1. To determine volume of cone using the formula:

```java
import java.util.Scanner;


public class Question1 {
    public static void main(String args[]){

        try{

            Scanner s = new Scanner(System.in);

            System.out.println("Volume of A Cone Program");

            System.out.print("Please enter the radius of the base circle of the cone:
");
            Long radius = Long.parseLong(s.nextLine());


            System.out.print("Please enter the height of the cone: ");
            Long height = Long.parseLong(s.nextLine());

            double volume = Math.PI*(height)*(Math.pow(radius,3.0))/3;

            System.out.println("Volume of Cone: "+String.format("%.2f",volume) +"
unit^3");



        }catch(Exception e){
            System.out.println("Program exited due to unforeseen error!");
        }


    }
}
```

```
krhero@hellblazer:/mnt/0FB812900FB81290/BTech/Assignments/3rd_Year/ST4/Assignment1$ java Question1.java
Volume of A Cone Program
Please enter the radius of the base cirlce of the cone: 5
Please enter the height of the cone: 10
Volume of Cone: 1309.00 unit^3
```

2. Java program to find LCM of two numbers:

```java
import java.util.Scanner;

public class Question2 {

    public static Long gcd(Long a, Long b){
        if(b==0) return a;
        return gcd(b,a%b);
    }
    public static void main(String args[]) {

        try {

            Scanner s = new Scanner(System.in);

            System.out.println("LCM Program");

            System.out.print("Please enter the first number: ");
            Long num1 = Long.parseLong(s.nextLine());

            System.out.print("Please enter the second number: ");
            Long num2 = Long.parseLong(s.nextLine());

            Long lcm = (num1/gcd(num1,num2)) * num2;

            System.out.println("LCM("+num1+","+num2+"): "+lcm);

            s.close();

        } catch (Exception e) {
            System.out.println("Program exited due to unforeseen error!");
        }

    }

}
```

```
krhero@hellblazer:/mnt/0FB812900FB81290/BTech/Assignments/3rd_Year/ST4/Assignment1$ java Question2.java
LCM Program
Please enter the first number: 5
Please enter the second number: 7
LCM(5,7): 35
```

3. Java program to replace the spaces of the string with given character.

```java
import java.util.Scanner;

public class Question3 {

    public static void main(String args[]) {

        try {

            Scanner s = new Scanner(System.in);

            System.out.println("String Replace Program");

            System.out.print("Please enter the string: ");
            String mainString = s.nextLine();

            System.out.print("Please enter the character(s) that replaces space: ");
            String subsituteString = s.nextLine();

            String finalString = mainString.replace(" ", subsituteString);

            System.out.println("Modified String: "+finalString);

            s.close();

        } catch (Exception e) {
            System.out.println("Program exited due to unforeseen error!");
        }

    }

}
```

```
krhero@hellblazer:/mnt/0FB812900FB81290/BTech/Assignments/3rd_Year/ST4/Assignment1$ java Question3.java
String Replace Program
Please enter the string: Hello my name is Krunal
Please enter the character(s) that replaces space: &
Modified String: Hello&my&name&is&Krunal
```

4. Create a class which asks the user to enter a sentence, and it should display the count of each vowel type in the sentence. The program should continue till the user enters the word "quit". Display the total count of each vowel for all sentences.

```java
import java.util.HashMap;
import java.util.HashSet;
import java.util.Scanner;

public class Question4 {
    public static void main(String args[]) {

        try {

            Scanner s = new Scanner(System.in);

            System.out.println("Vowel Count Program");

            System.out.println("Please enter a string whose vowels need to be
counted(\"quit\" to exit): ");
            String mainString = s.nextLine();

            while(!mainString.equals("quit")){
                HashMap<Character,Integer> m = new HashMap<Character,Integer>();
                m.put('a',0);
                m.put('e',0);
                m.put('i',0);
                m.put('o',0);
                m.put('u',0);
                for(char t : mainString.toLowerCase().toCharArray()){
                    if(t=='a' || t == 'e' || t=='i' || t == 'o' || t=='u'){
                        m.put(t,m.getOrDefault(t, 0) + 1);
                    }

                }
                System.out.println("Vowel Count:");
                m.forEach((k,v) -> {
                    System.out.println(""+k+": "+v);
                });
                System.out.println("Please enter a string whose vowels need to be
counted(\"quit\" to exit): ");
                mainString = s.nextLine();
            }

            s.close();

        } catch (Exception e) {
```

```
                System.out.println("Program exited due to unforeseen error!");
                System.out.println("Error:" +e.toString());
        }


    }
}
```

```
 Please enter a string whose vowels need to be counted("quit" to exit):
 i am a good boy
 Vowel Count:
 a: 2
 e: 0
 u: 0
 i: 1
 o: 3
 Please enter a string whose vowels need to be counted("quit" to exit):
 quit
```

