**Exercise 14:** *Create a class called Calculator which has 4 different methods add, diff, mul and div which*

*accepts two numbers as parameters. Create an object to access these methods and invoke*

*these methods with two numbers and display the result in the corresponding methods.*

**Solution 14:**

**package** com.hsbc.pack.day2;

// Program to perform various arithmetic operations using classes and objects

**public** **class** Calculator {

**public** **void** add(**int** a, **int** b)

{

**int** sum=a+b;

System.***out***.println("The numbers are a: "+a+" b: "+b);

System.***out***.println("The sum is: "+sum);

}

**public** **void** diff(**int** a, **int** b)

{

**int** diff=a-b;

System.***out***.println("The numbers are a: "+a+" b: "+b);

System.***out***.println("The difference is: "+diff);

}

**public** **void** mul(**int** a, **int** b)

{

**int** mul=a\*b;

System.***out***.println("The numbers are a: "+a+" b: "+b);

System.***out***.println("The product is: "+mul);

}

**public** **void** division(**int** a, **int** b)

{

**float** div=a/b;

System.***out***.println("The numbers are a: "+a+" b: "+b);

System.***out***.println("The division is: "+div);

}

**public** **static** **void** main(String[] args) {

// **TODO** Auto-generated method stub

Calculator c=**new** Calculator(); //creation of object

c.add(4, 5);

c.diff(10, 7);

c.mul(7, 5);

c.division(10, 5);

}

}

**Output:**

The numbers are a: 4 b: 5

The sum is: 9

The numbers are a: 10 b: 7

The difference is: 3

The numbers are a: 7 b: 5

The product is: 35

The numbers are a: 10 b: 5

The division is: 2.0

**Exercise 15:** *Create a class called Sample. Write a program to display the no of objects created for that*

*class or the no of times that class is instantiated.*

**Solution 15:**

**package** com.hsbc.pack.day2;

//To count the number of objects created.

**public** **class** Sample {

**static** **int** *count*=0;

**public** Sample()

{

*count*++;

}

**public** **static** **void** main(String[] args) {

// **TODO** Auto-generated method stub

Sample s=**new** Sample();

Sample s1=**new** Sample();

Sample s2=**new** Sample();

System.***out***.println("The number of objects created: "+*count*);

}

}

**Output:**

The number of objects created: 3

**Exercise 16 :***Create a class called Student with the following details: RollNo, StudName, MarksInEng,*

*MarksInMaths and MarksInScience. Write getters and setters for the all variables. RollNo*

*should be automatically generatedwhenever a newstudent is added.*

*Create a class called Standard with 8 students’ details and write separate method for each of*

*the following tasks and invoke the same.*

1. *To display the entire roll no and the name of the students in the class in the ascending order of roll no.*
2. *To display the roll no and the name of the student who has got the highest percentage.*
3. *To display the roll no and the name of the student who scored highest mark*

*inmathematics.*

1. *To display the roll no and the name of the student in the ascending order of the total marks in mathematics and science alone.*
2. *To display the roll no, name, total marks, percentage and rank of all the students in the descending order of rank.*

**Exercise 17:** *Write class that declares the following String.*

***“The quick brown fox jumps over the lazy dog”.***

*Perform the following modifications to the above string using appropriate methods.*

1. *Print the character at the 12th index.*
2. *Check whether the String contains the word “is”.*
3. *Add the string “and killed it” to the existing string.*
4. *Check whether the String ends with the word “dogs”.*
5. *Check whether the String is equal to “The quick brown Fox jumps over the lazy Dog”.*
6. *Check whether the String is equal to “*THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG*.*
7. *Find the index position of the character “a”.*
8. *Find the last index position of the character “e”.*
9. *Find the length of the String.*
10. *Check whether the String matches to “The quick brown Fox jumps over the lazy Dog”.*
11. *Replace the word “The” with the word “A”.*
12. *Split the above string into two such that two animal names do not come together.*
13. *Print the animal names alone separately from the above string.*
14. *Print the above string in completely lower case.*
15. *Print the above string in completely upper case.*

**Solution 17:**

**package** com.hsbc.pack.day2;

//To demonstrate the operations performed on string.

