is increased by one 1.

10. m = 6
n = 14

6. Input in JAVA

Unsolved Exercise

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

B. 1. Logical, Syntax, Runtime 2. execution 3. throws
4. Scanner 5. float

C. 1. Single line comments are used to write one line comments. It can be written in a fresh line or after the end of statement after semicolon.

Multiline comments are used to write more that one line or multiple lines so that the logic of the code can be explained in detail.

Documentation comments are used to write the documentation of the part of the program such as question of the program, name of the prorammer,etc.

2. Syntax errors are the errors that occur due to the discrepancy or mistakes while writing writing a program. These errors are similar to the punctuation or grammatical mistakes while writing a sentence.

Logical errors are the errors that occur in a program due to the flawed logic or a bug in the program.

Runtime errors are the errors that occur in a program which is syntactically correct but contains some error that can only be detected while execution of the program.

3. InputStreamReader is a class in Java that reads bytes and decodes them into characters using a specified charset.
4. Try block is used to define a block that you want to test for errors whereas catch block is used to execute the block in case if an error occurs.
5. Comments are non-executable statement that are required to explain certain parts of the program or add notes to some parts of the program.
6. Runtime errors are the errors that occur in a program which is syntactically correct but contains some error that can only be detected while execution of the program. Example of a runtime error is when a variable is declared to be a integer type but it receives a string instead.
7. Java.util package contains the scanner class.
8. a. nextInt() b. nextLine() c. next()
d. nextDouble() e. nextShort()
9. In Java, the import keyword is used to bring in a package, class or interface in your programs.
10. The nextInt() method of a Scanner object reads in a string of numbers and converts them to int type. The nextFloat() method of a Scanner object reads the input stream of numbers as float.

D. 1.
```
import java.util.*;
public class marks
{
    public static void main(String[] args)
    {
        int m1, m2, m3, total, avg;
        Scanner sc = new Scanner(System.in);
        System.out.print("Enter the marks in subject 1: ");
        m1 = sc.nextInt();
        System.out.print("Enter the marks in subject 2: ");
        m2 = sc.nextInt();
        System.out.print("Enter the marks in subject 3: ");
        m3 = sc.nextInt();
        total = m1+m2+m3;
        avg = total/3;
        System.out.println("The total marks are: "+total);
        System.out.println("Average marks are: "+avg);
    }
}
```

2.
```
public class swap
{
    public static void main(String[] args)
    {
        int a=10, b=20, temp=0;
        System.out.println("Value of a, b before switching: "+a+", "+b);
        temp = a;
        a = b;
        b = temp;
        System.out.println("Value of a, b after switching: "+a+", "+b);
    }
}
```

3.
```
import java.util.*;
public class CP
{
    public static void main(String[] args)
    {
        double cp=0, sp=0, profit=0;
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter the Cost Price (CP): ");
        cp = sc.nextDouble();
        System.out.println("Enter the Selling Price (SP): ");
```

```
            sp = sc.nextDouble();
            profit = sp-cp;
            if (profit == 50)
            {
               System.out.println("The selling price of the item was: "+sp);
            }
        }
    }
```

4.
```
    import java.util.*;
    public class compound_interest
    {
        public static void main(String[] args)
        {
            double p = 0, r = 0, t = 0, ci = 0, amt = 0;
            Scanner sc = new Scanner(System.in);
            System.out.print("Enter the principal amount: ");
            p = sc.nextDouble();
            System.out.print("Enter the rate of interest: ");
            r = sc.nextDouble();
            System.out.print("Enter the time: ");
            t = sc.nextDouble();
            ci = (p*(1+(r/100))*t);
            amt = p+ci;
            System.out.print("The compund interest is : "+ci+"\n");
            System.out.print("The final amount is: "+amt);
        }
    }
```

5.
```
    import java.util.*;
    public class nodays
    {
        public static void main(String[] args)
        {
            int d = 0;
            Scanner sc = new Scanner(System.in);
            System.out.print("Enter the number of days: ");
            d = sc.nextInt();
            double y = d/365;
            double m = y*12;
            double days = d%365;
```

```
            System.out.print(d+" Days are equal to "+y+" years "+m+"
            months and "+days+" days.");
        }
    }
```

6.
```
import java.util.*;
public class diagperi
{
    public static void main(String[] args)
    {
        double s=0, d=0, p=0;
        Scanner sc = new Scanner(System.in);
        System.out.print("Enter the side of the square: ");
        s = sc.nextDouble();
        d = 2*(s*s);
        p = 4*(s);
        System.out.print("Diagonal: "+d+"\n");
        System.out.print("Perimiter: "+p+"\n");
    }
}
```

7.
```
import java.util.*;
public class labourer
{
    public static void main(String[] args)
    {
        Scanner sc = new Scanner(System.in);
        String name;
        double dw = 0;
        System.out.print("Enter the name of the person: ");
        name = sc.nextLine();
        System.out.print("Enter the daily wages: ");
        dw = sc.nextDouble();
        double mi = dw*30;
        if (mi > 10000)
        {
            System.out.println("You need to pay a tax of 500");
            double t_mi = mi-500;
            System.out.println("Monthly income of "+name+" is: "+t_mi);
        }
        else
        {
```

```
            System.out.println("Monthly income of "+name+" is: "+mi);
            }
        }
    }
```

8.
```
import java.util.*;
public class cost
{
    public static void main(String[] args)
    {
        String name;
        double cost=0, MRP=0, GST=0, discount=0;
        Scanner sc = new Scanner(System.in);
        System.out.println("Please enter the customer's name: ");
        name = sc.nextLine();
        System.out.println("Enter the cost of the item: ");
        cost = sc.nextDouble();
        discount = (cost*0.15);
        MRP = cost-discount;
        System.out.println("The MRP of the product is: "+MRP);
        GST = (cost*0.18);
        System.out.println("Your Bill: "+"\n"+"Name: "+name+"
        "+(cost+GST));
    }
}
```

9.
```
import java.util.*;
public class opchk
{
    public static void main(String[] args)
    {
        double distance = 0, cost = 0;
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter the distance you have travelled: ");
        distance = sc.nextDouble();
        cost = distance*10;
        System.out.println("The total cost of travelling is: Rs
        "+cost);
    }
}
```

10.
```
import java.util.*;
public class temperature
{
```

```
        public static void main (String args[])
        {
            Scanner sc = new Scanner(System.in);
            float Fahrenheit=0, Celsius=0;
            System.out.println("Tempreature menu: \n1. Celsius to
            Fahrenheit \n2. Fahrenheit to Celsius \n3. Exit");
            System.out.println("Please enter your choice: ");
            int a = sc.nextInt();
            switch (a)
            {
            case 1:
            System.out.println("Enter the tempreature in degree Celsius: ");
            Celsius = sc.nextFloat();
            Fahrenheit =((Celsius*9)/5)+32;
            System.out.println("Temperature in Fahrenheit is:
            "+Fahrenheit);
            break;
            case 2:
            System.out.println("Enter the tempreature in degree
            Fahrenheit: ");
            Celsius = sc.nextFloat();
            Celsius = ((Fahrenheit-32)*5)/9;
            System.out.println("Temperature in celsius is: "+Celsius);
            break;
            case 3:
            break;
            }
        }
    }
```

7. Mathematical Library Methods

Unsolved Exercise

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

B. 1. 5 2. 16 3. double 4. 10
5. Math.sqrt((Math.pow(a, 2) + Math.pow(b, 3)) 6. 2*a*b*c*Math.sqrt(a*b)
7. 3 8. 2 9. -5.5 10. double

C.

