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CORE JAVA MATERIAL

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Java

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JAVA INTRODUCTION

- Java is a simple programing language
- Writing, compilation and debugging a program is very easy in java
- It helps to create reusable code
- Java has more features,

  1. Platform independent
  2. Open source
  3. Multithreading
  4. More secure
  5. Portable

1. Platform independent

- During the compilation the java program converts into byte code
- Using byte code we can run the application to any platform such as windows, mac, linux, etc

2. Open source:

- A program in which source code is available to the general public for use and/or modification from its original design at free of cost is called open source

3. Multithreading:

- Java supports multithreading
- It enables a program to perform several task simultaneously

4. More secure:

- It provides the virtual firewall between the application and the computer
- So it's doesn't grant unauthorized access

5. Portable:

- "Write once run anywhere"
- Java code written in one machine can run on another machine

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Syllabus:

1. Oops concept
2. Control statement/looping
3. Arrays
4. String
5. Exceptions
6. Collections

Terminology:

1. JDK
2. JRE
3. JVM

JDK:

- Java Development Kit
- If run any applications we need JDK have to installed
- JDK versions: 1.0 to 1.9
- Mostly V1.8 is used now

JRE:

- Java Runtime Environment
- It is a pre-defined. class files (i.e.) library files

JVM:

- Java Virtual Machine
- It is mainly used to allocate the memory and compiling

TOOLS:

1. Notepad
2. Net bean
3. Eclipse
4. J Developer-oracle
5. RAD-IBM

- Nowadays we mostly used eclipse (75% of the people using).
- Versions of eclipse:
  - Juno
  - Kepler
  - Luna
  - Mars
  - Neon

OOPS CONCEPT:

- Object Oriented Programing Structure
- OOPS is a method of implementation in which programs are organized as collection of objects, class and methods

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Oops principles are

1. Class
2. Method
3. Object
4. Abstraction
5. Encapsulation
6. Inheritance
7. Polymorphism

CLASS:

- Class is nothing but collection of methods or collection of objects.
  - Project name : Should be in Pascal notation
  - Pascal notation : Each word of the first letter should be in capital
  - src - Source file
  - Class name: Pascal notation
  - Package creation: ex, org.cts.scope-All small letters

Syntax:

(First type class name and click ctrl +space)

```
public class Bank        {

}   // Bank is a class name
```

Public-Access specifier

METHOD:

- Set of action to be performed

Method name: camel notation

Camel notation: First word should be small after every word of the first letter should be capital
Syntax:

```
public void dummy() {
                    // Here dummy is a method name
      }
```

Main Method:

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

          }
```

Main method type main and click ctrl +space

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OBJECT:

- Run time memory allocation
- Using object we call the any methods

Syntax:

(Class name) (Object name) =new (Class name) ();

- Alignment ctrl + shift+ F
- Run ctrl +F11

Example program:

1. StudentDatabase

```
public class StudentInfo {
        public void Studentname() {
                System.out.println("Name:Vengat");
        }

        public void studentList() { System.out.println();

        }

        public void StudentMark() { System.out.println("Mark:1005");

        }

        public void StudentAddress() { System.out.println("Address:
                Chennai");
        }

        public static void main(String[] arg) { StudentInfo info =
                new StudentInfo(); info.Studentname();
                info.StudentMark(); info.StudentAddress();
        }
}
```

2.ECommerce

```
public class OnlineShoppingSite {
        public void myAccount() { System.out.println("Account
                Name");
        }

        public void catalog() { System.out.println("My
                cat");
        }

        public void orders() {
```

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```
                System.out.println("My Orders");
        }

        public void myWishList() {

                System.out.println("MY Wish List");
        }

        public static void main(String[] args) { OnlineShoppingSite info = new
                OnlineShoppingSite(); info.catalog();
                info.myAccount(); info.orders();
                info.myWishList();
        }
}
```

Heap Memory:

- Object are stored in heap memory

RAM JVM Heap memory

- To reduce object memory we go for inheritance

ENCAPSULATION

- Structure of creating folders

INHERITANCE:

- We can access one class property into another class using 'extend' keyword and reusuable purpose

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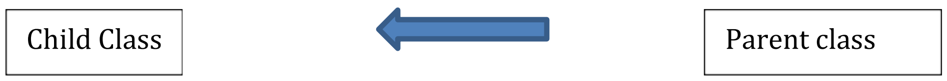
Child class Sub class
Parent class Super class

Types:

1. Single Inheritance
2. Multilevel Inheritance
3. Multiple Inheritances
4. Hybrid Inheritance
5. Hierarchical Inheritance

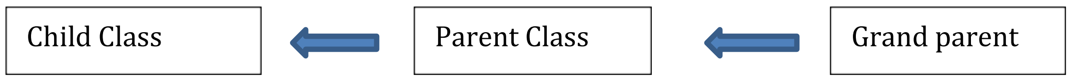
1. Single Inheritance :

- One parent class is directly support into one child class using extend keyword

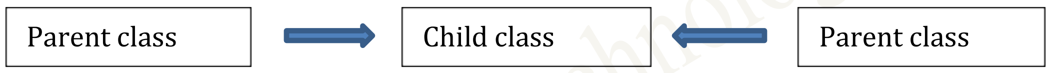


2. Multilevel Inheritance:

- One child class and more than one parent class



3. Multiple Inheritance:



- More than one parent class parallely support into one child class but it won't suport in java because

  1. Priority problem

  2. Compilation error/syntax error

(i.e) if both parent class having same method name it will get priority problem so it doesn;t work in java
Parent class□ child class □ parent class

- test () is a method name, it present in both parent class, so its get priority problem

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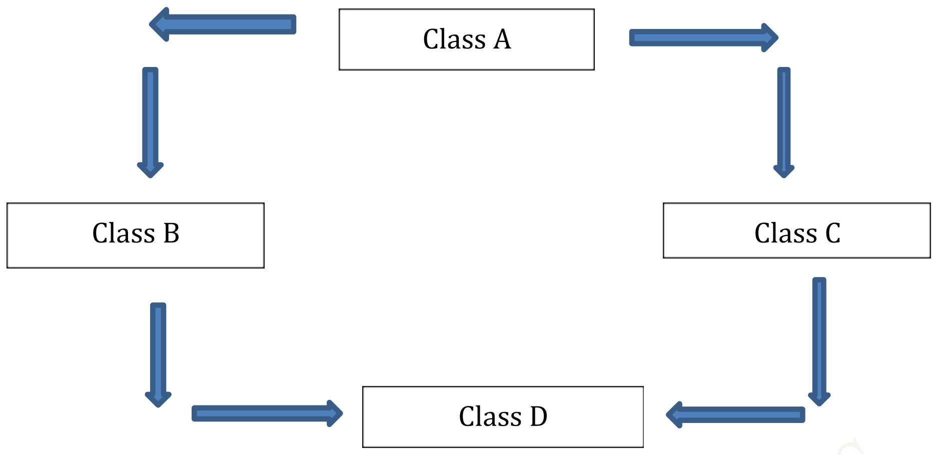
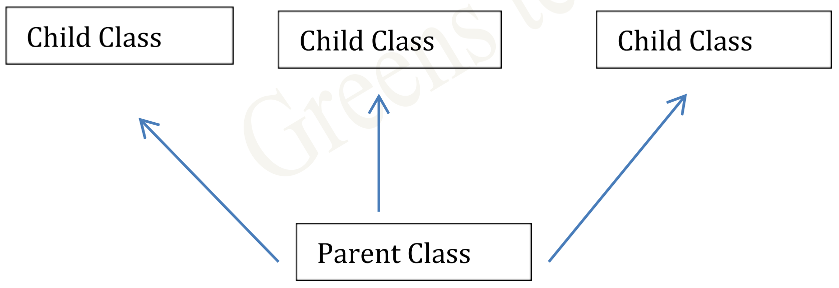
4.Hybrid Inheritance:

- It is a combination of single and multiple inheritance



5. Hierarchical Inheritance:

- One parent class and more than one child class



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ACCESS SPECIFIER:

1. Public
2. Protected
3. Default
4. Private

1. Public:

- It is global level access(same package + different package)

2. Private:

- ➢ It is a class level access

3. Default:

- ➢ Package level access
- ➢ Without access specifier within the package we can access

Ex,

Public static public- access specifier (need to mention public)
Private static private- access specifier (need to mention)
Static default- access specifier (need not to mention default)

4. Protected:

Inside package + outside Package (Extends)

DATA TYPES:

Data types	Size	Wrapper Class	Default value
byte	1	Byte	0
short	2	Short	0
int	4	Integer	0
long	8	Long	0
float	4	Float	0.0
double	8	Double	0.0
boolean	-	Boolean	false
char	-	Character	-
String	-	String	null

- ➢ To find range: formula

-2^n-1 to +2^n-1 - 1

For **byte**,

1 byte =8 bits
So n=8

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Apply

-128 to + 127

This is a byte range

Ex:

```
public class ByteInfo {
public static void main(String[] args) { byte num=12;
            System.out.println(num);
}
}
```

Long:

symbol 'l'

long n= 123467l(need to enter l finally)

Float
Symbol-‘f’
float f=10.06f
Double:
No need to enter d

char:

Character is any number, any alphabet or any special character
char= 'A'□single quotation
String:

Stri11ng = "klaou8778k"□ double quotation

Boolean:

Boolean is a true or false value
boolean b1=true;
boolean b2=false;