**public** **class** Solution17 {

**public** **static** **void** main(String[] args) {

// **TODO** Auto-generated method stub

StringBuffer sb=**new** StringBuffer("The quick brown fox jumps over the lazy dog");

//Print the character at the 12th index.

System.***out***.println("The character at 12th index is: "+sb.charAt(12));

//Check whether the String contains the word “is”

String str=sb.toString();

**if**(str.contains("is"))

System.***out***.println("The string contains is");

**else**

System.***out***.println("The string does not contains is");

//Add the string “and killed it” to the existing string

System.***out***.println("The apended string is: ");

System.***out***.println(sb.append(" and killed it."));

//Check whether the String ends with the word “dogs”.

String arr[]=str.split(" ",str.length());

**if**(arr[arr.length-1].equals("dogs"))

System.***out***.println("Yes, the string ends with dogs.");

**else**

System.***out***.println("No, It doesn't ends with dogs.");

//Check whether the String is equal to “The quick brown Fox jumps over the lazy Dog”.

StringBuffer sb1=**new** StringBuffer("The quick brown Fox jumps over the lazy Dog");

System.***out***.println(sb1);

**if**(sb.equals(sb1))

System.***out***.println("Both the strings are equal.");

**else**

System.***out***.println("Both the strings are not equal.");

//Check whether the String is equal to “THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG”.

String s1=sb1.toString().toUpperCase();

System.***out***.println(s1);

**if**(sb.equals(s1))

System.***out***.println("Both the strings are equal.");

**else**

System.***out***.println("Both the strings are not equal.");

//Find the index position of the character “a”.

System.***out***.println("The index position of the character a is: "+sb.indexOf("a"));

//Find the last index position of the character “e”.

System.***out***.println("The last index position of the character e is: "+sb.lastIndexOf("e"));

//Find the length of the String.

System.***out***.println("The length of the string is: "+sb.length());

//Check whether the String matches to “The quick brown Fox jumps over the lazy Dog”.

**if**(str.compareTo("The quick brown Fox jumps over the lazy Dog")==0)

System.***out***.println("Equal");

**else**

System.***out***.println("Not Equal");

//Replace the word “The” with the word “A”.

//String s2= sb.replace(0,3,"A").toString();

//System.out.println("The replaced string is: "+s2);

String word="";

String t="";

**for**(**int** i=0;i<str.length();i++)

{

**char** ch=str.charAt(i);

**if**(Character.*isLetter*(ch))

{

word=word+ch;

}

**else**

{

**if**(word.equals("The")||word.equals("the"))

{

t=t+" A";

word="";

}

**else**

{

t=t+" "+word;

word="";

}

}

}

System.***out***.println("After replacing "+ t);

//Split the above string into two such that two animal names do not come together.

/\*System.out.println("After splitting");

for(int i=0;i<arr.length;i++)

{

System.out.println(arr[i]);

}\*/

//Print the animal names alone separately from the above string.

System.***out***.println("The name of animals:");

**for**(**int** i=0;i<arr.length;i++)

{

**if**(arr[i].equals("fox")||(arr[i].equals("dog")))

System.***out***.println(arr[i]);

}

//Print the above string in completely upper case.

System.***out***.println("The string in upper case: "+str.toUpperCase());

//Print the above string in completely lower case.

System.***out***.println("The string in lower case: "+str.toLowerCase());

}

}

**Output:**

The character at 12th index is: o

The string does not contains is

The apended string is:

The quick brown fox jumps over the lazy dog and killed it.

No, It doesn't ends with dogs.

The quick brown Fox jumps over the lazy Dog

Both the strings are not equal.

THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG

Both the strings are not equal.