1. Library methods are defined already in the Java compiler and are stored as packages which are required to be imported before using it.
2. User-defined methods and Library Methods are the two types of methods used in Java.
3. Math.Max() method is used to find the larger number among the two given arguments. For example, Math.max(2,3) will return 3. Math.pow() method takes two arguments and multiplies the first argument with itself, as many times as the second argument. For example Math. pow(3, 2) will return 9.
4. Math.sqrt() takes one argument.
5. A = P*(1+Math.pow(r/n, n*t))
6. Math.ceil() returns the smallest integer value greater than the given argument whereas Math. floor() returns the largest integer value smaller than the given argument.
7. Library methods are the methods that are available already in the Java packages whereas user defined methods are the methods that the user creates in order to perform a task.
8. Math.sqrt(2*a*s + (u*u))
9. 3
10. -1.0

D.

1.
```
import java.util.*;
public class mat_amt
{
    public static void main(String[] args)
    {
        Scanner sc = new Scanner(System.in);
        double p=0, r=0, n=0, mat_amt;
        System.out.print("Enter the principal amount: ");
        p = sc.nextDouble();
        System.out.print("Enter the number of years: ");
        n = sc.nextDouble();
        System.out.print("Enter the rate of interest: ");
        r = sc.nextDouble();
        mat_amt = p*(1+(r/100)*n);
        System.out.print("Total amount after maturity: Rs "+mat_amt);
    }
}
```

2.
```
import java.lang.Math.*;
import java.util.*;
public class cone
{
    public static void main(String[] args)
```

```
    { Scanner sc = new Scanner(System.in);
        double H = 0, R = 0, Pi=3.14, V = 0, SA = 0, SH=0;
        System.out.println("Enter the Height,Radius and Slanted
        Height of the cone: ");
        H = sc.nextDouble();
        R = sc.nextDouble();
        SH = sc.nextDouble();
        V = Pi*(R*R)*H/3;
        SA = ((Pi*R)*(R+Math.sqrt((H*H)+(R*R))));
        System.out.println("Volume of the cone= "+V);
        System.out.println("Surface Area of the cone= "+SA);
    }
}
```

3.
```
import java.util.*;
import java.lang.Math.*;
public class pendulum
{
    public static void main(String[] args)
    {
        Scanner sc = new Scanner(System.in);
        double Pi = 3.14, L = 0, G = 9.8, T = 0;
        System.out.println("Enter the length of the pendulum: ");
        L = sc.nextDouble();
        T = 2*Pi*Math.sqrt(L/G);
        System.out.print("The time period of the pendulum is: "+T);
    }
}
```

4.
```
import java.util.*;
import java.lang.Math.*;
public class res
{
    public static void main(String[] args)
    {
        double a=0, b=0, c=0, r=0;
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter the value of a, b and c: ");
        a = sc.nextDouble();
        b = sc.nextDouble();
```

```
            c = sc.nextDouble();
            r = (Math.cbrt(a)+Math.pow(b,2)-Math.cbrt(c));
        System.out.println("The value of r is: "+r);
        }
    }
```

5.
```
import java.util.*;
import java.lang.Math.*;
public class dia
{
    public static void main(String[] args)
    {
        Scanner sc = new Scanner(System.in);
        double d=0, a=0, c=0, Pi = 3.14;
        System.out.print("Enter the diameter of the circle: ");
        d = sc.nextDouble();
        a = Pi*Math.pow((d/2), 2);
        c = 2*Pi*(d/2);
        System.out.print("The area and the circumference of the
        circle are: "+a+", "+c);
    }
}
```

6.
```
import java.util.*;
public class population
{
    public static void main(String[] args)
    {
        double p0 = 0, e = 2.71828, r = 0, t = 0, p=0;
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter the current population, rate of
        population and time in years: ");
        p0 = sc.nextDouble();
        r = sc.nextDouble();
        t = sc.nextDouble();
        p = p0*e*r*t;
        System.out.println("The total population is: "+p);
    }
}
```

8. Conditional Constructs in JAVA

Unsolved Exercise

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

B. 1. conditional opertor 2. switch 3. conditional
4. if 5. boolean

C. 1. a.

```
import java.lang.Math.*;
import java.util.*;
public class pen
{
    public static void main(String[] args)
    {
        double cp=0;
        Scanner sc = new Scanner(System.in);
        System.out.print("Enter the cost of the pen: ");
        cp = sc.nextDouble();
        if(cp<500)
        {
            double a = Math.random();
            System.out.print("Congratulations you have won a
            gift. \nYou can collect it from the reception desk
            by giving them the following code: "+a+"\n");
        }
        else if (cp > 500)
        {
           System.out.println("You have won a 25% discount!");
            double discount = 0.25*cp;
            double ucp = cp-discount;
            System.out.print("The updated cost: "+ucp);
        }
    else
        {
        System.out.print("Thank you for visiting us! \n Have a
        nice day!");
        }
    }
}
```

b.
```
import java.util.*;
    public class chkoddeven
    {
        public static void main(String[] args)
        {
            double a = 0;
            Scanner x = new Scanner(System.in);
            System.out.println("Enter the number you want to check: ");
            a = x.nextDouble();
            if(a > 0)
            {
                if(a%2 == 0)
                {
                    System.out.println("The number is even!");
                }
                else
                {
                    System.out.println("The number is odd!");
                }
            }
            else
            {
             System.out.println("Please enter a positive number!");
            }
        }
    }
```

c.
```
import java.util.*;
    public class triangle
    {
        public static void main(String[] args)
        {
            int a=0, b=0, c=0, s=0;
            Scanner sc = new Scanner(System.in);
            System.out.println("Enter the angles: ");
            a = sc.nextInt();
            b = sc.nextInt();
            c = sc.nextInt();
            s = a+b+c;
            if(s == 180)
            {
```

```
                System.out.print("A triangle can be formed with these
                values.");
            }
            else
            {
                System.out.print("A triangle can't be formed with
                these values.");
            }
        }
    }
```

d.
```
import java.util.*;
public class weekday
{
    public static void main(String[] args)
    {
        Scanner sc = new Scanner(System.in);
        int a = 0;
        System.out.println("Enter a number between 1 and 7");
        a = sc.nextInt();
        if((a<1) || (a>7))
        {
            System.out.println("Invalid Input, please enter a
            number between 1 and 7");
        }
        else
        {
            switch(a)
            {
                case 1:
                    System.out.println("Sunday");
                    break;
                case 2:
                    System.out.println("Monday");
                    break;
                case 3:
                    System.out.println("Tuesday");
                    break;
                case 4:
                    System.out.println("Wednesday");
                    break;
```

```
                    case 5:
                        System.out.println("Thursday");
                        break;
                    case 6:
                        System.out.println("Friday");
                        break;
                    case 7:
                        System.out.println("Saturday");
                        break;
                }
            }
        }
    }
```

e.
```
import java.util.*;
import java.lang.Math.*;
public class minmax
{
    public static void main(String[] args)
    {
        int a = 0, b = 0, max=0, min =0;
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter the two numbers: ");
        a = sc.nextInt();
        b = sc.nextInt();

        if(a==b)
        {
            System.out.println("Numbers are equal, doubling them
            now! "+2*a);
        }
        else
        {
            max = Math.max(a,b);
            min = Math.min(a,b);
            System.out.println("The square of the greater number
            is: "+ max*max);
            System.out.println("The cube of the smaller number
            is: "+ min*min*min);
        }
    }
}
```

