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<b>Experiment No.</b>	<b>2</b>

<b>AIM:</b>	Programs on Encapsulation. Write a program to demonstrate constructor
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### Program 1

<b>PROBLEM STATEMENT:</b>	<p>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 initialised using the constructor member function. The program consists of the following methods:</p> <ul style="list-style-type: none"> <li>• To initialise the balance amount and the rate of interest using constructor member function</li> <li>• To make deposit</li> <li>• To withdraw an amount for the balance</li> <li>• To find compound interest based on the rate of interest</li> <li>• To know the balance amount</li> <li>• To display the menu options</li> </ul>
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<b>PROGRAM:</b>	<pre>import java.util.*; import java.lang.Math;  public class bank{     Scanner scan=new Scanner(System.in);     double bal;     double r;     bank(){         bal=1000;         r= 3.0;     }      void deposit(){         System.out.print("Enter the deposit amount: ");         int deposit= scan.nextInt();         if(deposit&gt;0)         {             bal= bal+ deposit;             System.out.print("Depsoit amount = " +bal);         }         else{</pre>
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```

        System.out.print("Enter a valid deposit amount");
    }
}
void withdraw(){

System.out.print("Enter the withdrawing amount: ");
int withdrawAmount= scan.nextInt();
    if(withdrawAmount > bal)
    {
        System.out.println("Invalid Withdrawal Amount");
    }else{
        bal = bal- withdrawAmount;
        System.out.println("Please Collect your " + withdrawAmount + "
Rupees");
        System.out.println(" ");
        System.out.println("Available Balance: " +bal);
        System.out.println(" ");
    }

}

void Comp_Int(){

    System.out.print("Enter the time in years for which CI is to be
calculated: ");
    int time = scan.nextInt();
    double amount = bal*Math.pow(1 + r/100,time);
    System.out.println("Amount after Compound Interest = Rs "+amount);

}

public static void main(String[] args){
Scanner scan=new Scanner(System.in);
bank ob = new bank();
System.out.println("Welcome to Banking System:");
    while(true) {
System.out.println(" 1)To make deposit \n 2)To withdraw an amount for the
balance\n 3)To find compound interest based on the rate of interest");
System.out.print("Enter the option you want: ");
int option=scan.nextInt();
int flag;
switch (option){

case 1:

```

```
        ob.deposit();
        break;
    case 2:
        ob.withdraw();
        break;
    case 3:
        ob.Comp_Int();
        break;
    default:
        System.out.println("Invalid Option");
        break;

    }
    System.out.println("");
    System.out.println("Do you want to continue?(yes=1/no=0)");
    flag = scan.nextInt();
    if(flag==0) {
        break;
    }
}
}
```

**RESULT:**

```
Welcome to Banking System:
1)To make deposit
2)To withdraw an amount for the balance
3)To find compound interest based on the rate of interest
Enter the option you want: 1
Enter the deposit amount: 2000
Depsoit amount = 3000.0
Do you want to continue?(yes=1/no=0)
1
1)To make deposit
2)To withdraw an amount for the balance
3)To find compound interest based on the rate of interest
Enter the option you want: 2
Enter the withdrawing amount: 200
Please Collect your 200 Rupees

Available Balance: 2800.0

Do you want to continue?(yes=1/no=0)
1
1)To make deposit
2)To withdraw an amount for the balance
3)To find compound interest based on the rate of interest
Enter the option you want: 3
Enter the time in years for which CI is to be calculated: 3
Amount after Compound Interest = Rs 3059.6356

Do you want to continue?(yes=1/no=0)
0
```

**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 fraction {
    Scanner sc = new Scanner(System.in);
    int a,b,c,d;
```

```

int num,den,gcd;
fraction() {
    a = 1;
    b = 1;
    c = 1;
    d = 1;
}
void input() {
    System.out.print("Numerator 1: ");
    a = sc.nextInt();
    System.out.print("Denominator 1: ");
    b = sc.nextInt();
    System.out.print("Numerator 2: ");
    c = sc.nextInt();
    System.out.print("Denominator 2: ");
    d = sc.nextInt();
}
void add() {
    num = a*d + b*c;
    den = b*d;
    gcd = reduce(num, den);
    System.out.print("Result: "+num/gcd+"/"+den/gcd);
}
void sub() {
    num = a*d - b*c;
    den = b*d;
    gcd = reduce(num, den);
    System.out.print("Result: "+num/gcd+"/"+den/gcd);
}
void mul() {
    num = a*c;
    den = b*d;
    gcd = reduce(num, den);
    System.out.print("Result: "+num/gcd+"/"+den/gcd);
}
void div() {
    num = a*d;
    den = b*c;
    gcd = reduce(num, den);
    System.out.print("Result: "+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");
    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);
    fraction f = new fraction();
    int option,dem,flag;
    System.out.println("Welcome to Fraction Calculator:");
    while(true) {
        System.out.println("\n1 -> Addition\n2 -> Subtraction\n3 ->
Multiplication\n4 -> Division\n5 -> Multiple Table");
        System.out.print("Enter the option you want: ");
        option = sc.nextInt();
    }
}

```

```
switch(option) {
    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("Invalid choice!");
        break;
}
System.out.println("");
System.out.println("Do you want to continue?(yes=1/0=no)");
flag = sc.nextInt();
if(flag==0) {
    break;
}
}
}
```

```

12 // java Program to find the sum of two fractions
Welcome to Fraction Calculator:

1 -> Addition
2 -> Subtraction
3 -> Multiplication
4 -> Division
5 -> Multiple Table
Enter the option you want: 1
Numerator 1: 1
Denominator 1: 2
Numerator 2: 3
Denominator 2: 4
Result: 5/4
Do you want to continue?(yes=1/no=0)
1

1 -> Addition
2 -> Subtraction
3 -> Multiplication
1

1 -> Addition
2 -> Subtraction
3 -> Multiplication
4 -> Division
5 -> Multiple Table
Enter the option you want: 3
Numerator 1: 1
Denominator 1: 2
Numerator 2: 3
Denominator 2: 4
Result: 3/8
Do you want to continue?(yes=1/no=0)
1

1 -> Addition
2 -> Subtraction
3 -> Multiplication
4 -> Division
5 -> Multiple Table
Enter the option you want: 4
Numerator 1: 1
Denominator 1: 2
Numerator 2: 3
Denominator 2: 4
Result: 2/3
Do you want to continue?(yes=1/no=0)
1

1 -> Addition
2 -> Subtraction
3 -> Multiplication
4 -> Division
5 -> Multiple Table
Enter the option you want: 5
Enter the Denominator:
6
      1/6    1/3    1/2    2/3    5/6
1/6    1/36   1/18   1/12   1/9    5/36
1/3    1/18   1/9    1/6    2/9    5/18
1/2    1/12   1/6    1/4    1/3    5/12
2/3    1/9    2/9    1/3    4/9    5/9
5/6    5/36   5/18   5/12   5/9    25/36

```

**RESULT:**

**CONCLUSION:**

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