5. Write a Java method to compute the future investment value at a given interest rate for a specified number of years.

```java
import java.util.Scanner;

public class Question5 {

    public static void main(String args[]){

        try{

            Scanner scan = new Scanner(System.in);

            System.out.println("Interest Rate Program");

            System.out.print("Please enter Annual Interest Rate (in %): ");
            double rate = Double.parseDouble(scan.nextLine());

            System.out.print("Please enter Duration (in Years): ");
            double time = Double.parseDouble(scan.nextLine());

            double returnRate = Math.pow((1.00 + (rate)/100.00),time);

            System.out.println("Return Rate: "+String.format("%.2f",returnRate*100)+"
%");


            scan.close();


        }catch(Exception e){
            System.out.println("Program exited due to unforeseen error.");
            System.out.println("Error: "+e.toString());

        }

    }

}
```

```
krhero@hellblazer:/mnt/0FB812900FB81290/BTech/Assignments/3rd_Year/ST4/Assignment1$ java Question5.java
Intrest Rate Program
Please enter Annual Intrest Rate (in %): 10
Please enter Duration (in Years): 2
Return Rate: 121.00 %
```

6. Define a class student having roll_number as data member and two functions get_number() and put_number(). Derive a class test from a class student having marks of two subjects and two member functions two get and display marks. Derive a class result from a class test having total_marks as data member and a display function.

```java
public class Student{

    private String rollNo;

    Student(){
        this.rollNo = null;
    }

    Student(String roll){
        this.rollNo = roll;
    }

    String getRollNo(){
        return this.rollNo;
    }

    void setRollNo(String roll){
        this.rollNo = roll;
    }

    void display(){
        System.out.println("Roll No. : "+this.rollNo);
    }
}

public class Test extends Student{

    private int marks1,marks2;

    Test(){
        this.marks1 = 0;
        this.marks2 = 0;
    }

    Test(int marks1,int marks2){
        this.marks1 = marks1;
        this.marks2 = marks2;
    }
```

```java
    public int getMarks1() {
        return marks1;
    }

    public int getMarks2() {
        return marks2;
    }

    public void setMarks1(int marks1) {
        this.marks1 = marks1;
    }

    public void setMarks2(int marks2) {
        this.marks2 = marks2;
    }

    public void display(){
        System.out.println("Marks 1: "+this.marks1);
        System.out.println("Marks 2: "+this.marks2);
    }
}

public class Result extends Test {
    private int totalMarks;

    Result(){
        this.totalMarks = 0;
    }

    Result(int totalMarks){
        this.totalMarks = totalMarks;
    }

    public int getTotalMarks() {
        return totalMarks;
    }
    public void setTotalMarks(int totalMarks) {
        this.totalMarks = totalMarks;
    }
    public void display(){
        System.out.println("Total Marks : "+this.totalMarks);
    }

}
```

7. Define a circle class with radius as data member, Add necessary constructors and member function to compute area of circle. Class should overload the = = operator to compare two circle objects whether they are equal in radius. Demonstrate its use in main().

Main.java:

```java
package Question7;

import Question7.Circle;

public class Main {

    public static void main(String args[]) {

        System.out.println("Circle Class Demo");

        Circle c1 = new Circle(7);
        System.out.println("Circle with Radius 7 created!");

        Circle c2 = new Circle(6);
        System.out.println("Circle with Radius 6 created!");

        Circle c3 = new Circle(6);
        System.out.println("Circle with Radius 6 created again!");

        System.out.println("Area of Circle 1: "+String.format("%.2f",c1.getArea()));
        System.out.println("Area of Circle 2: "+String.format("%.2f",c2.getArea()));
        System.out.println("Area of Circle 3: "+String.format("%.2f",c3.getArea()));

        System.out.println("Comparing First Circle with Second Circle:
"+(c1.equals(c2)));

        System.out.println("Comparing Second Circle with Third Circle:
"+(c2.equals(c3)));



    }

}
```