Default package of java:

- java.lang

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- ctrl+2□+L□ this shortcut is used to find the data type

Syntax: to get the values from the user

- byte□nextByte();
- short□nextShort();
- int□nextInt();
- long□nextLong();
- float□nextFloat();
- double□nextDouble();
- char□next().charAt(0);
- String□next();
- String□nextLine();
- boolean□nextBoolean();

String:

- nextLine() is used to include space

String.s=sc.nextLine();

WRAPPER CLASS:

- Classes of data types is called wrapper class
- It is used to convert any data type into object
- All classes and wrapper classes default value is Null

CONTROL STATEMENT:

1. if
2. if.else
3. else.if

variable name□ camel notation
Difference between "=" and "=="□

- □ = is used to assigning the value
- □ == is used for condition checking

Example Program:

```
public class IfCondition {
        public static void main(String[] args) {
                int empID=20;
                if(empID==20){
                        System.out.println("valid");
                }else {
                        System.out.println("not valid");
                }
        }
}
```

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Output valid

- More than one condition we use for

  1. logical &&,// logical && check first condition if its fail it doesn't check second
  2.Bitwise &,/ bitwise & is check both condition
- So logical && is better than bitwise

LOOPING:

1. for
2. while
3. do.while

For:

Example Program:

```
public class ForLoop {
	public static void main(String[] args) {
		System.out.println("Start");
		for (int i = 1; i <= 3; i++) {
			System.out.println(i);
		}
		System.out.println("End");

	}
}
```

output:

```
Start
1
2

3

End
```

Inner for loop;

Example Program:

```
public class InnerForLoop {
	public static void main(String[] args) {
		for (int i = 1; i <= 5; i++) {
			for (int j = 1; j <= 6; j++) {
				System.out.print(i);
```

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```
                    }
                    System.out.println();
            }}}
```
Output:

```
111111

222222

333333

444444

555555
```

Println□ printline

Break:

- It will exit from the current loop

Example Program:

```
public class InnerForLoop {
        public static void main(String[] args) {
                for (int i = 1; i <= 10; i++) {
                        if (i == 5) {
                            break;
                    }
                    System.out.println(i);
                }
        }}
```
Output:

```
1

2

3

4
```

Continue:

- It will skip the particular iteration

Example Program:

```
    public class InnerForLoop {
            public static void main(String[] args) {
                    for (int i = 1; i <= 10; i++) {
                        if (i == 5) {
                                continue;
                    }
                    System.out.println(i);
```

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```
                    }
          }
}
```

Output

```
1

2

3

4

6

7

8

9

10
```

Basic programs using conditional statements:

<u>EVEN NUMBER AND ODD NUMBER:</u>

To print Even num:

Example Program:

```
    public class InnerForLoop {
                  public static void main(String[] args) {
                           for (int i = 1; i <= 20; i++) {
                                 if (i % 2 == 0) {
                              System.out.println(i);
                              }
                    }
          }
}
```

output

```
2
4
6
8
10
12
14
16
18
20
```

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To print Odd:

Example Program:

```
    public class InnerForLoop {
                    public static void main(String[] args) {
                            for (int i = 1; i <= 20; i++) {
                                    if (i % 2 == 1) {
                                                    System.out.println(i);
                                    }
                     }

            }

}
```

Output

```
1
3
5
7
9
11
13
15
17
19
```

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Sum of odd and even numbers:

Sum of odd:

Example Program:

```
public class SumofOddNum {
public static void main(String[] args) {
        int count=0;
        for(int i=1;i<=100;i++)
        {
                if(i%2==1){
                        count=count+i;
                }
        }
        System.out.println(count);
}
}
```

Output:

```
2500
```

Sum of even:

Example Program:

```java
public class SumofOddNum {
public static void main(String[] args) {
		int count=0;
		for(int i=1;i<=100;i++)
		{
			if(i%2==0){
				count=count+i;
			}
		}
		System.out.println(count);
}
}
```

Output:

```
2550
```

Factorial Numbers:

Example Program:

```java
public class FactorialNumbers {
		public static void main(String[] args) {
			int count=1;
			for(int i=1;i<=8;i++){
				count=count*i;
			}System.out.println(count);
		}
}
```

Output:

```
40320
```

<u>POLYMORPHISM</u>:

- Poly-many
- Morphism-forms
- Taking more than one forms is called polymorphism or one task completed by many ways

It has 2 types,

1.Method overloading(static binding/compile time polymorphism)

2.Method overriding(dynamic binding/run time polymorphism)

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1. Method overloading:

Class-same
Method-same
Argument-differ

- ➢ In a same class method name is same and the argument is different is called method overloading
- ➢ the argument is depends on
    - data types
    - data types count
    - data type order

Example Program:

```
public class StudentInfo {
        private void studentId(int num) {
        }
        private void studentId(String name) {                    \\ depends on order
        }
        private void studentId(String email, int ph) {                \\depends on data type
        }
        private void studentId(int dob, String add) {                \\depends on datatype count
        }
        public static void main(String[] arg) { StudentInfo info =
                new StudentInfo();
        }
}
```

- ➢ In the same method the argument can't use int and byte because int &byte both are numbers. so it doesn't work.
- ➢ public void employeeID(int num, byte num2) is not correct

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2. Method overriding:

Class name-differ(using extends)
Method-same
Argument- same

- ➢ In a different class , the method name should be same and argument name should be same is called overriding

Example Program:

- ➢ our aim is boy getting marry
- ➢ 1st class(sub class)

```
public class Boy extends Marriage {
        public void girlName() { System.out.println("ramya");
        }
        public static void main(String[] args) { Boy.b=new
        Boy();
        b.girlName();
        }
```

- 2nd class(super class)

```
public class          Marriage {
        public void girlName() { System.out.println("priya");
        }
```

output : ramya;

- The same method name in both class it take sub class only
- If we satisfied with super class we go for super class method but we won't satisfy with super class we go for sub class method
- We can assign our sub class to our super class but can't reverse

Example Program:

- Marriage b=new Boy() is possible
- Boy b=new Marriage() impossible
- Inside the class if we use static we dont want to crate object (i.e)

```
public class Employee{ public static
void addNum(){
System.out.println("Hello");
}
public static void main(String[] args){
addNum();        // dont want to create object
}
}
```

Output: Hello

- If its different class we have to use class name(i.e)

sub class:

```
public class Employee{ public static
void addNum(){
system.out.println("Hello");
}}
```

super class:

```
public class sample{
public static void main(string[] args){
Employee.addNum();
}}
```

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Output: Hello

ABSTRACTION:

- Hiding the implementation part is called abstraction
- it has 2 types,

  1.Partially abstraction(abstract class)
  2.Fully abstraction(interface)

1.Partially Abstraction(Abstract class):

- It will support abstract method and non-abstract method.
- We can’t create object for abstract class because in the method signature we didn't mention any business logic. so
- In abstract method, we only mention abstract signature, won't create business logic
- It have 2 class, abstract class(sub class) and super class. we create object and business logic only in super class, won't create in abstract class

Example Program:

abstract class

```
public    abstract class Bank {
          abstract void saving();                //method signature
          abstract void current(); abstract
          void salary(); abstract void joint();
          public void branchDetails(){
                    System.out.println("chennai");
          }
}
```

super class

```
public    class AxisBank extends Bank {
          public    void saving() {              // method signature
          System.out.println("saving regular");// business logic
}
public void current() { System.out.println("current");
}
public void salary() { System.out.println("salary");
}
public void joint() {
          System.out.println("joint");
}
public static void main(String[] args) { AxisBank info
          = new AxisBank();
```

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```
        info.branchDetails();
        info.salary(); info.saving();
}}
```

Output:

```
chennai
salary
saving regular
```

2. INTERFACE/FULLY ABSTRACTION;

- It will support only abstract method, won't support non abstract method
- In interface "public abstract" is default. we no need to mention
- It using implements keywords

Example Program:1

interface

```
public    interface Bank { abstract
        void saving(); abstract void
        current(); abstract void salary();
        abstract void joint();
        public void branchDetails();
}
```

super class

```
public    class AxisBank implements Bank {
        public void saving() { System.out.println("saving
                regular");
}
        public void current() { System.out.println("current");
        }
        public void salary() { System.out.println("salary");
        }
        public void joint() {
                System.out.println("joint");
        }
        public void branchDetails() { System.out.println("chennai");
        }
        public static void main(String[] args) { AxisBank info
                = new AxisBank(); info.branchDetails();
                info.salary();
                info.saving();
}
}
```

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Output:

```
chennai
salary
saving regular
```

- ➢ multiple inheritance its won't support in java but using interface its support
- ➢ here we have to create 2 interface(super class) and one sub class(normal). In the sub class we implement both interface

Example Program:2

interface

```
public interface AxisBank {
public void test();
}
public interface HdfcBank {
        public void test();
}
sub class(normal class)
public class Bank       implements AxisBank, HdfcBank{
        @Override
        public void test() {
                // TODO Autogenerated method stub
        }
}
```

Difference between abstract class and interface

Abstract class:

- ➢ It is partially abstraction
- ➢ It support both abstract method and non-abstract method
- ➢ It's using "extends" keyword
- ➢ Here "public abstract" have to mention
- ➢ We can use whatever access specifier we want

Interface:

- ➢ It is fully abstraction
- ➢ It support only abstract method
- ➢ It's using "implement" keyword
- ➢ "public Abstract" is default. no need to mention
- ➢ Here we use only public(access specifier)

ARRAYS:

- ➢ Collection of similar data
- ➢ The value are stored based on index
- ➢ The index will start 0 to n1

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Syntax:

int num[]=new num[5]

Here,

int data type
num variable
[] Array
5 Array length

- It takes 0 to 4(i.e) 0 to n-1, n=5

Example Program:

```
public class BasicArray {
        public static void main(String[] args) { int
                num[]=new int[5];
                System.out.println(num[2]);
                }
}
```

Output: 0

- If we didn't assign any value, it will takes the default value of data types(int)
- Default value of int is 0

Example Program:

```
public class BasicArray {
        public static void main(String[] args) {
                int    num[]=new    int[5];
                num[0]=10;
                num[1]=20;
                num[2]=30;
                num[3]=40;
                num[4]=50;
                System.out.println(num[2]);
}
}
```

Output: 30

- Overwrite the value:

```
    public class BasicArray {
        public static void main(String[] args) {
                int    num[]=new    int[5];
                num[0]=10;
                num[1]=20;
                num[2]=30;
                num[3]=40;
```

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```
                num[4]=50; num[2]=300;
                System.out.println(num[2]);

        }}
```

Output:

300

- If we overwrite the value, it takes last one

To find array length:

```
public class BasicArray {
public static void main(String[] args) {
        int     num[]=new     int[5];
        num[0]=10;
        num[1]=20;
        num[2]=30;
        num[3]=40;
        num[4]=50;
        num[2]=300;
        int             len=num.length;
        System.out.println(len);
}}
```

Output:

5

Using for loop:

```
public class BasicArray {
        public static void main(String[] args) {
                int     num[]=new     int[5];
                num[0]=10;
                num[1]=20;
                num[2]=30;
                num[3]=40;
                num[4]=50;
                num[2]=300;
                for(int         i=0;i<num.length;i++)
                System.out.println(num[i]);
}
}
```

Output:

10

20

300

40

50

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Enhanced for loop:

syntax:

```
for(int k:num)
System.out.println(k);
```

Example Program:

```
public class BasicArray {
        public static void main(String[] args) {
                int     num[]=new     int[5];
                num[0]=10;
                num[1]=20;
                num[2]=30;
                num[3]=40;
                num[4]=50;
                num[2]=300;
                for(int                    k:num)
                System.out.println(k);
}
}
```

Output:

```
10

20

300

40

50
```

- In this enhanced for loop, have no condition checking and value assign
- It is very fast compare to normal for loop

Advantage of array:

- In a single variable we can store multiple values

Disadvantage of arrays:

- It support only similar data types
- It is a fixed size
- Memory wastage is high
- To overcome these we go for collections

STRING:

- Collections of charactor or word enclosed with double quotes

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Basic Topics:

- String function
- Mutable string
- Immutable string

Example Program:

```
public class StringBasic {
        public static void main(String[] args) { String
                s1="Vengat"; System.out.println(s1);
        }
}
```

Output: Vengat

<u>Some Basic Methods:</u>

<u>charAt():</u>

- ➢ It is used to print the particular character

Example Program:

```
public class StringBasic {
        public static void main(String[] args) { String
                s1="Vengat"; System.out.println(s1);
                char ch = s1.charAt(2);
                System.out.println(ch);
        }
}
```

Output:

```
Vengat
n
```

- ➢ 2 takes as 0 to 2 (i.e) 0 1 2> v e n

<u>Equals():</u>

- ➢ equals is a method is used to check our string index is true or false

Example Program:

```
public class StringBasic {
        public static void main(String[] args) { String s1 =
                "Vengat"; System.out.println(s1);
                boolean b = s1.equals("Vengat");
                System.out.println(b);
                boolean b1 = s1.equals("vengat");
                System.out.println(b1);}}
```

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Output:

```
Vengat
true
false
```

- b1 is false because equals() is case sensitive

Equalsignorecase():

- It is like a equals() method but it is not case sensitive

Example Program:

```
public class StringBasic {
        public static void main(String[] args) { String s1 =
                "Vengat"; System.out.println(s1);
                boolean b = s1.equals("Vengat");
                System.out.println(b);
                boolean b1 = s1.equalsIgnoreCase("vengat");
                System.out.println(b1);
}}
```

Output:

```
Vengat

true
true
```

contains():

- Contains() is a method , is used to check the particular character or word in the string

Example Program:

```
public class StringBasic {
        public static void main(String[] args) {
                String s1 = "Hello welcome to java class";
                System.out.println(s1);
                boolean b = s1.contains("welcome");
                System.out.println(b);
        }
}
```

Output:

```
Hello welcome to java class
true
```

- If we check other than the string index, it shows false

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Example Program:

```
public class StringBasic {
	public static void main(String[] args) {
		String s1 = "Hello welcome to java class";
		System.out.println(s1);
		boolean b = s1.contains("welcome");
		System.out.println(b);
		boolean b1 = s1.contains("hai");
		System.out.println(b1);
	}
}
```

Output:

```
Hello welcome to java class
true
false
```

split():

- split() is a method, is used to split the string by space or character or word or whatever

Example Program:

```
public class StringBasic {
	public static void main(String[] args) {
		String s1 = "Hello welcome to java class";
		String[] x = s1.split(" "); // here we split by space
		System.out.println(s1.length()); System.out.println(x.length);
		String[] x1 = s1.split("o"); // here we split by "o"
		System.out.println(s1.length()); System.out.println(x1.length);
	}
}
```

Output:

```
27 //this whole string length s1

5 // this is after splitting by spacex

27 //this whole string length s1

4 // this is after splitting by "o"x1
```

For loop:

Example Program:

```
public class StringBasic {
	public static void main(String[] args) {
		String s1 = "Hello welcome to java class";
```

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```
                String[] x = s1.split(" "); // here we split by space
                for(int i=0;i<x.length;i++){ System.out.println(x[i]);
                }
        }
}
```

Output:

```
Hello
welcome
to
java
class
```

Enhanced for loop:

```
public class StringBasic {
        public static void main(String[] args) {
                String s1 = "Hello welcome to java class";
                String[] x = s1.split(" "); // here we split by space
                for (String k : x) {
                        System.out.println(k);
                }
        }
}
```

Output:

```
Hello
welcome
to
java
class
```

toUpperCase() and toLowerCase():

- toUpperCase() is used to convert the string into uppercase
- toLowerCase() is used to convert the string into lowercase

Example Program:

```
public class StringBasic {
        public static void main(String[] args) { String s1 =
                "Hello";
                String m = s1.toLowerCase(); // to convert lowercase
                System.out.println(m);
                String m1 = s1.toUpperCase(); // to convert upper
```

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```
                        System.out.println(m1);
            }
}
```

Output:

```
hello
HELLO
```

subString():

- It is used to print from, which character we want in the string index

Example Program:

```
      public class StringBasic {
         public static void main(String[] args) { String s1 = "Hello
                                          java";
                           String m = s1.substring(2);
// to print from 3rd character 0 1 2 l l o   j a v a
                        System.out.println(m);
                        String m1 = s1.substring(2, 6);
// upto     6, 0 1 2 3 4 5 6 H e | l l o |
                        System.out.println(m1);

            }}
```

Output:

```
llo java
llo
```

indexOf():

- It is used to print the position of the character in the string
- If it is available means, its print the relevant position
- But if the character is not available , it will print "-1"
- As well as , if multiple same character is have, it takes first one position

Example Program:

```
public class StringBasic {
            public static void main(String[] args) { String s1 =
                        "Hello java";
                        int m = s1.indexOf("o"); // "o", to print o position
                        System.out.println(m);
                        int m1 = s1.indexOf("b"); // "b" is not in the string, so it print"-1" System.out.println(m1);
                        int m2 = s1.indexOf("a"); // multiple character "a", it takes firstone System.out.println(m2);
            }
}
```

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Output:

```
4

-1

7
```

lastIndexof():

- If multiple same character , it takes last one

Example Program:

```
public class StringBasic {
            public static void main(String[] args) { String s1 =
                        "Hello java";
                        int m = s1.indexOf("o"); // "o", to print o position
                        System.out.println(m);
                        int m1 = s1.indexOf("b"); // "b" is not in the string, so it print"1" System.out.println(m1);
                        int m2 = s1.indexOf("a"); // multiple character "a", it takes firstone System.out.println(m2);
                        int m3 = s1.lastIndexOf("a"); // multiple character "a", it takes last
one
                        System.out.println(m3);
            }
}
```

Output:

```
4

1

7

9
```

replace():

- replace() is a method ,it is used to replace the index character or word

Example Program:

```
public class StringBasic {
            public static void main(String[] args) { String s1 =
                        "Hello world";
                        String m = s1.replace("world", "java"); // to replace world to java System.out.println(m);
            }
}
```

Output:

```
Hello java
```

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Example Program:

```
public class StringBasic {
            public static void main(String[] args) { String s1 = "This is
                        manual Testing";
                        String m = s1.replace("manual", "Automation"); // to replace manual to
Automation
                        System.out.println(m);
            }
}
```

Output:

```
This is Automation Testing
```

isEmpty():

- ➢ It is used to check the index length is zero or not,
- ➢ If its zero, its true otherwise false