f.
```
import java.util.*;
public class grades
{
    public static void main(String[] args)
    {
        Scanner sc = new Scanner(System.in);
        double m1=0, m2=0, m3=0, avg=0;
       System.out.println("Enter the marks of the 3 subjects: ");
        m1 = sc.nextDouble();
        m2 = sc.nextDouble();
        m3 = sc.nextDouble();
        avg = (m1+m2+m3)/3;
        if((avg >= 90) && (avg <= 100))
        {
            System.out.println("You have obtained Grade A");
                  }
                  else if((avg >= 80) && (avg <= 89))
        {
       System.out.println("You have obtained Grade B");
    }
        else if((avg >= 70) && (avg <= 89))
        {
            System.out.println("You have obtained Grade C");
        }
        else if((avg >= 60) && (avg <= 69))
        {
            System.out.println("You have obtained Grade D");
        }
        else if((avg >= 0) && (avg <= 59))
        {
            System.out.println("You have obtained Grade E");
        }
        else
        {
            System.out.println("You have obtained Grade F");
        }
    }
}
```

g.
```
import java.util.*;
public class customer
{
```

```
    public static void main(String[] args)
    {
        double amt=0, discount=0;
        String name;
        Scanner sc = new Scanner(System.in);
        System.out.println("Please enter your name: ");
        name = sc.nextLine();
        System.out.println("Please enter your bill amount: ");
        amt = sc.nextDouble();
        if(amt <= 3000)
        {
            discount = amt*(0.05);
            double s = amt-discount;
            System.out.println("Your updated price is: "+s);
        }
        else if(amt >= 5000)
        {
            discount = amt*(0.1);
            double s = amt-discount;
            System.out.println("Your updated price is: "+s);
        }
    }
}
```

h.
```
import java.util.*;
public class payment
{
    public static void main(String[] args)
    {
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter the total amount: ");
        double amt = sc.nextDouble();
        System.out.println("Enter your mode of payment: \n 1. Credit
        Card\n 2. Debit Card\n 3. E-Wallet\n 4. Cash\n Enter the
        number of your choice.");
        int c = sc.nextInt();
        switch(c)
        {
            case 1:
                double discount1 = (amt*0.015);
                System.out.println("You are getting a 1.5% discount.");
```

```
                System.out.println("Your updated bill: Rs"+(amt-
                discount1));
                break;
            case 2:
                System.out.println("You are getting a Rs 10 cashback.");
                System.out.println("Your updated bill: Rs"+(amt-10));
                break;
            case 3:
                System.out.println("You are getting a Rs 20 cashback.");
                System.out.println("Your updated bill: Rs"+(amt-20));
                break;
            case 4:
                System.out.println("Your bill: Rs"+amt);
                break;
        }
    }
}
```

i.

```
import java.util.*;
public class telephonebill
{
    public static void main(String[] args)
    {
        int call=0, ecall=0;
        double ac=0, tamt=0;
        Scanner sc = new Scanner(System.in);
        System.out.print("Enter the number of calls you have made: ");
        call = sc.nextInt();
        if(call <= 50)
        {
            System.out.println("Your bill is Rs 100");
        }
        else if((call>=51)&&(call<=100))
        {
            ecall = call-50;
            ac = (ecall*0.8);
            tamt = (100+ac);
            System.out.println("Your bill is Rs. "+tamt);
        }
        else if((call>=101)&&(call<=200))
        {
```

```
            ecall = call-50;
            ac = (ecall*0.6);
            tamt = (100+ac);
            System.out.println("Your bill is Rs. "+tamt);
        }
        else if(call>=201)
        {
            ecall = call-50;
            ac = (ecall*0.4);
            tamt = (100+ac);
            System.out.println("Your bill is Rs. "+tamt);
        }
    }
}
```

j.

```
import java.util.*;
public class salesreport
{
    public static void main(String[] args)
    {
        Scanner sc = new Scanner(System.in);
        System.out.println("Please enter the number of products you
        have sold: ");
        int a = sc.nextInt();
        if (a<=50)
        {
            System.out.println("You have scored a 5% bonus and you've
            won a Parker Pen!");
            //Bonus here refers to the commission that an employee
            receives.
        }
        else if((a>=51)&&(a<=75))
        {
             System.out.println("You have scored a 7.5% bonus and
             you've won a Memory card!");
        }
        else if((a>=76)&&(a<=100))
        {
            System.out.println("You have scored a 10% bonus and
            you've won a Smartphone!");
        }
```

```
            else if(a<=101)
            {
                System.out.println("You have scored a 15% bonus and
                you've won a Laptop!");
            }
            else
            {
                System.out.println("Please enter a valid number");
            }
        }
    }
```

k.
```
import java.util.*;
public class annual_income
{
    public static void main (String[] args)
    {
        Scanner sc = new Scanner(System.in);
        System.out.print("Please enter your annual income: ");
        double a = sc.nextDouble();
        if(a<=100000)
        {
            System.out.print("You are not eligible for the tax
            bracket");
        }
        else if((a>=100001)&&(a<=150000))
        {
            double ea = a-100000;
            double tax = ea*0.1;
            System.out.print("You are eligible for a 10% income
            tax.\n Updated amount: "+(a-tax));
    }
        else if((a>=150001)&&(a<=250000))
        {
            double ea = a-150000;
            double tax = (ea*0.2)+5000;
            System.out.print("You are eligible for a 20% income
            tax.\n Updated amount: "+(a-tax));
        }
        else if(a>=250001)
        {
```

```
                double ea = a-250000;
                double tax = (ea*0.3)+25000;
                System.out.print("You are eligible for a 30% income
                tax.\n Updated amount: "+(a-tax));
            }
            else
            {
                System.out.print("Please enter a valid amount!");
            }
        }
    }
```

l.
```
import java.util.*;
public class chkvowel
{
    public static void main(String[] args)
    {
        Scanner sc = new Scanner(System.in);
        System.out.print("Enter a character: ");
        char c = sc.next().charAt(0);
        if((c =='a') || (c=='e') || (c=='i') || (c=='o') || (c=='u'))
        {
           System.out.println("You have entered a vowel");
        }
        else
        {
            System.out.println("You have entered a consonant");
        }
    }
}
```

