AIM:	Programs on Encapsulation. Write a program to demonstrate constructor
Program 1	
PROBLEM STATEMENT:	A program to simulate a simple banking system in which the initial balance and rate of interest are read from the keyboard and these values are initialized using the constructor member function. The program consists of the following methods: • To initialize the balance amount and the rate of interest using the constructor member function • To make deposit • To withdraw an amount for the balance • To find compound interest based on the rate of interest • To know the balance amount • To display the menu options

PROGRAM:	import java.util.*;
	import java.lang.*;
	
	class bank{
	private double balance;
	private static double ROI_saving;
	bank(){
	balance=1000;
	ROI_saving=0.3;
	}
	
	bank(double amount){
	balance=amount;
	ROI_saving=0.3;
	}
	
	public void deposit(double amount){
	balance+=amount;
	}
	
	public void withdraw(int amount){
	if(balance<=0){System.out.println("aapake khaate mein paryaapt paisa nahin hai");}
	else{balance-=amount;}
	}
	
	public void chk_balance(){System.out.println("Abi aapake pass "+ balance+" Rupee hai. kya karnge etni dhanrashi ka");}
	
	public void compund_interest(int t,int n){
	double r=0.5;

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        double amount = balance * Math.pow(1 + (r / n), n * t);
        double cinterest = amount - balance;
        System.out.println("Compound Interest after " + t + " years: "+cinterest);
        System.out.println("Amount after " + t + " years: "+amount);
    }

    public void simple_interest(int T){
        double SI = (balance * T * ROI_saving) / 100;
        System.out.println("Simple interest = " + SI);
    }
}

class file{
    public static void main(String[] args){
        bank p1= new bank();
        Scanner sc =new Scanner(System.in);
        boolean flag=true;
        while(flag){

System.out.println("==========================================================
========================");
            System.out.println("aapake paas 6 vikalp hain jinhen aap chunenge");
            System.out.println("Option1: Deposit\nOption2: Withdraw\nOption3: Find compound
Interest\nOption4: Simple Interest\nOption5: Check your Balance\nOption6:Exit");
            System.out.print("Enter Option : ");
            int option=sc.nextInt();

            switch(option){
                case 1:
                    System.out.print("Raashi Daalen : ");
                    int amount=sc.nextInt();
                    p1.deposit(amount);
                    break;

                case 2:
                    System.out.print("raashi daalen : ");
                    int amount2=sc.nextInt();
                    p1.withdraw(amount2);
                    break;

                case 3:
                    System.out.print("Enter Time : ");
                    int time=sc.nextInt();
                    System.out.println("Enter number of times that interest is compounded per unit
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time: ");
                int n=sc.nextInt();
                p1.compund_interest(time,n);
                break;
            case 4:
                System.out.print("Enter no of years : ");
                int tim2e=sc.nextInt();
                p1.simple_interest(tim2e);
                break;
            case 5:
                p1.chk_balance();
                break;
            case 6:
                flag=false;
                System.out.println("Dhanyavaad, Ham aasha karate hain ki aapaka din shubh
ho");
System.out.println("==========================================================
========================");
                break;
             default:
                System.out.println("Invalid option");
                break;
        }
      }
   }
}
```

RESULT:

```
================================================================================
aapake paas 6 vikalp hain jinhen aap chunenge
Option1: Deposit
Option2: Withdraw
Option3: Find compound Interest
Option4: Simple Interest
Option5: Check your Balance
Option6:Exit
Enter Option : 1
Raashi Daalen : 20000
================================================================================
aapake paas 6 vikalp hain jinhen aap chunenge
Option1: Deposit
Option2: Withdraw
Option3: Find compound Interest
Option4: Simple Interest
Option5: Check your Balance
Option6:Exit
Enter Option : 5
Abi aapake pass 21000.0 Rupee hai. kya karnge etni dhanrashi ka
================================================================================
aapake paas 6 vikalp hain jinhen aap chunenge
Option1: Deposit
Option2: Withdraw
Option3: Find compound Interest
Option4: Simple Interest
Option5: Check your Balance
Option6:Exit
Enter Option : 6
Dhanyavaad, Ham aasha karate hain ki aapaka din shubh ho
================================================================================
```

Program 2	
PROBLEM STATEMENT :	Create a four-function calculator for fractions. Here are the formulas for the four arithmetic operations applied to fractions: Addition: a/b + c/d = (a*d + b*c) / (b*d) Subtraction: a/b - c/d = (a*d - b*c) / (b*d)

	Multiplication: a/b * c/d = (a*c) / (b*d) Division: a/b / c/d = (a*d) / (b*c) Create the class fraction. Use default constructor to set numerator and denominator to 1. a) There are methods to print the four functions for fractions. b)Program generates a multiplication table for fractions. Let the user input a denominator, and then generate all combinations of two such fractions that are between 0 and 1, and multiply them together. Here's an example of the output if the denominator is 6:

PROGRAM:	import java.util.*;
	class file2 {
	Scanner sc = new Scanner(System.in);
	int a,b,c,d;
	int num,den,gcd;
	file2() {
	a = 1;
	b = 1;
	c = 1;
	d = 1;
	}
	void input() {
	System.out.println("Numerator 1: ");
	a = sc.nextInt();
	System.out.println("Denominator 1: ");
	b = sc.nextInt();
	System.out.println("Numerator 2: ");
	c = sc.nextInt();
	System.out.println("Denominator 2: ");
	d = sc.nextInt();
	}
	void add() {
	num = a*d + b*c;
	den = b*d;
	gcd = reduce(num, den);
	System.out.println("Add kar diya: "+num/gcd+"/"+den/gcd);
	}
	void sub() {
	num = a*d - b*c;
	den = b*d;
	gcd = reduce(num, den);
	System.out.println("substrate kar diya: "+num/gcd+"/"+den/gcd);
	}
	void mul() {
	num = a*c;
	den = b*d;
	gcd = reduce(num, den);

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    System.out.println("Multiply kar diya: "+num/gcd+"/"+den/gcd);
  }
  void div() {
    num = a*d;
    den = b*c;
    gcd = reduce(num, den);
    System.out.println("Divide kar diya: "+num/gcd+"/"+den/gcd);
  }
  int reduce(int n,int d) {
    if(d==0)
      return n;
    else if(n==0)
      return d;
    if(n>d)
      return reduce(n-d, d);
    else
      return reduce(d-n, n);
  }
  void multiplier(int a,int b,int c,int d) {
    num = a*c;
    den = b*d;
    gcd = reduce(num, den);
    System.out.print("\t"+num/gcd+"/"+den/gcd);
  }
  void mul_table(int d) {
    den = d;
    for(int k=1;k<d;k++) {
      num = k;
      gcd = reduce(num, den);
      System.out.print("\t"+num/gcd+"/"+den/gcd);
    }
    System.out.println("\n-----------------------------------------------------------------------\n");
    for(int i=1;i<d;i++) {
      num = i;
      den = d;
      gcd = reduce(num, den);
      System.out.print(num/gcd+"/"+den/gcd);
      for(int j=1;j<d;j++) {
        multiplier(i, d, j, d);
      }
      System.out.println("\n");
    }
  }
  public static void main(String[] args) {
```

```
        Scanner sc = new Scanner(System.in);
        file2 f = new file2();
        int choice,dem,flag;
        System.out.println("Welcome to Calculator:");
        while(true) {
            System.out.println("Apka pass 5 options hai\n1 -> Addition\n2 -> Subtraction\n3 ->
Multiplication\n4 -> Division\n5 -> Multiple Table");
            choice = sc.nextInt();
            switch(choice) {
                case 1:
                    f.input();
                    f.add();
                    break;
                case 2:
                    f.input();
                    f.sub();
                    break;
                case 3:
                    f.input();
                    f.mul();
                    break;
                case 4:
                    f.input();
                    f.div();
                    break;
                case 5:
                    System.out.println("Enter the Denominator: ");
                    dem = sc.nextInt();
                    f.mul_table(dem);
                    break;
                default:
                    System.out.println("Likhane nahi ata hai kya?!?!?");
                    break;
            }
            System.out.println("Aur kuch?(yes=1/0=no)");
            flag = sc.nextInt();
            if(flag==0) {
                System.out.println("Ok bye bye!!");
                break;
            }
        }
    }
}
```

RESULT:

```
Welcome to Calculator:
Aapake pass 5 options hai
1 -> Addition
2 -> Subtraction
3 -> Multiplication
4 -> Division
5 -> Multiple Table
1
Numerator 1:
12
Denominator 1:
12
Numerator 2:
12
Denominator 2:
12
Add kar diya: 2/1
Aur kuch?(yes=1/0=no)
1
```

```
Aapake pass 5 options hai
1 -> Addition
2 -> Subtraction
3 -> Multiplication
4 -> Division
5 -> Multiple Table
2
Numerator 1:
23
Denominator 1:
2
Numerator 2:
3
Denominator 2:
23
substrate kar diya: 523/46
Aur kuch?(yes=1/0=no)
0
Ok bye bye!!
```

CONCLUSION:	In this experiment, we learned about the use of constructors and how constructors can initialize the object of the class and learned how to create an object and how to call it.