The index position of the character a is: 36

The last index position of the character e is: 52

The length of the string is: 58

Not Equal

After replacing A quick brown fox jumps over A lazy

The name of animals:

fox

dog

The string in upper case: THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG

The string in lower case: the quick brown fox jumps over the lazy dog

**Exercise 18:** *Write a program to demonstrate the difference between equals and == operator with*

*appropriate example.*

**Solution 18:**

**package** com.hsbc.pack.day2;

//To test the == and equals operator

**public** **class** StringTesting {

**public** **static** **void** main(String[] args) {

// **TODO** Auto-generated method stub

String str=**new** String("hello");

String str1= "hello";

**if**(str==str1)

System.***out***.println("In == operator both the strings are equal");

**else**

System.***out***.println("In == operator both the strings are not

equal");

**if**(str.equals(str1))

System.***out***.println("In equals operator both the strings are equal");

**else**

System.***out***.println("In equals operator both the strings are not equal");

}

}

**Output:**

In == operator both the strings are not equal

In equals operator both the strings are equal

**Exercise 19:** *Write a program to declare an array with 8 elements and copy the 8 elements into another*

*array and display the same.*

**Solution 19:**

**package** com.hsbc.pack.day2;

**import** java.util.Scanner;

/\*To declare an array with 8 elements and copy the 8 elements into another

array and display the same\*/

**public** **class** ArrayCopy {

**public** **static** **void** main(String[] args) {

// **TODO** Auto-generated method stub

Scanner sc=**new** Scanner(System.***in***);

**int**[] arr=**new** **int**[8];

**int**[] arr1=**new** **int**[arr.length];

System.***out***.println("Enter the elements");

**for**(**int** i=0;i<arr.length;i++)

{

arr[i]=sc.nextInt(); //taking input from user

}

System.***out***.println("Original array");

**for**(**int** i=0;i<arr.length;i++)

{

System.***out***.println(arr[i]); //Printing the original array

arr1[i]=arr[i]; //copying the array

}

System.***out***.println("Copy array");

**for**(**int** i=0;i<arr1.length;i++)

{

System.***out***.println(arr1[i]); //Printing the copy array

}

}

}

**Output:**

Enter the elements

5

8

9

10

11

56

78

98

Original array

5

8

9

10

11

56

78

98

Copy array

5

8

9

10

11

56

78

98

**Exercise 20:***Write a program to display the sum and the average of elements in the array.*

**Soltuion 20:**

**package** com.hsbc.pack.day2;

**import** java.util.Scanner;

//To display the sum and the average of elements in the array.

**public** **class** ArrayOperations {

**public** **static** **void** main(String[] args) {

// **TODO** Auto-generated method stub

Scanner sc=**new** Scanner(System.***in***);

**int**[] arr=**new** **int**[8];

**int** sum=0;

**double** avg=0;

System.***out***.println("Enter the elements");

**for**(**int** i=0;i<arr.length;i++)

{

arr[i]=sc.nextInt(); //taking input from user

sum=sum+arr[i]; //adding elements of array

}

System.***out***.println("The sum of array is: "+sum);

avg=sum/arr.length;

System.***out***.println("The average of the array is: "+avg);

}

}

**Output:**

Enter the elements

1

2

3

4

5

6

7

8

The sum of array is: 36

The average of the array is: 4.0

**Exercise 21:** *Write a program to construct two matrices and display the sum of those.*

**Solution 21:**

**package** com.hsbc.pack.day2;

**import** java.util.Scanner;

//Matrix Addition

**public** **class** MatrixAddition {

//Function for adding matrix

**public** **static** **void** add(**int**[][] first,**int**[][] second,**int** r,**int** c) {

**int**[][] sum=**new** **int**[r][c];

**for**(**int** i=0;i<r;i++)

{

**for**(**int** j=0;j<c;j++)

{

sum[i][j]=first[i][j]+second[i][j];

}

}

System.***out***.println("Printing the sum.3");

*printArray*(sum,r,c);

}

//Function for printing the array in the form of matrix

**public** **static** **void** printArray(**int**[][] arr,**int** r,**int** c)

{

**for**(**int** i=0;i<r;i++)

{

**for**(**int** j=0;j<c;j++)

{

System.***out***.print(arr[i][j]+"\t");