2. a.
```
import java.util.*;
public class volume
{
    public static void main(String[] args)
    {
      double pi = 3.14;
      Scanner sc = new Scanner(System.in);
      System.out.println("Whose volume do you want to deduce?\n
      1. Sphere\n 2. Cylinder\n 3. Cone");
      int a = sc.nextInt();
      switch(a)
      {
```

```
                case 1:
                double rs=0, vs=0;
               System.out.println("Enter the radius of the sphere: ");
                rs = sc.nextDouble();
                vs = (4*pi*rs*rs*rs)/3;
                System.out.println("The volume of sphere: "+vs);
                break;

                case 2:
                double h=0, rc=0,vc=0;
               System.out.println("Enter the radius of the cylinder: ");
                rc = sc.nextDouble();
                System.out.println("Enter the height of the cylinder: ");
                h = sc.nextDouble();
                vc = pi*rc*rc*h;
               System.out.println("The volume of the cylinder is: "+vc);
                break;
                case 3:
                double rco=0, hco=0, vco=0;
                System.out.println("Enter the radius of the cone: ");
                rco = sc.nextDouble();
                System.out.println("Enter the height of the cone: ");
                hco=sc.nextDouble();
                vco= pi*rco*rco*(hco/3);
      System.out.println("The voume of the cone: "+vco);
                break;
            }
          }
      }
```

b.
```
import java.util.*;
public class temperature
 {
   public static void main (String args[])
   {
        Scanner sc = new Scanner(System.in);
        float Fahrenheit, Celsius;
        int c;
        System.out.println("Please enter your choice: \n1. Celsius
        to Fahrenheit\n2. Fahremheit to Celsius");
        c = sc.nextInt();
```

```
            switch(c)
            {
                case 1:
               System.out.print("Enter the tempreature in Celsius: ");
                Celsius = sc.nextFloat();
                Fahrenheit =((Celsius*9)/5)+32;
                System.out.println("Temperature in Fahrenheit is:
                "+Fahrenheit);
                break;

                case 2:
              System.out.print("Enter the tempreature in Fahrenheit: ");
                Fahrenheit = sc.nextFloat();
                Celsius  = ((Fahrenheit-32)*5)/9;
              System.out.println("Temperature in celsius is: "+Celsius);
                break;
            }
      }
   }
```

c.
```
   import java.util.*;
   public class chkprime
   {
     public static void main(String[] args)
     {
       Scanner sc = new Scanner(System.in);
       int num = 0;
       System.out.println("Enter your choice: \n1. Check Prime\n2. Check
       Factorial");
       int a = sc.nextInt();
       switch(a)
       {
            case 1:
            System.out.println("Enter the number you want to check: ");
            num = sc.nextInt();
            boolean c = false;
            for (int i = 2; i <= num/2; ++i)
            {
             if (num%i == 0)
             {
                c = true;
                break;
```

```
            }
          }
          if (!c)
            System.out.println(num + " is a prime number.");
          else
            System.out.println(num + " is not a prime number.");
              break;

          case 2:
          int i,fact=1;
          System.out.println("Enter the number: ");
          int n=sc.nextInt();
          for(i=1;i<=n;i++)
          {
            fact=fact*i;
          }
          if(n==fact)
          {
              System.out.println("The factorial of "+n+" is not equal
              to "+n);
          }
          else
          {
          System.out.println("Factorial of "+n+" is: "+fact);
          }
          break;
      }
    }
}
```

d.
```
import java.lang.Math.*;
import java.util.*;
public class mathlib
{
    public static void main(String[] args)
    {
        Scanner sc = new Scanner(System.in);
        int a = 0;
        System.out.println("Enter your choice: \n1. Sq root\n2. Abs
        Value\n3. Ceiling method\n4. Random number");
        a = sc.nextInt();
```

```
            switch(a)
            {
                case 1:
                System.out.println("Square root of 9: "+Math.sqrt(9));
                break;
                case 2:
                System.out.println("Absolute value of 126.4 is: "+Math.
                abs(126.4));
                break;
                case 3:
                System.out.println("Smallest integer value greater that
                56.7 is: "+Math.ceil(56.7));
                break;
                case 4:
                System.out.println("Random number between 0 and 1: "+Math.
                random());
                break;
            }
        }
    }
```

e.
```
import java.util.*;
public class area
{
    public static void main(String[] args)
    {
        Scanner sc = new Scanner(System.in);
        int a = 0;
        System.out.println("Enter you choice to find the area of: \
        n1. Rectange\n2. Square\n3. Circle");
        a = sc.nextInt();
        switch(a)
        {
            case 1:
           System.out.print("Enter the length of the rectangle: ");
            double l = sc.nextDouble();
            System.out.print("Enter the breadth of the rectangle: ");
            double b = sc.nextDouble();
            double area = l*b;
            System.out.print("Area of the rectangle is: "+area);
            break;
```

```
                case 2:
                System.out.print("Enter the side of the square: ");
                double s = sc.nextDouble();
                double ar = s*s;
                System.out.print("Area of the square is: "+ar);
                break;
                case 3:
                System.out.print("Enter the radius of the circle: ");
                double r = sc.nextDouble();
                double ac = ((3.14)*r*r);
                System.out.print("Area of the circle is: "+ac);
                break;
            }
        }
    }
```

9. Interative Constructs in JAVA

Unsolved Exercise

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

B. 1. empty 2. break, continue 3. 30
4. zero 5. entry controlled 6. while

C. 1. Documentation comments are used to write the documentation part of the program such as question of the program, name of the programmer, etc. whereas multiline comments are used to write more than one line or multiple lines so that the logic of the code can be explained in detail.

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

3. The three types of errors are logical, runtime and syntax error.

4. Logical errors are the errors that occur in a program due to flaws in the logic of the program or bugs in the programs. The most common example of a logical error is divide by zero.

5. Try statement is used with block that may have an error and might throw an exception whereas, catch statement is used to handle the exception in such scenarios.

D. 1. i.
```
public class oddseries
{
    public static void main(String args[])
    {
        int num=100;
```

```
            System.out.print("Series: ");
            for (int i=1; i<=num; i++)
            {
                if (i%2!=0)
                {
                    System.out.print(i + " ");
                }
            }
        }
    }
```

ii.
```
public class oddseries
{
    public static void main(String args[])
    {
        int num=20;
        System.out.print("Series: ");
        for (int i=20; i>0; i--)
        {
          if(i%2 == 0)
          System.out.print(i + " ");
        }
    }
}
```

iii.
```
public class evenchk
{
    public static void main(String[] args)
    {
        int s=2;
        int n = 8;
        while(n!=0)
        {
           System.out.print(s);
           System.out.print(" ");
           s*=2;
           n-=1;
        }
    }
}
```

iv.
```
public class fractions
{
```

```
    public static void main(String[] args)
    {
        for(int i = 1; i<=10; i++)
        {
            System.out.println(i+"/"+(i*3));
        }
    }
}
```

v.
```
import java.util.Scanner;
public class Series
{
 public static void main(String args[])
 {
  Scanner sc = new Scanner(System.in);
  System.out.print("Enter the number of terms: ");
  int n = sc.nextInt();
  int s = 0, i;                // s for terms of series, c for
                               counter to generate n terms
  for (i = 1; i <= n; i++) {
   s = s * 10 + i;
   System.out.print(s + " ");
  }
 }
}
```

vi.
```
import java.util.Scanner;
public class Series2
{
 public static void main(String args[])
 {
  Scanner sc = new Scanner(System.in);
  System.out.print("Enter the number of terms: ");
  int n = sc.nextInt();
  int s = 0, i;
  for (i = 1; i <= n; i++)
  {
   s = s * 10 + 1;
   System.out.print(s + " ");
  }
 }
}
```

2. i.
```
import java.util.*;
public class Q2_i
{
    public static void main(String[] args)
    {
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter the number of terms: ");
        int n = sc.nextInt();
        int s = 0;
        for(int i=1; i<=n; i++)
        {
            System.out.print((i*i)+" ");
            s =s + i*i;
        }
        System.out.println("The sum of the series is: "+s);
    }
}
```

ii.
```
public class series
{
    public static void main(String[] args)
    {
        int i = 0, p = 1;
        for(i = 10;i>0;i--)
        {
            p = p*i;
        }
        System.out.println("p = "+p);
    }
}
```

iii.
```
public class s2
{
    public static void main(String[] args)
    {
        int i = 0, s = 1, n = 10, a = 0;
      for(i = 1; i <=5; i++)
        {
            a = a +s;
            s = s+n;
            n = n*10;
        }
```