Circle.java:

```java
package Question7;

public class Circle {
```

```java
    private double radius;


    Circle(double radius) {
        this.radius = radius;
    }

    public double getRadius() {
        return radius;
    }

    public void setRadius(double radius) {
        this.radius = radius;
    }

    public double getArea() {
        return Math.PI * this.radius * this.radius;
    }

    public boolean equals(Circle c) {
        return this.radius == c.getRadius();
    }

}
```

```
Circle Class Demo
Circle with Radius 7 created!
Circle with Radius 6 created!
Circle with Radius 6 created again!
Area of Circle 1: 153.94
Area of Circle 2: 113.10
Area of Circle 3: 113.10
Comparing First Circle with Second Circle: false
Comparing Second Circle with Third Circle: true
```

8. Write a Java program that takes the user to provide a single character from the alphabet. Print Vowel or Consonant, depending on the user input. If the user input is not a letter (between a and z or A and Z), or is a string of length > 1, print an error message.

```java
import java.util.Scanner;

public class Question8 {


    public static void main(String args[]){

        try{
            Scanner scan = new Scanner(System.in);

            System.out.print("Please enter a character: ");
            String mainString = scan.nextLine();

            if(mainString.length()>1) throw new Exception("More than 1 Character
Received as Input!");
            if(mainString.length()<=0) throw new Exception("No Character Received as
Input!");

            char t = mainString.charAt(0);
            if(!((t>='a' || t<='z') && (t>='A' && t<='Z'))) throw new
Exception("Character not between 'a' and 'z' or 'A' and 'Z'");

            System.out.println("Program Run Successfully!");
            scan.close();

        }catch(Exception e){
            System.out.println("Program exited due to unforeseen error.");
            System.out.println("Error: "+e.toString());
        }
    }
}
```

```
krhero@hellblazer:/mnt/0FB812900FB81290/BTech/Assignments/3rd_Year/ST4/Assignment1$ java Question8.java
Please enter a character: 5
Program exited due to unforeseen error.
Error: java.lang.Exception: Character not between 'a' and 'z' or 'A' and 'Z'
```

```
krhero@hellblazer:/mnt/0FB812900FB81290/BTech/Assignments/3rd_Year/ST4/Assignment1$ java Question8.java
Please enter a character: b
Program Run Successfully!
```

9. Write a program that accepts three numbers from the user and prints "increasing" if the numbers are in increasing order, "decreasing" if the numbers are in decreasing order, and "Neither increasing or decreasing order" otherwise.

```java
import java.util.Scanner;

public class Question9 {

    public static void main(String[] args) {

        try {
            Scanner scan = new Scanner(System.in);

            System.out.print("Enter 3 Numbers(Separated with Spaces): ");
            int num1 = scan.nextInt();
            int num2 = scan.nextInt();
            int num3 = scan.nextInt();

            if (num1 <= num2 && num2 <= num3) {
                System.out.println("Numbers are in increasing order.");
            } else if (num1 >= num2 && num2 >= num3) {
                System.out.println("Numbers are in decreasing order.");
            } else {
                System.out.println("Numbers are in neither increasing nor decreasing order.");
            }
            scan.close();
        } catch (Exception e) {
            System.out.println("Program exited due to unforeseen error.");
            System.out.println("Error: "+e.toString());
        }
    }

}
```

```
Enter 3 Numbers(Separated with Spaces): 10 20 30
Numbers are in increasing order.
krhero@hellblazer:/mnt/0FB812900FB81290/BTech/Assignments/3rd_Year/ST4/Assignment1$ java Question9.java
Enter 3 Numbers(Separated with Spaces): 30 20 50
Numbers are in neither increasing nor decreasing order.
krhero@hellblazer:/mnt/0FB812900FB81290/BTech/Assignments/3rd_Year/ST4/Assignment1$ java Question9.java
Enter 3 Numbers(Separated with Spaces): 30 20 10
Numbers are in decreasing order.
krhero@hellblazer:/mnt/0FB812900FB81290/BTech/Assignments/3rd_Year/ST4/Assignment1$ ^C
krhero@hellblazer:/mnt/0FB812900FB81290/BTech/Assignments/3rd_Year/ST4/Assignment1$ java Question9.java
Enter 3 Numbers(Separated with Spaces): num1 20 30
Program exited due to unforeseen error.
Error: java.util.InputMismatchException
```