1. Write a program to create a class phonebook. First take n inputs for names and numbers from the user and store it in a hashmap.

Take name input from user multiple times, search for the records and print the phone number if found. Exit the loop if the input name is empty

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

public class PhoneBook {

    public static void main(String[] args) {
        HashMap book = new
HashMap<String,Integer>();
        Scanner sc=new Scanner(System.in);
        System.out.println("Enter the number of
records :");
        int n =sc.nextInt();
        sc.nextLine();
        for (int i = 1; i <= n; i++) {
            System.out.println("Enter name and number
"+i);

book.put(sc.nextLine().toLowerCase(),sc.nextInt());
            sc.nextLine();
        }
        String name;
        while(true) {
            System.out.println("Enter the name to be
searched");
            name= sc.nextLine().toLowerCase();
            if(name == "")
                break;
            if (book.containsKey(name))
                System.out.println("Number found: " +
book.get(name));
            else
                System.out.println("name not found");
        }
    }
}
```

2. Write a program to input n names from the user and print the name in the 3rd and 5th position when arranged in alphabetical order. (n>=5)

```
import java.util.ArrayList;
import java.util.Scanner;
import java.util.TreeSet;

public class names {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        TreeSet ts = new TreeSet();
        ArrayList al = new ArrayList();
        System.out.print("Enter the number of names :
");
        int n = Integer.parseInt(sc.nextLine());
        sc.nextLine();
        System.out.println("Enter the names");
        for (int i = 0; i < n; i++) {
            ts.add(sc.nextLine());
        }
        al.addAll(ts);
        System.out.println(al);
        System.out.println("Third student :" + al.get(2));
        System.out.println("Fifth student :" + al.get(4));
    }
}
```

3. Write a program to take input for limits from the user and check if a number is :

a) armstrong number : sum of cubes of digits = n
153 = 1+125+27

b) perfect number : sum of positive factors = n
28=1+2+4+7+14

```
import java.util.Scanner;

public class SpecialNumbers {
    boolean isArmstrong(int n){

        int a, sum=0, temp=n;
        while(n>0) {
            a=n%10; //Getting last digit
            n=n/10;  //Removing last digit from number
            sum=sum+(a*a*a); //Calculating sum of cubes of digits
        }
        if(temp==sum)
            return true;
        else
```

```
            return false;
    }

    boolean isPerfect(int n){
        int sum = 1;

        // Finding all the divisors
        for (int j = 2; j <= n/2; j++) {
            if (n % j==0) {
                sum = sum + j;
            }
        }

        // Checking whether the sum of the divisors and
number both are equal or not
        if (sum == n && n != 1)
            return true;

        return false;

    }

    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        SpecialNumbers sn = new SpecialNumbers();
        System.out.println("Enter the begin and end
limits");
        int begin = sc.nextInt();
        int end = sc.nextInt();

        System.out.println("Armstrong numbers");
        for (int i = begin; i <= end; i++) {
            if(sn.isArmstrong(i))
                System.out.println(i+" ");
        }
        System.out.println("Perfect numbers");
        for (int i = begin; i <= end; i++) {
            if(sn.isPerfect(i))
                System.out.println(i+" ");
        }
    }
}
```

4. Different methods to traverse keys and values in a Map.

```
import java.util.Map;
import java.util.HashMap;

public class testMap
{
    public static void main(String[] arg)
    {
        Map<Integer,String> test = new
HashMap<Integer,String>();



        test.put(2, "Abhi");
        test.put(4, "Anurag");
        test.put(6, "Aman");
        test.put(3, "Anu");

        System.out.println(test.keySet());
        for (Integer name : test.keySet()) {
            System.out.println("key: " + name);
            System.out.println(test.get(name));
        }
        System.out.println(test.values());
        for (String url : test.values())
            System.out.println("value: " + url);

        System.out.println(test.entrySet());
        for (Map.Entry<Integer,String> entry :
test.entrySet())
            System.out.println("Key = " + entry.getKey()
+", Value = " + entry.getValue());
    }
}
```