}

System.***out***.println();

}

}

**public** **static** **void** main(String[] args) {

Scanner sc=**new** Scanner(System.***in***);

System.***out***.println("Enter number of rows: ");

**int** r=sc.nextInt();

System.***out***.println("Enter number of columns: ");

**int** c=sc.nextInt();

**int**[][] first=**new** **int**[r][c]; //Declaration of 2-D Array.

**int**[][] second=**new** **int**[r][c];

System.***out***.println("Enter the values for first array: ");

**for**(**int** i=0;i<r;i++) {

**for**(**int** j=0;j<c;j++) {

first[i][j]=sc.nextInt(); //Scanning the value of first array.

}

}

System.***out***.println("Enter the values for second array: ");

**for**(**int** i=0;i<r;i++) {

**for**(**int** j=0;j<c;j++) {

second[i][j]=sc.nextInt(); //Scanning the value of second array.

}

}

System.***out***.println("First Array");

*printArray*(first, r, c); //Calling print function to print the first array

System.***out***.println("Second Array");

*printArray*(second, r, c); //calling the print function to print the second array

*add*(first,second,r,c); //calling the add function.

}

}

**Output:**

Enter number of rows:

3

Enter number of columns:

3

Enter the values for first array:

1

2

3

4

5

6

7

8

9

Enter the values for second array:

10

11

12

13

14

15

16

17

18

First Array

1 2 3

4 5 6

7 8 9

Second Array

10 11 12

13 14 15

16 17 18

Printing the sum.

11 13 15

17 19 21

23 25 27

**Exercise 22:** *Write a program to display the square of the elements of a two dimensional array.*

**Solution 22:**

**package** com.hsbc.pack.day2;

**import** java.util.Scanner;

//To display the square of the elements of a two dimensional array.

**public** **class** ArraySquare {

**public** **static** **void** printArray(**int**[][] arr,**int** r,**int** c)

{

**for**(**int** i=0;i<r;i++)

{

**for**(**int** j=0;j<c;j++)

{

System.***out***.print(arr[i][j]+"\t");

}

System.***out***.println();

}

}

**public** **static** **void** main(String[] args) {

// **TODO** Auto-generated method stub

Scanner sc=**new** Scanner(System.***in***);

System.***out***.println("Enter number of rows: ");

**int** r=sc.nextInt();

System.***out***.println("Enter number of columns: ");

**int** c=sc.nextInt();

**int**[][] first=**new** **int**[r][c]; //Declaration of 2-D Array.

System.***out***.println("Enter the values for first array: ");

**for**(**int** i=0;i<r;i++) {

**for**(**int** j=0;j<c;j++) {

first[i][j]=sc.nextInt(); //Scanning the value of first array.

}

}

sc.close();

System.***out***.println("First Array");

*printArray*(first, r, c); //Calling print function to print the first array

**for**(**int** i=0;i<r;i++)

{

**for**(**int** j=0;j<c;j++)

{

first[i][j]=first[i][j]\*first[i][j];

}

}

System.***out***.println("Final Array");

*printArray*(first, r, c); //Calling print function to print the first array

}

}

**Output:**

Enter number of rows:

2

Enter number of columns:

2

Enter the values for first array:

1

2

3

4

First Array

1 2

3 4

Final Array

1 4

9 16

**Exercise 23:** *Write a program to construct an array with 10 elements and to find the number of*

*occurrences of each element in the Array.*

**Solution 23:**

**package** com.hsbc.pack.day2;

**import** java.util.Scanner;

/\*To construct an array with 10 elements

\* and to find the number of occurrences of each element in the Array.