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

iv.
```
    public class s3
    {
        public static void main(String[] args)
        {
            int i = 0, s = 0;
            for(i = 10; i <=100;)
            {
                s = s + i;
                i = i + 10;
            }
            System.out.print(s);
        }
    }
```

v.
```
    import java. util. *;
    class s4{
        public static int i, j, n, fact=1,sum=0;
        public static void main()
        {
            Scanner sc=new Scanner(System.in) ;
            System.out.println("Enter the number of terms: ") ;
            n=sc.nextInt() ;
            for(i=1;i<=n;i++)
            {
                for(j=1;j<=i; j++)
                {
                    fact=fact*j;
                }
                sum=sum+fact;
            }
            System.out.println("Sum of series is "+sum) ;
        }
    }
```

vi.
```
    import java. util. *;
    class s5{
        public static int i, j, n, fact=1,product=1;
        public static void main()
        {
```

```
            Scanner sc=new Scanner(System.in) ;
            System.out.println("Enter the number of terms: ") ;
            n=sc.nextInt() ;
            for(i=1;i<=n;i++)
            {
                for(j=1;j<=i; j++)
                {
                    fact=fact*j;
                }
                product=product*fact;
            }
            System.out.println("product of series is "+product) ;
        }
    }
```

vii.
```
public class s6
{
    public static void main(String[ ] args)
    {
        float i, prod = 1;
        for(i = 1; i < 10; i++)
        {
            prod = (i/(i+1))*prod;
        }
        System.out.print(prod);
    }
}
```

viii.
```
import java.util.*;
class s7
{
    public static void main ()
    {
        int i, s, a = 0;
        for (i =1;i<=4;i++)
        {
            s=i*i +1;
            a = a + s;
        }
        System.out.print("s = "+a);
    }
}
```

3.
```
import java.util.*;
import java.io.*;
class neon_number
{
    public static void main(String[] args)
    {
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter the number you want to check: ");
        int n = sc.nextInt();
        int square = n * n;
        int sum = 0;
        while (square > 0)
        {
            int r = square % 10;
            sum += r;
            square = square / 10;
        }
        if (sum == n)
            System.out.println(n+ " is Neon number");
        else
            System.out.println(n+ " is not a Neon number");
    }
}
```

4.
```
import java.util.*;
public class comma
{
    public static void main(String[] args)
    {
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter the number: ");
        int num=sc.nextInt();
        while (num > 0) {
            System.out.print( num % 10+", ");
            num = num / 10;
        }
    }
}
```

5.
```
import java.util.Scanner;
public class reverse_num
{
    public static void main(String[] args)
    {
```

```
        Scanner in = new Scanner(System.in);
        System.out.print("Enter Number: ");
        int oN = in.nextInt();

        int cN = oN;
        int rN = 0;

        while(cN != 0) {
            int digit = cN % 10;
      cN /= 10;
            rN = rN * 10 + digit;
        }

        int diff = rN - oN;
        System.out.println("Reversed Number = " + rN);
       System.out.println("Absolute Difference = " + Math.abs(diff));
    }
}
```

6.
```
import java.util.Scanner;
public class Disarium_Number
{
    public static void main(String[] args)
    {
        Scanner in = new Scanner(System.in);
        System.out.print("Enter the number: ");
        int num = in.nextInt();
        int oN = num;
        int digitCount = 0;

        while (num != 0)
        {
            num /= 10;
            digitCount++;
        }

        num = oN;
        int sum = 0;

        while (num != 0)
        {
```

```
            int d = num % 10;
        sum += Math.pow(d, digitCount);
            digitCount--;
            num /= 10;
          }

          if (sum == oN)
              System.out.println(oN+" is a Disarium Number");
          else
              System.out.println(oN+" is not a Disarium Number");
      }
  }
```

7.
```
import java.util.*;
class chkpalindrome
{
 public static void main(String[] args)
 {
  Scanner sc = new Scanner(System.in);
  int r,sum=0,temp;
  System.out.println("Enter the number to be tested: ");
  int n=sc.nextInt();

  temp=n;
  while(n>0)
  {
   r=n%10;
   sum=(sum*10)+r;
   n=n/10;
  }
  if(temp==sum)
   System.out.println("It's a palindrome number");
  else
   System.out.println("It's not a palindrome number");
}
}
```

8. i.
```
import java.util.*;
public class s8
{
    public static void main(String[] args)
    {
```

```
        Scanner sc = new Scanner(System.in);
        int i, a= 0,t = 0, s = 0,n=0;
        System.out.print("Enter the number: ");
        a = sc.nextInt();
        System.out.print("Enter the limit: ");
        n = sc.nextInt();
        for(i = 1; i<n ;i++)
        {
            t = a*(i);
            s = s + t;
        }
        System.out.print("Sum  = "+s);
    }
}
```

ii.
```
import java.util.*;
public class s9
{
    public static void main(String[] args)
    {
        Scanner sc = new Scanner(System.in);
        int i,n = 0, s = 0, t = 0;
        System.out.print("Enter the number: ");
        n = sc.nextInt();
        for (i = 1; i <= n; i++)
        {
            t = i*2;
            s = s + t;
        }
        System.out.print("The sum of the given series is: "+s);
    }
}
```

iii.
```
import java.util.*;
public class s10
{
    public static void main(String[] args)
    {
        Scanner sc = new Scanner(System.in);
        int i,n=0,t,p = 1;
       System.out.print("Enter the limit: ");
        n = sc.nextInt();
```

```
            for(i = 1; i <= n;i++)
            {
                t = i*11;
                p = p*t;
            }
            System.out.print("The product of the series: "+p);
        }
    }
```

iv.
```
import java.util.*;
public class s1
{
    public static void main(String[] args)
    {
        Scanner sc = new Scanner(System.in);
        int add=1, s=0, n=0;
        System.out.println("Enter the limit: ");
        n = sc.nextInt();
        for (int i=1;i<=n;i++)
        { add=add+i;
          s = s+add;
        }
         System.out.println(s);
    }
}
```

v.
```
import java.util.Scanner;
public class s2
{
    public static void main(String[] args)
    {
        double sum = 0;
        int n, x=0;
        Scanner s = new Scanner(System.in);
        System.out.print("Enter the number of terms: ");
        n = s.nextInt();
        int mul = 1;
        while(x > 0)
        {
            mul = mul * x;
            x--;
        }
```

```
            for(int i = 1; i <= n; i++)
            {
                sum = sum + (double)i / (mul);
            }
            System.out.println("Sum of series:"+sum);
        }
    }
```

vi.
```
    import java.util.*;
    import java.lang.Math.*;
    public class s3
    {
        public static void main(String[] args)
        {
            Scanner sc = new Scanner(System.in);
            int i = 0, n = 0, t=0, a = 0;
            double sum = 0;
            System.out.println("Enter the limit of the series: ");
            n = sc.nextInt();
            System.out.println("Enter the value of a: ");
            a = sc.nextInt();
            for (i = 2; i <= n; )
            {
                i = i+2;
                sum = sum + (a/(Math.sqrt(i)));
            }
            System.out.println("The sum of the series is: "+sum);
        }
    }
```