Example Program:

```
public class StringBasic {
            public static void main(String[] args) { String s1 = "";
                        boolean m = s1.isEmpty();// here index is empty, so its true System.out.println(m);
                        String s2 = " ";
                        boolean m1 = s2.isEmpty();
// here index is not empty because space included System.out.println(m1);          // space is also
                        a one character
            }
}
```

Output:

```
true
false
```

startsWith() and endsWith():

- ➢ It is used to check the index starts with particular word or character
- ➢ As well as ends with

Example Program:

```
public class StringBasic {
            public static void main(String[] args) { String s1 =
                        "Hello java class"; boolean m =
                        s1.startsWith("Hello"); System.out.println(m);
                        boolean m1 = s1.endsWith("class");
                        System.out.println(m1);
            }
}
```

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Output:

```
true
true
```

ASCII value:

- To find ascii value

Example Program:

```
public class Dummy {
        public static void main(String[] args) {
                char ch='M';
                int x=ch; System.out.println(x);
        }
}
```

Output: 77

- Every character have one ASCII value
- A-Z 65 to 90
- A-z 97 to 122
- 0-9 48 to 57
- remaining special characters

compareTo():

- It is a method, it is used to compare the character based on ASCII value

Example Program:

```
public class Dummy {
public static void main(String[] args) { String s="A";
                int i = s.compareTo("A");
                System.out.println(i);
        }
}
```

Output:

```
0
```

Here, A ASCII value is 65, so 65-65=0

Example Program:

```
public class Dummy {
        public static void main(String[] args) { String s="A";
                int i = s.compareTo("B");
                System.out.println(i);
        }}
```

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Output:

1

Here, 65-66=1

- If we use many character, it will compare only first differing character

Example Program:

```
public class Dummy {
        public static void main(String[] args) { String
                s="ABCD";
                int i = s.compareTo("ABFK ");
                System.out.println(i);
        }
                }
```

Output:

3 // 6770=3

- If it is different length and same accuration, the output will be based on length

Example Program:

```
public class Dummy {
        public static void main(String[] args) { String
                s="ABCD";
                int i = s.compareTo("AB");
                System.out.println(i);
        }
}
```

Output:

2

Here, ABCD length is 4
AB2, 42=2

- If different length and different accuration , it will compare the first differing character

Example Program:

```
public class Dummy {
        public static void main(String[] args) { String
                s="ABCD";
                int i = s.compareTo("ACLK");
                System.out.println(i);
        }
}
```

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Output:

1

Here, 6667=1, BC=1

Literal String:

- It's stored inside the heap memory (string pool or string constant).
- It will share the memory if same value (duplicate value)

Non-literal string:

- Its stored in the heap memory.
- Its create a new memory every time even if its duplicate value(same value)

Example Program:

```
public class StringBasic {
        public static void main(String[] args) { String s1 =
                "vengat";
                String s2 = "vengat";           // literal string(same value so its share
the memory)
                System.out.println(System.identityHashCode(s1));
                System.out.println(System.identityHashCode(s2));  String  x1=new
                String("vengat");
                String x2=new String("vengat");// non literal string( its won't
share, create new memory
                System.out.println(System.identityHashCode(x1)); System.out.println(System.identityHashCode(x2));
        }
}
```

- identityHashcode() is used to print the reference value(storage reference)

Output:

```
31168322 // literal string share the memory if same value
31168322
17225372

5433634    // but non literal won't share
```

Immutable string:

- We can store more duplicate value in same memory
- We can't change the value in memory
- In concord nation, it's have to create new memory

Mutable string:

- we can't store duplicate value in same memory
- we can change the value in memory
- In concord nation, its takes same memory

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Example Program:

```
public class StringBasic {
            public static void main(String[] args) { String s1 =
                        "vengat";
                        String s2 = "prabu";                // mutable string
                        System.out.println("Immutable string");
                        System.out.println(System.identityHashCode(s1));
                        System.out.println(System.identityHashCode(s2)); String r =
                        s1.concat(s2); System.out.println(r);
                        System.out.println(System.identityHashCode(r)); StringBuffer
                        x1=new StringBuffer("vengat");
                        StringBuffer x2=new StringBuffer("prabu");// mutable string
                        System.out.println("mutable string");
                        System.out.println(System.identityHashCode(x1));
                        System.out.println(System.identityHashCode(x2)); x1.append(x2);
                        System.out.println(x1); System.out.println(System.identityHashCode(x1));
            }
}
```

Output:

```
Immutable string
31168322
17225372

vengatprabu

5433634          // here it takes new memory for concordinattion
mutable string
2430287

17689166

vengatprabu

2430287      // but here it takes x1 memory
```

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COLLECTIONS:

Why we go for collections:

- It will support dissimilar data types.
- It is dynamic memory allocation
- No memory wastage like array

It has 3 types,

1. List
2. Set
3. Map

1. List :(Interface)

- ArrayList(class)
- LinkedArrayList(c)
- vector(c)

2.Set:(Interface)

- Hashset(c)
- Linked hashset(c)
- Treeset(c)

3.Map:(Interface)

- Hashmap(c)
- Linked hashmap(c)
- Treemap(c)
- Hashtable(c)
- concurrent hashmap(C)

List:

ArrayList:

Syntax:

List ex=new ArrayList();
Here,
List□interface
ex□object name
ArrayList()□ class
Example Program:

```
public class ArList {
        public static void main(String[] args) { List ex=new
                ArrayList(); ex.add(10);
                ex.add(1000000000000000000l);
                ex.add(10.12f);
                ex.add("Hai");
                ex.add("A"); ex.add(true);
                System.out.println(ex);
        }
}
```

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Output:

```
[10, 10000000000000000, 10.12, Hai, A, true]
```

- add() is a method, it is used to insert a value.
- Arraylist will display the output based on the insertion order

Generics:

- It will support particular datatypes or object only
- It is a features of jdk 1.5
- In the generics, we can mention only wrapper class
- < >- This is generic symbol, is used to define the particular datatype
- If we need integer datatype,

syntax:

List<Integer> ex=new ArrayList<Integer>();

Example Program:

```
public class ArList {
        public static void main(String[] args) { List<Integer> ex=new
                ArrayList<Integer>(); ex.add(10);
                ex.add(20);
                ex.add(30);
                ex.add(40);
                ex.add(40);
                ex.add(50); System.out.println(ex);
        }
}
```

Output:

```
[10, 20, 30, 40, 40, 50]
```

- List allows the duplicate value
- ArrayList print in a insertion order

size():

- size is a method, it is used to find the size of the ArrayList

Example Program:

```
public class ArList {
        public static void main(String[] args) { List<Integer> ex=new
                ArrayList<Integer>(); ex.add(10);
                ex.add(20);
                ex.add(30);
                ex.add(40);
```

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```
                ex.add(40);
                ex.add(50);
                int i = ex.size(); System.out.println(i);

        }}
```

Output:

```
6
```

get():

- get() is a method , it is used to print the particular value

Example Program:

```
public class ArList {
        public static void main(String[] args) { List<Integer> ex=new
                ArrayList<Integer>(); ex.add(10);
                ex.add(20);
                ex.add(30);
                ex.add(40);
                ex.add(40);
                ex.add(50);
            int x = ex.get(3); System.out.println(x);
        }
}
```

Output:

```
    40
```

- it takes the value from 0(i.e) 0 1 2 3 > 10 20 30 40

For loop:

```
public class ArList {
        public static void main(String[] args) { List<Integer> ex=new
                ArrayList<Integer>(); ex.add(10);
                ex.add(20);
                ex.add(30);
                ex.add(40);
                ex.add(40);
                ex.add(50);
            for(int i=0;i<ex.size();i++){ System.out.println(ex.get(i));
        }
        }
}
```

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Output:

```
10

20

30

40

40

50
```

Enhanced for loop:

```
public class ArList {
        public static void main(String[] args) { List<Integer> ex=new
                ArrayList<Integer>(); ex.add(10);
                ex.add(20);
                ex.add(30);
                ex.add(40);
                ex.add(40);
                ex.add(50);
            for(Integer k:ex){ System.out.println(k);
        }
        }
}
```

Output:

```
10

20

30

40

40

50
```

Remove():

- remove is a method, it is used to remove the particular index value
- If we remove the particur index value, index order will not change
- After that the index value move to forward

Example Program:

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

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```
                List<Integer> ex = new ArrayList<Integer>(); ex.add(10);
                ex.add(20);
                ex.add(30);
                ex.add(40);
                ex.add(40);
                ex.add(50);
                ex.remove(3); System.out.println(ex);
        }
}
```

Output:

```
[10, 20, 30, 40, 50]
```

- In this output, index order is not change
- But the values moved to forward

Index based add():

- It is used to add the value based on the index

Example Program:

```
public class ArList {
        public static void main(String[] args) { List<Integer> ex = new
                ArrayList<Integer>(); ex.add(10);
                ex.add(20);
                ex.add(30);
                ex.add(40);
                ex.add(40);
                ex.add(50);
                ex.add(2,100); System.out.println(ex);
        }
}
```

Output:

```
[10, 20, 100, 30, 40, 40, 50]
```

- In this o/p , if we insert one value based on index, after all the index value move to backward

set():

- set is a method, it is used to replace the value but index and value order will not change

Example Program:

```
public class ArList {
        public static void main(String[] args) { List<Integer> ex = new
                ArrayList<Integer>();
```

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```
                ex.add(10);
                ex.add(20);
                ex.add(30);
                ex.add(40);
                ex.add(40);
                ex.add(50);
                ex.set(2,100); System.out.println(ex);
        }
}
```

Output:

```
[10, 20, 100, 40, 40, 50]
```

contains():

- contains() is a method it is used to check the particular value or object

Example Program:

```
public class ArList {
        public static void main(String[] args) { List<Integer> ex = new
                ArrayList<Integer>(); ex.add(10);
                ex.add(20);
                ex.add(30);
                ex.add(40);
                ex.add(40);
                ex.add(50);
                boolean x = ex.contains(30);
                System.out.println(x); boolean y =
                ex.contains(100);
                System.out.println(y);
        }
}
```

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Output:

```
true
false
```

clear():

- clear is a method it is used to clear the all index value

Example Program:

```
public class ArList {
        public static void main(String[] args) { List<Integer> ex = new
                ArrayList<Integer>(); ex.add(10);
                ex.add(20);
                ex.add(30);
                ex.add(40);
                ex.add(40);
                ex.add(50);
                System.out.println(ex);// before clearing ex.clear();
                System.out.println(ex);// after clearing
        }
}
```

Output:

```
[10, 20, 30, 40, 40, 50]
[]
```

indexof():

- indexof() is a method, it is used to print the position of the list

Example Program:

```
public class ArList {
        public static void main(String[] args) { List<Integer> ex = new
                ArrayList<Integer>(); ex.add(10);
                ex.add(20);
                ex.add(30);
                ex.add(40);
                ex.add(40);
                ex.add(50);
                int x = ex.indexOf(30);
                System.out.println(x);
        }
}
```

Output:

```
2
```

Lastindexof():

- It is used to print the position from the last

Example Program:

```
public class ArList {
        public static void main(String[] args) { List<Integer> ex = new
                ArrayList<Integer>(); ex.add(10);
                ex.add(20);
                ex.add(30);
                ex.add(40);
                ex.add(40);
```

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```
                ex.add(50);
                int x = ex.lastIndexOf(40);
                System.out.println(x);
        }
}
```

Output:

```
4
```

addAll():

- addAll() is a method, it is used to copy from one list to another list

Example Program:

```
public class ArList {
        public static void main(String[] args) { List<Integer> ex = new
                ArrayList<Integer>(); List<Integer> ex1 = new
                ArrayList<Integer>(); ex.add(10);
                ex.add(20);
                ex.add(30);
                ex.add(40);
                ex.add(40);
                ex.add(50); System.out.println(ex);
                System.out.println(ex1);// before addAll
                ex1.addAll(ex);
                System.out.println(ex); System.out.println(ex1);//
                After addAll
        }
}
```

Output:

```
[10, 20, 30, 40, 40, 50]
[]
[10, 20, 30, 40, 40, 50]

[10, 20, 30, 40, 40, 50]
```

removeAll():

- removeAll() is a method , it is used to compare the both list and remove all the list1 values in list 2

(i.e)

list2=list2-list1

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Example Program:

```
public class ArList {
        public static void main(String[] args) { List<Integer> ex = new
                ArrayList<Integer>(); List<Integer> ex1 = new
                ArrayList<Integer>(); ex.add(10);
                ex.add(20);
                ex.add(30);
                ex.add(40);
                ex.add(50);
                ex1.addAll(ex);
                ex.add(100);
                ex.add(200);
                ex.add(300); ex1.add(1000);
                ex1.add(50); ex1.add(2000);
                ex1.add(3000);
                System.out.println(ex);
                System.out.println(ex1);
                ex1.removeAll(ex);
                System.out.println(ex1);
        }
}
```

Output:

```
[10, 20, 30, 40, 50, 100, 200, 300]

[10, 20, 30, 40, 50, 1000, 50, 2000, 3000]

[1000, 2000, 3000]
```

- If we go for removeAll method, here ex1.removeAll(ex), ex1 compare to ex and remove all ex values in the ex1.

retainAll():

- retainAll() is a method, it is used to compare both list and print the common values

Example Program:

```
public class ArList {
        public static void main(String[] args) { List<Integer> ex = new
                ArrayList<Integer>(); List<Integer> ex1 = new
                ArrayList<Integer>(); ex.add(10);
                ex.add(20);
                ex.add(30);
                ex.add(40);
                ex.add(50);
                ex1.addAll(ex);
                ex.add(100);
```

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```
                ex.add(200);
                ex.add(300); ex1.add(1000);
                ex1.add(2000); ex1.add(3000);
                System.out.println(ex);
                System.out.println(ex1);
                ex1.retainAll(ex);
                System.out.println(ex1);
        }
}
```

Output:

```
[10, 20, 30, 40, 50, 100, 200, 300]

[10, 20, 30, 40, 50, 1000, 2000, 3000]

[10, 20, 30, 40, 50]
```

LinkedList:

systax:

List<Integer> ex = new LinkedList<Integer>();

Example Program:

```
public class ArList {
        public static void main(String[] args) { List<Integer> ex = new
                LinkedList<Integer>(); ex.add(10);
                ex.add(20);
                ex.add(30);
                ex.add(40);
                ex.add(50); System.out.println(ex);
        }
}
```

Output:

```
[10, 20, 30, 40, 50]
```

- it will also print in insertion order.

Vector:

syntax:

List<Integer> ex = new Vector<Integer>();

Example Program:

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

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```
                    List<Integer> ex = new Vector<Integer>(); ex.add(10);
                    ex.add(20);
                    ex.add(30);
                    ex.add(40);
                    ex.add(50); System.out.println(ex);
          }
}
```

Output:

```
[10, 20, 30, 40, 50]
```

- It will also print the same insertion order.
- in all the arraylist methods, will also support in LinkedList and Vector

ArrayList: Worst case

- In ArrayList deletion and insertion is a worst one because if we delete/insert one index value after all the index move to forward/backward.
- It makes performance issue.

ArrayList: Best case

- In Arraylist retrieve/searching is a best one
- For ex we have 100 index is there, if we going to print 60th value, we can easily search

LinkedList: Best case

- Insertion and deletion is a best one because
- Here all values based on the seperate nodes. so, here we can easily delete/insert one value(i.e) if we delete one value, the next node will join to the previous one

LinkedList: Worst case

- Searching/retrieving is a worst
- For ex, if we have 100 nodes, we have to print 90th node value, it will pass to all the previous nodes and comes to first and then it will print.
- It's makes performance issue

Difference between ArrayList and Vector:

ArrayList:

- Asynchronize
- It is not a thread safe

Vector:

- Synchronize
- Thread safe

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Here,

Synchronize one by one(thread safe)
Asynchronize paralally(not thread safe)
Example: ticket booking,
If one ticket is having,10 people is booking at a same time, what happen , the one person only booked the ticket. because its a synchronize process. it allows one by one.

List<Integer> ex = new ArrayList<Integer>();
List<Integer> ex = new LinkedList<Integer>();
List<Integer> ex = new Vector<Integer>();
here we can write these in different way,
ArrayList<Integer> ex = new ArrayList<Integer>();
LinkedList<Integer> ex = new LinkedList<Integer>();
Vector<Integer> ex = new Vector<Integer>();

User defined Array list:

- Here we can use our own data type

Pojo class :(client old java object/model class/bean class)

- In class level if we use private , even we can access in another class.
- If we use private in class 2, right click in class 2 source generate getters and setters
- Using this methods we can access in another class
- This method is called pojo class

Class 1:

```
import java.util.ArrayList;
import java.util.List;

public class Employee extends New {

        public static void main(String[] args) {
        List<Employee> emp=new ArrayList<Employee>();
        Employee E1=new Employee();
        E1.setId(12);
        E1.setName("vengat");
        E1.setEmail("vengat123@gmail.com");
        Employee E2=new Employee();
        E2.setId(13);
```

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```
E2.setName("mohan");
E2.setEmail("mohan123@gmail.com");
Employee E3=new Employee();
E3.setId(14);
E3.setName("vel");
E3.setEmail("vel123@gmail.com");
emp.add(E1);
emp.add(E2);
emp.add(E3);
for (Employee x : emp) {
        System.out.println(x.getId());
        System.out.println(x.getName());
        System.out.println(x.getEmail());
}
}

}
```

Class 2:

```
public class New {
        private int id;
        private String name;
        private String email;
        public int getId() {
                return id;
        }
        public void setId(int id) {
                this.id = id;
        }
        public String getName() {
                return name;
        }
        public void setName(String name) {
                this.name = name;
        }
        public String getEmail() {
                return email;
        }
        public void setEmail(String email) {
                this.email = email;
        }
}
```

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Output:

```
12
vengat
vengat123@gmail.com
13
mohan
mohan123@gmail.com
14
vel
vel123@gmail.com
```

List:

In the list we have to know these points,

- It is all insertion order
- It allows duplicate value
- It is index based

Set:

- It ignore the duplicate value
- It is value based

Hashset:

- It will print random order

Example Program:

```
public class ArList {
        public static void main(String[] args) { Set<Integer> ex = new
                HashSet<Integer>(); ex.add(10);
                ex.add(20);
                ex.add(30);
                ex.add(40);
                ex.add(50);
                ex.add(50); System.out.println(ex);
        }
}
```

Output:

```
[50, 20, 40, 10, 30] // random order and ignore duplicate value
```

- It will allows one Null value and won't allow duplicate NULL

LinkedHashset:

- Insertion order

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Example Program:

```
public class ArList {
        public static void main(String[] args) {
                Set<Integer> ex = new LinkedHashSet<Integer>(); ex.add(10);
                ex.add(20);
                ex.add(30);
                ex.add(40);
                ex.add(50);
                ex.add(50); System.out.println(ex);
        }
}
```

Output:

```
[10, 20, 30, 40, 50] // insertion order
```

- It will also allows one Null value and won't allow duplicate NULL

TreeSet:

- Ascending order

Example Program:

```
public class ArList {
        public static void main(String[] args) { Set<Integer> ex = new
                TreeSet<Integer>(); ex.add(20);
                ex.add(10);
                ex.add(30);
                ex.add(50);
                ex.add(40);
                ex.add(50); System.out.println(ex);
        }
}
```

Output:

```
[10, 20, 30, 40, 50]
```

Example Program:

```
public class ArList {
        public static void main(String[] args) { Set<String> ex = new
                TreeSet<String>(); ex.add("Ramesh");
                ex.add("babu");
                ex.add("Vasu");
                ex.add("10000"); System.out.println(ex);
        }
}
```

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Output:

```
[10000, Ramesh, Vasu, babu]
```

Here,

- It will print ascending order
- Ascending order based on the ASCII value

(i.e)

- 1ASCII value is 49
- RASCII value is 82
- VASCII value is 86
- bASCII value is 98

[49,82,86,98][10000, Ramesh, Vasu, babu] this is a way to print ascending order.

- TreeSet won't allow single Null value

Set:

- It is not maintaining any order(i.e)
- Hashset random order
- LinkedHashsetinsertion order
- Treeset ascending order
- It is value based

remove():

- remove is a method , it is used to remove particular value

```
public class ArList {
        public static void main(String[] args) { Set<Integer> ex = new
                TreeSet<Integer>(); ex.add(10);
                ex.add(20);
                ex.add(30);
                ex.add(40);
                ex.add(50);
                ex.add(50); ex.remove(40);
                System.out.println(ex);
        }
}
```

Output:

```
[10, 20, 30, 50]
```

- Normal for loop is not work here because it is not index based, it is value based

Enhanced for loop:

```
public class ArList {
        public static void main(String[] args) { Set<Integer> ex = new
                TreeSet<Integer>(); ex.add(10);
                ex.add(20);
                ex.add(30);
                ex.add(40);
                ex.add(50);
                ex.add(50);
                for(int i:ex){ System.out.println(i);
}
}
}
```

Output:

```
10

20

30

40

50
```

- All wrapper class default value is Null as well as all class default value is Null

Null:

- Null is a undefined/unknown/unassigned value
- Null is won't create any memory
- So Treeset will give exception in compile time if we use Null

Difference between List and Set:
List:
- It is all insertion order
- It allows duplicate value
- It is index based

Set:

- It is not maintaining any order(i.e)

Hashset random order
LinkedHashset insertion order
Treeset ascending order

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- It is value based
- It ignores duplicate value

we can copy the values from List to set as well as set to list

Example Program:

```
public class ArList {
        public static void main(String[] args) { List<Integer> ex=new
                ArrayList(); Set<Integer> ex1 = new TreeSet<Integer>();
                ex.add(10);
                ex.add(20);
                ex.add(30);
                ex.add(40);
                ex.add(50);
                ex.add(50);
                ex.add(10); ex1.addAll(ex);
                System.out.println(ex);
                System.out.println(ex1);
        }}
```

Output:

```
[10, 20, 30, 40, 50, 50, 10]

[10, 20, 30, 40, 50]
```

Here, set ignore the duplicate value

- we can find the duplicate count using size() method

Example Program:

```
public class ArList {
        public static void main(String[] args) { List<Integer> ex = new
                ArrayList(); Set<Integer> ex1 = new TreeSet<Integer>();
                ex.add(10);
                ex.add(20);
                ex.add(30);
                ex.add(40);
                ex.add(50);
                ex.add(50);
                ex.add(10); ex1.addAll(ex);
                System.out.println(ex);
                System.out.println(ex1);
                int i = ex.size()           ex1.size();
                System.out.println(i);
        }
}
```

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Output:

```
[10, 20, 30, 40, 50, 50, 10]

[10, 20, 30, 40, 50]

2

Here 2 duplicate value is there
```

Map:

- It is key and value pair
- Here key+value is a one entry
- Key ignore the duplicate value and value allow the duplicate

Hashmap:

- It is a random order(based on key)

Example Program:

```
public class ArList {
	public static void main(String[] args) {
		Map<Integer, String> ex = new HashMap<Integer,String>(); ex.put(10, "Java");
		ex.put(20, "Java");
		ex.put(30, "sql");
		ex.put(40, ".net");
		ex.put(50, "sales");
		ex.put(50, "fire"); System.out.println(ex);
	}
}
```

Output:

```
{50=fire, 20=Java, 40=.net, 10=Java, 30=sql}
```

- If duplicate key is there, it takes the last one
- Key will allows the only one Null
- Value allow the duplicate null

Linked Hashmap:

- Insertion order(based on key)
- Key will allows the only one Null
- Value allow the duplicate null

```
Map<Integer, String> ex = new LinkedHashMap<Integer, String>()
```

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TreeMap:

- Ascending order(based on key)
- Key won't allow Null(even single null)
- Value allow the duplicate null

Map<Integer, String> ex = new TreeMap<Integer, String>()

Hashtable:

- Random order
- Both key and values are ignore the Null

Map<Integer, String> ex = new Hashtable<Integer, String>()

concurrent hashmap:

- Random order
- Both key and values are ignore the Null

Map<Integer, String> ex = new ConcurrentHashMap<Integer, String>()

Difference between HashMap and HashTable:

HashMap:

- Key allows single null
- Asynchronies(not thread safe)

Hashtable:

- Key and value won't allow null
- Synchronize(thread safe)

Some Methods:

get():

- It is a method, it is used to print the value based on key

Example Program:

```
public class ArList {
        public static void main(String[] args) {
                Map<Integer, String> ex = new HashMap<Integer,String>(); ex.put(10, "Java");
                ex.put(20, "Java");
                ex.put(30, "sql");
                ex.put(40, ".net");
                ex.put(50, "sales");
                ex.put(50, "fire"); String
                s=ex.get(40);
                System.out.println(s);
        }
}
```

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Output:

.net

keyset():

- It is a method, it is used to seperate the key

Example Program:

```
public class ArList {
        public static void main(String[] args) {
                Map<Integer, String> ex = new HashMap<Integer,String>(); ex.put(10, "Java");
                ex.put(20, "Java");
                ex.put(30, "sql");
                ex.put(40, ".net");
                ex.put(50, "sales");
                ex.put(50, "fire"); Set<Integer> s =
                ex.keySet(); System.out.println(s);
        }
}
```

Output:

```
[50, 20, 40, 10, 30]
```

Value():

- It is a method, it is used to seperate the value

Example Program:

```
public class ArList {
        public static void main(String[] args) {
                Map<Integer, String> ex = new HashMap<Integer,String>(); ex.put(10, "Java");
                ex.put(20, "Java");
                ex.put(30, "sql");
                ex.put(40, ".net");
                ex.put(50, "sales");
                ex.put(50, "fire"); Collection<String> s =
                ex.values(); System.out.println(s);
        }
}
```

Output:

```
[fire, Java, .net, Java, sql]
```

entryset():

- It is used to iterate the map

Example Program:

```
public class ArList {
          public static void main(String[] args) {
                    Map<Integer, String> ex = new HashMap<Integer,String>(); ex.put(10, "Java");
                    ex.put(20, "Java");
                    ex.put(30, "sql");
                    ex.put(40, ".net");
                    ex.put(50, "sales");
                    ex.put(50, "fire");
                    Set<Entry<Integer, String>> s = ex.entrySet();
                    for(Entry<Integer, String> x:s){
                              System.out.println(x);
                    }
          }
}
```

Output:

```
50=fire
20=Java
40=.net
10=Java
30=sql
```

- We can print key and value seperately

Example Program:

```
public class ArList {
          public static void main(String[] args) {
                    Map<Integer, String> ex = new HashMap<Integer,String>(); ex.put(10, "Java");
                    ex.put(20, "Java");
                    ex.put(30, "sql");
                    ex.put(40, ".net");
                    ex.put(50, "sales");
                    ex.put(50, "fire");
                    Set<Entry<Integer, String>> s = ex.entrySet();
                    for(Entry<Integer, String> x:s){
                              System.out.println(x.getKey());
                              System.out.println(x.getValue());
                    }
          }
}
```

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Output:

```
50

fire
20
Java
40
.net
10
Java
30
Sql
```

EXCEPTION:

- Exception is like a error, the program will terminated that line itself

Example Program:

```
public class Exception {
	public static void main(String[] args) {
		System.out.println("Start");
		System.out.println("1");
		System.out.println("2");
		System.out.println("3");
		System.out.println(10/0);
		System.out.println("4");
		System.out.println("5");
		System.out.println("End");
	}
}
```

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Output:

```
Start
1
2

3
```

```
Exception in thread "main" java.lang.ArithmeticException: / by zero
        at org.exception.Exception.main(Exception.java:9)
```

- This is exception, if we getting error in run time , the program will be terminated from that line
- Here, java:9 is 9th line only we getting exception

Throwable:

- Super class of exception throwable
- Exception
- Error

Exception:

1. Unchecked exception(Run time exception)

2. Checked exception(Compile time exception)

Unchecked exception:

1. ArithmaticException

2. NullPointException

3. InputMismatchException

4. ArrayIndexOutOfBoundExcepion

5. StringIndexOutOfBoundExcepion

6. IndexOutOfBoundExcepion

7. NumberFormatException

Checked exception:

1. IOException

2. SQLException

3. FileNotFoundException

4. ClassNotFoundException

1. ArithmaticException:

- ➢ If we are trying to give any number divided by zero, we get Arithmatic exception.

Example Program:

```
public class Exception {
        public static void main(String[] args) {
                System.out.println("Start");
```

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```
                    System.out.println("1"); System.out.println("2");
                    System.out.println("3"); System.out.println(10/0);
                    System.out.println("4"); System.out.println("5");
                    System.out.println("End");
          }
}
```

Output:

```
Start
1
2

3

Exception in thread "main" java.lang.ArithmeticException: / by zero
          at org.exception.Exception.main(Exception.java:9)
```

2. NullPointException:

- If we give Null in the string, it will throw the Null point exception. Because default value of string is Null.