\*/

**public** **class** ArrayFrequency {

**public** **static** **void** main(String[] args) {

// **TODO** Auto-generated method stub

//Initialize array

**int** [] arr = **new** **int** [10];

Scanner sc=**new** Scanner(System.***in***);

System.***out***.println("enter the values: ");

**for**(**int** i=0;i<10;i++)

{

arr[i]=sc.nextInt();

}

sc.close();

//fr Array will store frequencies of element

**int** [] fr = **new** **int** [arr.length];

**int** visited = -1;

**for**(**int** i = 0; i < arr.length; i++){

**int** count = 1;

**for**(**int** j = i+1; j < arr.length; j++){

**if**(arr[i] == arr[j]){

count++;

//To avoid the counting same element again

fr[j] = visited;

}

}

**if**(fr[i] != visited)

fr[i] = count;

}

//Displays the frequency of each element present in array

System.***out***.println(" Element | Frequency");

**for**(**int** i = 0; i < fr.length; i++){

**if**(fr[i] != visited)

System.***out***.println(" " + arr[i] + " | " + fr[i]);

}

}

}

**Output:**

enter the values:

1

2

1

2

3

4

3

4

5

6

Element | Frequency

1 | 2

2 | 2

3 | 2

4 | 2

5 | 1

6 | 1

**Exercise 24:** *Create a class called shape with the following methods*

1. *area*
2. *perimeter*

*Overload the area and perimeter method to calculate for both square and rectangle.*

*Create a main class and invoke the area method to calculate the area of the square and*

*rectangle. Also invoke the perimeter method to calculate the perimeter of the square*

*and rectangle*

**Solution:**

**package** com.hsbc.pack.day2;

/\*Demonstration of function overloading by

\* calculating area and perimeter of square

\* and rectangle.\*/

**public** **class** Shape {

**public** **void** area(**double** l, **double** b) {

System.***out***.println("The area of Rectangle is: "+(l\*b));

}

**public** **void** area(**double** s)

{

System.***out***.println("The area of square is: "+(s\*s));

}

**public** **void** perimeter(**double** l,**double** b)

{

**double** p=2\*(l+b);

System.***out***.println("The perimeter of rectange is: "+p);

}

**public** **void** perimeter(**double** s)

{

System.***out***.println("The perimeter of square is: "+(4\*s));

}

**public** **static** **void** main(String[] args) {

// **TODO** Auto-generated method stub

Shape s1=**new** Shape();

s1.area(5);

s1.area(4,5);

s1.perimeter(6);

s1.perimeter(5, 7.8);

}

}

**Output:**

The area of square is: 25.0

The area of Rectangle is: 20.0

The perimeter of square is: 24.0

The perimeter of rectange is: 25.6

*.*

**Exercise 25:** *Create a class called employee with the following data members*

1. *empName*
2. *empId*
3. *empAge*
4. *empdesgn*
5. *empLocation*
6. *empExpInYrs*

*All these data members should be initialized using constructors. Use constructor overloading*

*and demonstrate by creating different employee objects with*

1. *Employee name alone*
2. *Employee name and id*
3. *Employee name, id and age*
4. *Employee name, id and designation*
5. *Employee name, id, age and designation*
6. *Employee name, id, age and location*
7. *Employee name, id, age and experience*
8. *Employee name, id, designation and experience*
9. *Employee name, id, designation, location and experience*
10. *Employee name, id, age, designation, location and experience*

**Exercise 26:** *Create a class called Calculator which has 4 different methods add, diff, mul and div which*

*accepts two numbers as parameters. Overload the methods such that the parameters can be*

*of the following pattern.*

1. *Both are of int data type.*
2. *Both are of double data type.*
3. *First parameter is of int data type and second parameter is of double data type.*
4. *First parameter is of double data type and second parameter is of int data type.*

*Create anobject to access these methods and invoke these methods with different type of*

*numbers and display the result in the corresponding methods.*

**Solution 26:**

**package** com.hsbc.pack.day2;

// Program to perform function overloading.