vii.
```
    import java.util.*;
    public class s4
    {
        public static void main(String[] arg)
        {
            Scanner sc = new Scanner(System.in);
            int i = 0, j = 0, n=0, a=0, es=0, os=0, t=0, sum = 0 ;
            System.out.println("Enter the limit: ");
            n = sc.nextInt();
            System.out.println("Enter the value of a : ");
            a = sc.nextInt();
            for(i = 1; i<=n; )
```

```
            {
                t = a*i;
                os = os + t;
                i = i+2;

            }
            System.out.print("\n");
             for(i = 2; i<=n; )
            {
                t = a*i;
                es = es + t;
           i = i+2;
            }
            sum = os - es;
            System.out.print("The sum of the series is: "+sum);
        }
    }
```

viii.
```
import java.util.*;
public class s5
{
    public static void main(String[] args)
    {
        Scanner sc = new Scanner(System.in);
        int i = 0, n=0, x=0, t=0, prod=1;
        System.out.println("Enter the limit: ");
        n = sc.nextInt();
        System.out.println("Enter the value of x: ");
        x = sc.nextInt();
        for(i = 1; i <= n; i = i+2)
        {
            t = (x+i);
            prod = prod*t;
        }
       System.out.println("The product of the terms is: "+prod);
    }
}
```

9.
```
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 the 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("It's a Niven Number");
        }
        else
        {
            System.out.println("It's not a Niven Number");
        }
    }
}
```

10.
```
import java.util.Scanner;
public class Automorphic
{
    public static void main(String args[])
    {
        Scanner in = new Scanner(System.in);
        System.out.println("Enter a number");
        int num = in.nextInt();
        int c=0, sqr = num*num;
        int temp =num;
        while(temp>0){
            c++;
            temp=temp/10;
        }
        int lastSquareDigits = (int) (sqr%(Math.pow(10,c)));
```

```
            if(num == lastSquareDigits)
                System.out.println("Automorphic number");
            else
                System.out.println("Not an Automorphic number");
        }
    }
```

11.
```
import java.util.Scanner;
public class Krishnamurthy_Number
{
    public static boolean isKrishnamurthy(int number)
    {
        int sum = 0, lastDigit = 0;
        int tempNum = number;
        while(tempNum != 0)
        {
            lastDigit = tempNum % 10;
            sum += factorial(lastDigit);
      tempNum /= 10;
        }
        if(sum == number)
            return true;
        return false;
    }

    public static long factorial(int n)
    {
        long fact = 1;
        for(int i=1; i<=n; i++)
        {
            fact *= i;
        }
        return fact;
    }
    public static void main(String[] args)
    {
        int number = 0;
        boolean result = false;
        Scanner scan = new Scanner(System.in);
        System.out.print("Enter an integer number::");
        number = scan.nextInt();
```

```
            result = isKrishnamurthy(number);
            if(result)
                System.out.println(number +
                    " is a Krishnamurthy number.");
            else
                System.out.println(number +
                    " is not a Krishnamurthy number.");
            scan.close();
        }
    }
```

12.
```
import java.util.*;
public class Menu1
{
    public static void main(String args[])
    {
        int ch = 0;
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter your choice: \n1. 1+12+123+1234+12345
        \n2. 1/1* 2/4* 3/9*");
        ch = sc.nextInt();
        switch (ch)
        {
            case 1:
                int sum = 0;

                System.out.print("Enter the number of terms: ");
                int n = sc.nextInt();
                int s = 0, i;
                System.out.print("The series is: ");// s for terms
                of series, c for counter to generate n terms
                for (i = 1; i <= n; i++) {
                    s = s * 10 + i;
                    System.out.print(s + " ");
                    sum  = sum + s;
                }
                System.out.println("\nThe of the series is :"+sum);
                break;
                        case 2:
                int m = 0;
                double S = 0;
```

```
                System.out.print("Enter the number of terms: ");
            m = sc.nextInt();
                System.out.print("\nThe series is: ");
                for(float l = 1; l<=m;l++)
                {
                    System.out.println((l/(l*l))+", ");
                    S = S + (l/(l*l));
                }
              System.out.println("\nThe sum of the series is: "+S);
                break;
        }
    }
}
```

13.
```
import java.util.*;
public class Menu2
{
    public static void main(String[] args)
    {
        int ch = 0;
        Scanner sc = new Scanner(System.in);
        System.out.println("Please enter your choice: \n1.  x+ x2/2!
        + x3/3! + ……. n \n2. 1/13 – 1/23 + 1/33…….1/n3");
        ch = sc.nextInt();
        switch(ch)
        {
            case 1:
                int n = 0,i;
                double sum=0, frac;
                System.out.println("Enter the number of terms: ");
                n = sc.nextInt();
                System.out.print("The series is: ");
                for(i=1; i<=n; i++)
                {
                    int j;
                    double fact=1;
                    for(j=1;j<=i;j++)
                    {
                        fact=fact*i;
                    }
                    System.out.println(i+"/"+"!"+i+"  ");
```

```
                frac = (i/fact);
                sum = sum + frac;
            }
            System.out.println("\nThe sum of the series is:
            "+sum);
            break;
        case 2:
            int m = 0;
            double es = 0, os = 0, Sum = 0;
            System.out.println("Enter the number of terms: ");
            m = sc.nextInt();
            for(int j = 1; j<=m; j++)
            {
                if(j%2!=0)
                {
                    os = os + j;
                }
                else if(j%2==0)
                {
                    es = es + j;
                }
                Sum = os-es;
            }
            System.out.println("The sum of the series is: "+Sum);
            break;
    }
  }
}
```

14.
```
import java.util.*;
public class Menu3
{
    public static void main(String[] args)
    {
        Scanner sc = new Scanner(System.in);
        int a = 0;
        System.out.print("Enter your choice: \n1. 0, 3 7, 15, 24, …
        n \n2. 1/2 + 3/4 + 5/6 + 7/8 + … + 19/20");
        a = sc.nextInt();
        switch(a)
        {
```

```
                case 1:
                    System.out.println("Enter the number of elements: ");
                    int n = sc.nextInt();
                    System.out.print("The series is: ");
                    for(int i = 1; i <= n; i++)
                    {
                        int d = i*i-1;
                        System.out.print(d+" ");
                    }
                    break;
                case 2:
                    double sum = 0;
                     System.out.println("Enter the number of elements:  ");
                    int m = sc.nextInt();
               System.out.print("The sum of the series is: ");
               for (int i = 1; i <= 19; i++)
                   sum += (i / (double)(i + 1));
               System.out.println(sum);
               break;
          }
       }
   }
```

15.
```
import java.util.Scanner;
public class Duck_number
{
   public static void main(String args[])
       {
        Scanner sc = new Scanner(System.in);
        System.out.print("Input a number : ");
        String nstr = sc.nextLine();
        int l = nstr.length();
        int ctr = 0;
        char chr;

        for(int i=1;i<l;i++)
        {
            chr = nstr.charAt(i);
            if(chr=='0')
```

```
                ctr++;
            }

            char f = nstr.charAt(0);

            if(ctr>0 && f!='0')
                System.out.println("Duck number");
            else
                System.out.println("Not a duck number");
        }
    }
```

16.
```
import java.util.*;
public class factors
{
    public static void main(String[] args)
    {
        Scanner sc = new Scanner(System.in);
        System.out.println("Please enter your choice: \n1.Factors\
        n2. Factorial");
        int a = sc.nextInt();
    switch(a)
    {
        case 1:
        System.out.println("Enter the number: ");
        int n = sc.nextInt();
        System.out.print("Factors of " + n+ " are: ");
        for (int i = 1; i < n; ++i)
        {
            if (n% i == 0)
            {
                System.out.print(i + " ");
            }
        }
        break;
        case 2:
        int i,fact=1;
        System.out.println("Enter the number: ");
        int m = sc.nextInt();
```

```
            for(i=1;i<=m;i++){
                fact=fact*i;
            }
            System.out.println("Factorial of "+m+" is: "+fact);
           break;
        }
    }
    }
```

17.
```
import java.util.Scanner;
public class Smallest
{
    public static void main(String[] args)
    {
        Scanner cs= new Scanner (System.in);
        System.out.println ("Enter the number");
        int num = cs.nextInt ();
        int r, s=num%10;
        while (num > 0)
        {
            r = num % 10;
            if (s> r)
            {
                s= r;
            }
            num = num / 10;
        }
        System.out.println("\nThe Smallest Digit is "+s);
    }
}
```

18.
```
import java.io.*;
import java.util.*;
class Palindrome_Prime
{
    public static void main(String args[])
  {
     Scanner sc = new Scanner(System.in);
        int number, temp, rem, i;
        int count = 0;
```

```
        int sum = 0;
        System.out.println("Please enter the number: ");
        number = sc.nextInt();
        temp = number;
        for(i = 1; i <= temp; i++)
        {
            if(temp%i == 0)
            {
                count++;
            }
        }
        while(number > 0)
        {
            rem = number%10;
            sum = sum*10+rem;
            number = number/10;
        }

        if(temp == sum && count == 2)
        {
          System.out.println(temp +" is a Palindrome Prime number");
        }
        else
        {
            System.out.println(temp +" is not a Palindrome Prime
            number");
        }
    }
}
```

19.
```
import java.util.*;
public class Fibonacci
{
    public static void main(String[] args)
    {
        Scanner sc = new Scanner(System.in);
        int firstTerm = 0, secondTerm = 1;
        System.out.println("Please enter your choice: \n1. Fibonacci\
        n2. Product of even");
```

```
            int r = sc.nextInt();
            switch(r)
            {
            case 1:
            System.out.println("Enter the number of terms: ");
            int n = sc.nextInt();
             System.out.println("Fibonacci Series till " + n + " terms:");
            for (int i = 1; i <= n; ++i)
            {
                System.out.print(firstTerm + ", ");
                int nextTerm = firstTerm + secondTerm;
                firstTerm = secondTerm;
                secondTerm = nextTerm;
            }
            break;
            case 2:
            System.out.print("Enter the number: ");
            int num = sc.nextInt();
            int orgNum = num;
            int prod = 1;
            while (num != 0)
            {
          int digit = num % 10;
                num /= 10;
                if (digit % 2 == 0)
                prod = prod * digit;
            }

            if (prod == 1)
                System.out.println("No even digits in " + orgNum);
            else
             System.out.println("Product of even digits are "+prod);
            break;
        }
    }
    }
```

20.
```
import java.util.*;
public class n_input
```

```
{
    public static void main(String[] args)
    {
        Scanner sc = new Scanner(System.in);
        int count = 0, sum = 0;
        System.out.println("Enter how many numbers you want to enter: ");
        int n = sc.nextInt();
        System.out.println("You may provide positive as well as
        negative numbers as input!");
        for(int i = 1; i<=n; i++)
        {
            int a = sc.nextInt();
            if(a>=0)
            {
                count = count + 1;
            }
            else if(a<=0)
       {
                sum  = sum + a;
            }
         }
        System.out.println("The number of positive integers are:
        "+count);
       System.out.println("The sum of negative integers are: "+sum);
    }
}
```

21.
```
import java.io.*;
import java.util.*;
class Trimorphic_number
{
    public static void main(String args[])
    {
        Scanner in=new Scanner(System.in);
        int n, cube, temp, c=0;
        System.out.println("Enter the number: ");
        n= in.nextInt();
        cube=n*n*n;
        temp=n;
        while(temp>0)
```

```
        {
            c++;
            temp=temp/10;
        }
        int end = cube%(int) Math.pow(10,c);
        if(n==end)
        {
            System.out.println(n+" is a trimorphic number.");
        }
        else
        {
            System.out.println(n+" is not a trimorphic number.");
        }
    }
}
```

10. Nested Loop

Unsolved Exercise

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

B. 1. nested loop 2. break 3. skips 4. do-while

C. 1. a. When a for loop is nested within a for loop is known as a nested for loop whereas, if a do-while loop is nested within a do-while loop then it is known as a nested do-while loop.

b. Break and continue are jump statements, break statement is used to terminate the execution of a loop, whereas the continue statement is used to skip the current execution of the loop.

2. When one loop is added within another loop, then it is known as nested loop.

3. The syntax of nested while loop is given below:

```
while(expression)
    {
    statement(s)
        while(expression)
            {
            statement(s)
            }
     }
```

4.
```
class break_with_NestedWhileLoop
{
    public static void main(String args[])
    {
        int A = 1;
        while(A < 4)
        {
            int B = 3;
            while(B < 6)
            {
                System.out.println(A+" -> "+B);
                B++;
                break;
            }
                A++;
        }
    }
}
```

D. 1.
```
import java.util.*;
public class prime
{
    public static void main(String[] args)
    {
        int i, s, j, p;
        int arr[] = new int[100];
        Scanner sc = new Scanner(System.in);
        System.out.print("Enter the total number of entries:");
        s = sc.nextInt();
        System.out.print("Enter the numbers:");
        for (i = 0; i < s; i++) {
            arr[i] = sc.nextInt();
        }
        System.out.print("Prime numbers from the list are:");
        for (i = 0; i < s; i++) {
            j = 2;
```

```
                p = 1;
                while (j < arr[i]) {
                    if (arr[i] % j == 0) {
                        p = 0;
                        break;
                    }
                    j++;
                }
                if (p == 1) {
                    System.out.print(" " + arr[i]);
                }
                else
                {
                    System.out.print(" N/A" );
                    break;
                }
            }
        }
    }
```

2.
```
public class Armstrong
{
    public static void main(String[] args)
     {
        int n, count = 0, a, b, c, sum = 0;
        System.out.print("Armstrong numbers from 200 to 1000: ");
        for(int i = 200; i <= 1000; i++)
        {
            n = i;
            while(n > 0)
            {
                b = n % 10;
                sum = sum + (b * b * b);
                n = n / 10;
            }
            if(sum == i)
```

```
                {
                    System.out.print(i+" ");
                }
                sum = 0;
            }
        }
    }
```

3.
```
import java.util.Scanner;
public class Palindrome
{
    public static void main(String[] args)
    {
        Scanner sc = new Scanner(System.in);
        int SL, EL;
        System.out.println("Enter the Starting limit: ");
        SL = sc.nextInt();
        System.out.println("Enter the Lower limit: ");
        EL = sc.nextInt();
        int num1 = 0;
        int num2 = 0;
        System.out.println("Palindrome numbers between "+SL+" and
        "+EL+" are: ");
        for (int i = SL; i <= EL; 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.Scanner;
public class Niven_numbers
{
    public static void main(String[] args)
    {
        Scanner cs=new Scanner(System.in);
        int SL,UL;
        System.out.println("Enter the Lower limit:");
        SL=cs.nextInt();
        System.out.println("Enter the Upper limit:");
        UL=cs.nextInt();
        System.out.println("Niven numbers between "+SL+" and "+UL+"
        are: ");
        for(int i=SL;i<=UL;i++)
        {
            int num2=i;
            int num1=i;
            int sum=0;
            while(num1!=0)
            {
                int rem=num1%10;
                num1=num1/10;
                sum=sum+rem;
            }
            if(num2%sum==0)
                System.out.print(i+" ");
        }
    }
}
```