**public** **class** Calculator {

**public** **void** add(**int** a, **int** b)

{

**int** sum=a+b;

System.***out***.println("The numbers are a: "+a+" b: "+b);

System.***out***.println("The sum is: "+sum);

}

//function overloading

**public** **void** add(**double** a, **double** b)

{

**double** sum=a+b;

System.***out***.println("The numbers are a: "+a+" b: "+b);

System.***out***.println("The sum is: "+sum);

}

**public** **void** diff(**double** a, **double** b)

{

**double** diff=a-b;

System.***out***.println("The numbers are a: "+a+" b: "+b);

System.***out***.println("The difference is: "+diff);

}

**public** **void** diff(**int** a, **int** b)

{

**int** diff=a-b;

System.***out***.println("The numbers are a: "+a+" b: "+b);

System.***out***.println("The difference is: "+diff);

}

**public** **void** mul(**int** a, **int** b)

{

**int** mul=a\*b;

System.***out***.println("The numbers are a: "+a+" b: "+b);

System.***out***.println("The product is: "+mul);

}

//function overloading

**public** **void** mul(**int** a,**double** b)

{

**double** mul=a\*b;

System.***out***.println("The numbers are a: "+a+" b: "+b);

System.***out***.println("The product is: "+mul);

}

**public** **void** division(**int** a, **int** b)

{

**float** div=a/b;

System.***out***.println("The numbers are a: "+a+" b: "+b);

System.***out***.println("The division is: "+div);

}

**public** **void** division(**double** a, **int** b)

{

**double** div=a/b;

System.***out***.println("The numbers are a: "+a+" b: "+b);

System.***out***.println("The division is: "+div);

}

**public** **static** **void** main(String[] args) {

// **TODO** Auto-generated method stub

Calculator c=**new** Calculator(); //creation of object

c.add(4, 5);

c.add(4.5, 5.5);

c.diff(10, 7);

c.diff(10.1, 7.8);

c.mul(7, 5);

c.mul(3, 4.75);

c.division(10, 5);

c.division(9.55, 2);

}

}

**Output:**

The numbers are a: 4 b: 5

The sum is: 9

The numbers are a: 4.5 b: 5.5

The sum is: 10.0

The numbers are a: 10 b: 7

The difference is: 3

The numbers are a: 10.1 b: 7.8

The difference is: 2.3

The numbers are a: 7 b: 5

The product is: 35

The numbers are a: 3 b: 4.75

The product is: 14.25

The numbers are a: 10 b: 5

The division is: 2.0

The numbers are a: 9.55 b: 2

The division is: 4.775

**Exercise 27:** *Write a class called Computer such that the object of that class should be created only when*

*the class is loaded.*

**Solution 27:**

**package** com.hsbc.pack.day2;

//To demonstrate the significance of initializer

**public** **class** Computer {

// Initializer block starts..

{

// This code is executed before every constructor.

System.***out***.println("Class Loads !!");

}

// Initializer block ends

**public** Computer()

{

System.***out***.println("Default Constructor");

}

**public** **static** **void** main(String[] args) {

// **TODO** Auto-generated method stub

Computer c=**new** Computer();

}

}

**Output:**

Class Loads !!

Default Constructor

**Exercise 28:** *In the calculator (Lab exercise - 14) program, make the add and diff method to accept var-args*

*and demonstrate.*

**Solution 28:**

**package** com.hsbc.pack.day2;

**public** **class** Calculator1 {

**public** **void** add(**int** ...args)

{

System.***out***.println("argument length: " + args.length);

**int** sum = 0;

**for**(**int** x: args){

sum += x;

}

System.***out***.println("The sum is: "+sum);

}

**public** **void** diff(**int** ...args )

{

System.***out***.println("argument length: " + args.length);

**int** diff = 0;

**for**(**int** x: args){

diff -= x;

}

System.***out***.println("The difference is: "+diff);

}

**public** **static** **void** main(String[] args) {

// **TODO** Auto-generated method stub

Calculator1 c1=**new** Calculator1();

c1.add(2,3);

c1.diff(5,4);

c1.add(2,3,5);

c1.diff(2,3,5);

}

}

**Output:**

argument length: 2

The sum is: 5

argument length: 2

The difference is: -9

argument length: 3

The sum is: 10

argument length: 3

The difference is: -10