5.
```
import java.util.Scanner;
public class S10
{
    public static void main(String[] args)
    {
        double sum = 0;
        int n;
        System.out.println("1/1! + 2/2! + 3/3! + ..N/N!");
        Scanner s = new Scanner(System.in);
```

```
        System.out.print("Enter the no. of terms in series:");
        n = s.nextInt();
        S10 obj = new S10();
        for(int i = 1; i <= n; i++)
        {
            sum = sum + ((double)i / (obj.fact(2*i)));
        }
        System.out.println("Sum of series:"+sum);
    }
    int fact(int x)
    {
        int mul = 1;
        while(x > 0)
        {
            mul = mul * x;
            x--;
        }
        return mul;
    }
}
```

6.
```
import java.util.*;
public class s11
{
    static int sumOfTheSeries(int n)
    {
        int sum = 0;
        for (int i = 1; i <= n; i++)
        {
            int k = 1;
            for (int j = 1; j <= i; j++)
            {
                sum += k;
                k += 2;
            }
        }
        return sum;
    }
    public static void main(String[] args)
    {
```

```
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter the nth term: ");
        int n = sc.nextInt();
        System.out.println("Sum = " + sumOfTheSeries(n));
    }
}
```

7. a.
```
import java.util.Scanner;
public class num_pattern1
{
    public static void main(String[] args)
    {
        System.out.println("Enter the number of rows: ");
        Scanner sc = new Scanner(System.in);
        int noOfRows = sc.nextInt();
        int value = 1;
        System.out.println("Pattern :");
        for (int i = 1; i <= noOfRows; i++)
        {
            for (int j = 1; j <= i; j++)
            {
                System.out.print(value+"\t");
                value++;
            }
            System.out.println();
        }
    }
}
```

b.
```
import java.util.Scanner;
class num_pattern2
{
    public static void main(String[] args)
    {
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter the number of rows : ");
        int n = sc.nextInt();
        for(int i = 1;i <= n;i++)
        {
```

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

c.
```
import java.util.Scanner;
class Rev_Floyd
{
    public static void main(String args[])
    {
        Scanner sc =  new Scanner(System.in);
        System.out.println("Enter the number of rows of Floyd's
        Triangle: ");
        int num = sc.nextInt();
        int i,j,k=10;
        System.out.println("\nReverse Floy'd Triangle:");
        for(i=num;i>=1;i--)
        {
            for(j=1;j<=i;j++)
            {
                System.out.print(k+" ");
                k--;
            }
            System.out.println();
        }
    }
}
```

d.
```
import java.util.Scanner;
public class num_pattern4
{
    public static void main(String[] args)
    {
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter the number of rows: ");
        int rows = sc.nextInt();
```

```
            for (int i = 1; i <= rows; i++)
            {
                for (int j = i; j >= 1; j--)
                {
                    System.out.print(j+" ");
                }
                System.out.println();
            }
        }
    }
```

e.
```
    import java.util.Scanner;
    public class num_pattern5
    {
        public static void main(String[] args)
        {
            Scanner sc = new Scanner(System.in);
          System.out.println("How many rows you want in this pattern?");
            int rows = sc.nextInt();
            System.out.println("Here is your pattern....!!!");
            for (int i = 1; i <= rows; i++)
            {
                for (int j = 1; j <= i; j++)
                {
                    System.out.print(i+" ");
                }
                System.out.println();
            }
        }
    }
```

f.
```
    import java.util.Scanner;
    class num_pattern6
    {
        public static void main(String args[])
        {
            int rows,columns;
            Scanner scan=new Scanner(System.in);
            System.out.print("Enter the nunber of rows: ");
            rows=scan.nextInt();
```

```
            System.out.print("Enter the nunber of columns: ");
            columns=scan.nextInt();
            for (int i=1; i<=rows; i++){
                for (int j=1; j<=columns; j++){
                    System.out.print("1");
                }
                System.out.print("\n");
            }
        }
    }
```

g.
```
import java.util.*;
public class num_pattern7
{
    public static void main(String[] args)
    {
        int n, i, j, k = 0;
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter the number of rows: ");
        n = sc.nextInt();
        for(i = n; i >= 1; --i)
        {
            for(j = 1; j <= i; ++j)
            {
                System.out.print("x ");
            }
            System.out.print("\n");
        }
    }
}
```

h.
```
import java.util.Scanner;
class pattern9{
    public static void main (String args[])
    {
        int i,j,k=1;
        int letter=64;
        Scanner scan=new Scanner(System.in);
        System.out.print("Enter the number of rows: ");
        int rows=scan.nextInt();
```

```
            for(i=1; i<=rows; i++)
            {
                for(j=1; j<=i; j++,k++)
                {
                    System.out.print((char)(k+letter));
                }
                System.out.println();
            }
        }
    }
```

11. Computing and Ethics

Unsolved Exercise

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

B. 1. malware 2. proprietary 3. BSA 4. Cyber crime
5. malicious

C. 1. Individual property refers to the objects owned by a person. For example, clothes, pen, etc.

2. The types of Intellectual Property Rights are:
   a. Patents: This means only the owner or the innovator has the sole right to produce, use or sell the item at least for first 5 years before others could start manufacturing it. This right is also valid for computer software.
   b. Trademarks: Trademarks are visuals such as symbols, designs or written matter such as words or phrases or even sound that identifies or separates the items or services of one company from another company. Those visuals or written matter cannot be used by any other company. The validity of trademarks remains for 7 years with the parent company, which may continue if the company renews the licence.
   c. Copyright: Copyright is used for protecting different literary work such as different codes of computer programs, databases, novels, poems, musical compositions, etc. Due to this law, the work of authors, musicians last for at least seventy years with the author even if he or she dies.
3. Copyright is used for protecting different literary work such as different codes of computer programs, databases, novels, poems, musical compositions, etc.
4. Data Privacy is an area of data security that mostly deals with the handling of sensitive data such as personal, financial or intellectual data.

5. With the help of the Internet we can:
   a. search for information
   b. video conference with people
   c. send and receive emails
   d. watch and download movies
6. Data Protection Act was implemented in 1998 and it was designed to guard private data kept in servers, workstations and personal computers or in structured record keeping systems.
7. Disadvantages of e-mail are:
   a. we may receive many unsolicited emails, spams, which might cause useless distraction.
   b. we may be a victim of fraudulent e-mail and might get caught up in scams.
8. Open source software are the software that can be freely used and distributed without any problem to any individual, as this type of software is owned and maintained by a community.
9. It is a technique that is used to gain illegal access to computers, whereby the trespasser sends messages to a computer with an IP address indicating that the message is coming from a trusted host.
10. Cyberwarfare is the digital attacks from a nation to another, causing similar harm as done in actual warfare and/or interrupting the vital computer systems such as Banking System, hacking confidential and strategical documents of the Government etc.