Example Program:

```
public class Exception {
          public static void main(String[] args) { String s= null;
                    System.out.println(s.length());
          }
}
```

Output:

```
Exception in thread "main" java.lang.NullPointerException
          at org.exception.Exception.main(Exception.java:6)
```

3.InputMismatchException:

- If we getting input from the user, the user need to give integer input but the user trying to input string value , at this this we get input mismatch exception

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Example Program:

```
public class Exception {
        public static void main(String[] args) { Scanner sc=new
                Scanner(System.in); System.out.println("PLs enter
                value"); int i=sc.nextInt(); System.out.println(i);
        }
}
```

Output:

```
PLs enter value
hai
Exception in thread "main" java.util.InputMismatchException
        at java.util.Scanner.throwFor(Unknown Source)
        at java.util.Scanner.next(Unknown Source)

        at java.util.Scanner.nextInt(Unknown Source)
        at java.util.Scanner.nextInt(Unknown Source)
        at org.exception.Exception.main(Exception.java:9)
```

4. ArrayIndexOutOfBoundExcepion:

- In particular array, the index value is not available it will throw Array index of bound exception.

Example Program:

```
public class Exception {
        public static void main(String[] args) { int
                num[]=new int[4];
                System.out.println(num[5]);
        }

}
```

Output:

```
Exception in thread "main" java.lang.ArrayIndexOutOfBoundsException: 5
        at org.exception.Exception.main(Exception.java:8)
```

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5. StringIndexOutOfBoundExcepion:

- In particular String, the index value is not available it will throw String index Out of bound exception.

Example Program:

```
public class Exception {
        public static void main(String[] args) { String
                s="Java";
                char c = s.charAt(10);
                System.out.println(c);
        }
}
```

Output:

```
Exception in thread "main" java.lang.StringIndexOutOfBoundsException: String index out of range: 10
        at java.lang.String.charAt(Unknown Source)
        at org.exception.Exception.main(Exception.java:8)
```

6. IndexOutOfBoundExcepion:

- In a list, the index value is not available it will throw index out of bound exception.

Example Program:

```
public class Exception {
        public static void main(String[] args) { List<Integer> ex = new
                ArrayList<Integer>(); ex.add(10);
                ex.add(20);
                ex.add(30);
                ex.add(40); System.out.println(ex.get(3));
                System.out.println(ex.get(10));
        }
}
```

Output:

```
40

Exception in thread "main" java.lang.IndexOutOfBoundsException: Index: 10, Size: 4
        at java.util.ArrayList.rangeCheck(Unknown Source)
        at java.util.ArrayList.get(Unknown Source)

        at org.exception.Exception.main(Exception.java:16)
```

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7. NumberFormatException:

- if we give numbers in the string, we can convert the data type into integer. but if we give num and char combination in the string, we can't convert to integer.
- if we trying to convert, it will throw number format exception

Example Program:

```
public class Exception {
        public static void main(String[] args) { String s="1234";
                System.out.println(s+5);// string +5 int i =
                Integer.parseInt(s); System.out.println(i+5);//
                Integer +5
                        String s1="123Abc45"; int j =
                Integer.parseInt(s1);
                System.out.println(j+5);
        }
}
```

Output:

```
12345

1239

Exception in thread "main" java.lang.NumberFormatException: For input string: "123Abc45"
        at java.lang.NumberFormatException.forInputString(Unknown Source)
        at java.lang.Integer.parseInt(Unknown Source)
        at java.lang.Integer.parseInt(Unknown Source)
        at org.exception.Exception.main(Exception.java:13)
```

Exception Handling:

1. Try

2. Catch

3. Finally

4. Throw

5. Throws

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Errors:

1. Network error

2. JVM crack

3. out of memory

4. stack overflow

Try and catch:

- If we get exception, try will throw the exception and catch will catch the exception

Example Program:

```
public class Exception {
        public static void main(String[] args) {
                System.out.println("start");
                System.out.println("1");
                System.out.println("2");
                System.out.println("3");
                try {
                        System.out.println(10/0);}
                        catch(ArithmeticException e){
                                System.out.println("dont/by zero");
                        }
                System.out.println("4"); System.out.println("5");
                System.out.println("end");
        }
}
```

Output:

```
start
1
2

3

dont/by zero
4
5

end
```

- Here we can enter the same exception or super class of the exception

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(i.e)

- Super class of the all unexpected exception is run time exception/exception
- Super class of exception□ throwable
- So we can use runtime exception/exception/throwable instead of the particular exception

Example Program:

we can use throwable

```
try {
        System.out.println(10/0);}
        catch(Throwable e){
        System.out.println("dont/by zero");
   }
```

instead of

```
try {

                              System.out.println(10/0);}
                              catch(ArithmeticException e){
                                        System.out.println("dont/by zero");

                              }
```

Finally:

- finally will execute always whether the exception through or not
- We can give the combination like try□catch□finally, we can't reverse/interchange
- If we give try□finally, again it will show the exception

Example Program:

```
public class Exception {
        public static void main(String[] args) {
                System.out.println("start");
                System.out.println("1");
                System.out.println("2");
                System.out.println("3");
                try {
                        System.out.println(10/0);}
                        catch(ArithmeticException e){
                                System.out.println("dont/by zero");
                        }finally{
                                System.out.println("final");
                        }
                System.out.println("4"); System.out.println("5");
                System.out.println("end");}}
```

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Output:

```
start
1
2

3

dont/by zero
final
4

5

end
```

- Even if exception not through, finally will print

Example program:

```
public class Exception {
        public static void main(String[] args) {
                System.out.println("start");
                System.out.println("1");
                System.out.println("2");
                System.out.println("3");
                try {
                        System.out.println(10/0);}
                        catch(NullPointerException e){
                                System.out.println("dont/by zero");
                        }finally{
                                System.out.println("final");
                        }
                System.out.println("4"); System.out.println("5");
                System.out.println("end");
        }
}
```

Output:

```
start
1
2

3

final
```

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```
Exception in thread "main" java.lang.ArithmeticException: / by zero
	at org.exception.Exception.main(Exception.java:11)
```

- In between try ,catch and finally, we won't write any logics
- In one try block we can use n-number of catch blocks but we can't repeat the same exception
- In one try block we can handle only one exception

Example Program:

```
public class Exception {
	public static void main(String[] args) {
		System.out.println("start");
		System.out.println("1");
		System.out.println("2");
		System.out.println("3");
		try {
			System.out.println(10/0);}
			catch(NullPointerException e){
				System.out.println("null point");
			}
		catch(ArithmeticException e) {
			System.out.println("dont/by zero");
		}
		finally{
				System.out.println("final");
			}
		System.out.println("4"); System.out.println("5");
		System.out.println("end");
	}
}
```

Output:

```
start
1
2

3

dont/by zero
final
4

5

end
```

- In a try block, one catch we can use same excepion and another catch we use throwable exception

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- At this time, it will through the first one if it is match, will print. if it is not correct will throw the second
- throwable is the super class of all exception
- In more than one catch block, we can use like sub class and super class combination. But we can't use reverse

sub class ArithmaticException, NullPointException,.....

super class Throwable/Exception

- if we give Super class and sub class combination, it will give compilation error

Example Program:

```
public class Exception {
        public static void main(String[] args) {
                System.out.println("start");
                System.out.println("1");
                System.out.println("2");
                System.out.println("3");
                try {
                        System.out.println(10/0);}
                        catch(NullPointerException e){
                                System.out.println("null point");
                        }
                catch(Throwable e) {
                        System.out.println("dont/by zero");
                }
                finally{
                                System.out.println("final");
                        }
                System.out.println("4"); System.out.println("5");
                System.out.println("end");
        }
}
```

Output:

```
start
1
2

3

dont/by zero
final
4
```

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5

end

Example Program:

```
try {

          System.out.println(10/0);}
          catch(Throwable e) {
          System.out.println("dont/by zero");
                    }

                    catch(NullPointerException e){
                    System.out.println("null point");
                    }

                    finally{
                    System.out.println("final");
                    }
```

- If we give like above, will get compile time exception/error because we can't reverse
- In one try block, we can write only one finally block

Inner try:

- If we use inner try, it will print inner catch, inner finally and outer finally.
- But one try block handle one exception only, even if we use inner try also
- If main try have no exception, it will through inner try. in that inner try if catch exception is wrong, it will goes and print outer finally

Example Program:

```
public class Exception {
          public static void main(String[] args) {
                    System.out.println("start");
                    System.out.println("1");
                    System.out.println("2");
                    System.out.println("3");
                    try {
                              System.out.println(10/0);
                              try {
                                        String s=null; System.out.println(s.charAt(0));
                              }catch(NullPointerException e){
                                        System.out.println("inner catch");
                              }finally{
                                        System.out.println("inner finally");
                              }
```

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```
                }
            catch(ArithmeticException e) {
                System.out.println("dont/by zero");
            }
            finally{
                    System.out.println("outer finaly");
                }
            System.out.println("4"); System.out.println("5");
            System.out.println("end");
        }
}
```

Output:

```
start
1
2

3

dont/by zero
outer finaly
4
5

end
```

Example Program:

```
public class Exception {
        public static void main(String[] args) {
            System.out.println("start");
            System.out.println("1");
            System.out.println("2");
            System.out.println("3");
            try {
                System.out.println(10/2);
                try {
                    String s=null; System.out.println(s.charAt(0));
                }catch(NullPointerException e){
                    System.out.println("inner catch");
                }finally{
                    System.out.println("inner finally");
                }
                }
                catch(ArithmeticException e) {
                System.out.println("dont/by zero");
                }
```

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```
                    finally{
                                    System.out.println("outer finaly");
                        }
                System.out.println("4"); System.out.println("5");
                System.out.println("end");
        }
}
```

Output:

```
start
1
2
3
5
inner catch
inner finally
outer finaly
4
5
end
```

Throw and Throws:

Throw:

- Throw is a keyword, we can through any exception inside the method
- At a time we can throw only one exception

Throws:

- Throws is a keyword, it is used to declare the exception(in method level)
- At a time we can declare more than one exception

Example Program:

```
public class Exception {
        public static void main(String[] args) throws InterruptedException, ArithmeticException,IOException{
                info();
        }
        private static void info() throws IOException {
                System.out.println("hello");
                throw new IOException();
        }
```

- If we try to throws the compile time exception in any method, we must handle it in compile time

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Example Program:

```
public class Exception {
	public static void main(String[] args) throws InterruptedException,
ArithmeticException,IOException{
		info();
	}
	private static void info() throws IOException {
		System.out.println("hello");
		throw new IOException();
	}
```

Constructor:

- Class name and constructor name must be same.
- It doesn’t have any return type.
- We don’t want to call constructor which is creating object itself.
- It will automatically invoke the default constructor.
- It will support in method overloading but won’t support in method overriding

Example :

```
public class Const1 {
	public Const1() {
		System.out.println("i am in constructor");
	}

	public Const1(int a) {
		System.out.println("1 argument int");
	}

	private void Const1(int i) {
		System.out.println(i);
	}

	public static void main(String[] args) {
		Const1 c = new Const1();
		Const1 c1 = new Const1(10);

		c.Const1(10);

	}
}
```

Here,

public Const1() Non- Argument based constructor

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public Const1(int a) Argument based constructor

- In argument base constructor we have to pass the argument in object
  Const1 c1=new Const1(10);
- In non-argument base constructor we don't want to pass any argument
  Const1 c=new Const1();

<u>Output</u>:

```
i am in constructor
1 argument int
10
```

<u>This</u>:

- It is a keyword.
- If we use 'this' argument , we can pass without object
- This argument we must use only in first statement

<u>Example</u> 1:

```
public class Const1 {
public Const1() {
        this(10);
        System.out.println("i am in constructor");

}
public Const1(int a){
        System.out.println("1 argument int");
}

public static void main(String[] args) {

                Const1 c=new Const1();

        }
}
```

s**<u>Output</u>:**

```
1 argument int
i am in constructor
```

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EXAMPLE 2:

```
public class sample {
  public sample(){
        this(10);
        System.out.println("i am in constructor");

}
public sample(int i) {
        this(23.23f);
        System.out.println("am integer constructor");
}
public sample(float f) {
        System.out.println("am float constructor");
}


public static void main(String[] args) {

                sample s=new sample();
        }
}
```

Output:

```
am float constructor
am integer constructor
i am in constructor
```

- If we trying to declare any variable without value in class level. It will print the default value

```
public class sample {
        int id;
```

- Inside the method, we must initialize the local variable otherwise we get compile time error

```
public class sample {
        int id=10;
        private void num() {
                int id=100;
                System.out.println(id);

        }
```

Output: 100

- If same variable name in local level and class level, it will give first preference is local level

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This():

Class level:

- It will refer the class level variable value

Example:

```
public class sample {
        int id=100;
        private void num() {
                System.out.println(id);

        }
        public static void main(String[] args) {
                sample s=new sample();
                s.num();
        }}
```

Output:

```
100
```

Method level access of this():

Without this():

```
public class Const1 {
   int id=100;
private void num() {
    int id=10;
     System.out.println(id);
}
public static void main(String[] args) {
Const1 s=new Const1();
s.num();
}
}
```

Output:
10

With this():

```
public class sample {
int id=100;
private void num() {
int id=10;
System.out.println(this.id);
}
public static void main(String[] args) {
sample s=new sample();
s.num();
}

}
```

Output:

```
100
```

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Super :

- ➢ It will refer the parent class level variable value

Class 1:

```
public class sample extends Const1 {
int id=100;
private void num() {
int id=10;
System.out.println(super.id);
}
public static void main(String[] args) {
sample s=new sample();
s.num();
}
    }
```

Class 2:

```
public class Const1 {
int id =30;
}
```

Output:

```
30
```

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Final:

- ➢ It's a keyword.
- ➢ If we use final before the variable, we can't overwrite.
- ➢ If we trying to overwrite it show compile time error.
- ➢ As well as if we use final before the method/class, we can't extend.
- ➢ We can use final in three ways,
  - ▪ Variable level
  - ▪ Method level
  - ▪ Class level

Variable level using final:

- We can overwrite the value of variable on variable declaration.
- If we final, the value of variable can't be overwrite.

Example:

Without using final:

```
public class sample {

public static void main(String[] args) {

            int a=10;
   a=20;
           System.out.println(a);
           }
}
```

Output:

20

With using final

```
public class sample {

public static void main(String[] args) {

            final int a=10;
   a=20;
           System.out.println(a);
           }
}
```

output:

- We get compile time error.
- if we use final , we can't overwrite

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Method level using final():

Class 1:

```
public class sample  {
         public final void example() {

                  }
}
```

Class 2:

```
public class Const1 extends sample  {
         public void example(){ // we get compile time error here, because if we use final in method level(parent class), we can't use again

         }
}
```

- We get compile time error, because we using final in method level
- We can't over ride while using final

Class level :

- If we are using final in class level , we can't extends to anywhere

```
public final class sample  {
}
```

JAVA INTERVIEW QUESTIONS:

1. *What is the difference between JDK, JRE and JVM?*

- **JDK**: Java Development Kit
    - JDK is a software, it contains JRE and JVM
    - If we run any applications, JDK have to installed
- **JRE**: Java Runtime Environment
    - It is a predefined .class files(i.e.) library files
- **JVM**: Java Virtual Machine
    - It is mainly used to allocate the memory and compiling

2. *What is meant by class, method and objects?*

- **CLASS:**
    - Class is nothing but collection of methods or collection of objects.
- **METHOD:**
    - A set of action to be performed
- **OBJECT:**
    - Run time memory allocation
    - Using object we can call the any methods

3. *What is meant by Encapsulation?*

- Structure of creating folder is called encapsulation

4. *What is the use of inheritance and its types?*

- Inheritance is used to reduce the object memory

- We can access one class property into another class using 'extend' keyword is called inheritance
- Reusable purpose
- It has 5 types
  1. Single Inheritance
  2. Multilevel Inheritance
  3. Multiple Inheritance
  4. Hybrid Inheritance
  5. Hierarchical Inheritance

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1. **Single Inheritance:**
   - ➢ One parent class is directly support into one child class using extend keyword
2. **Multilevel Inheritance:**
   - ➢ More than one parent class support into one child class using extends keyword
3. **Multiple Inheritance:**
   - ➢ More than one parent class parallely support into one child class but it won't support in java because
     - Priority problem
     - Compilation error/syntax error

   (i.e.) if both parent class having same method name it gets priority problem so it doesn't work in java

   - ➢ but multiple inheritance support in java using interface
4. **Hybrid inheritance:**
   - ➢ It's a combination of single and multiple inheritance
5. **Hierarchical Inheritance:**
   - ➢ One parent class directly support into more than one child class

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5. *What is meant by java? why we go for java??*

1. Java is a simple programing language
2. Writing, compilation and debugging a program is very easy in java
3. It helps to create reusable code
4. Java has more features,
   1. platform independent
   2. open source
   3. multithreading
   4. more secure
   5. portable

1. **Platform independent:**
   - ➢ During the compilation the java program converts into byte code
   - ➢ Using byte code we can run the application to any platform such as windows, mac, Linux.Etc.
2. **Open source:**
   - ➢ A program in which source code is available to the general public for use and/or modification from its original design at free of cost is called open source
3. **Multithreading:**
   - ➢ Java supports multithreading
   - ➢ It enables a program to perform several task simultaneously
4. **More secure:**
   - ➢ It provides the virtual firewall between the application and the computer
   - ➢ So it's doesn't grant unauthorized access

5. **Portable:**

    - "Write once Run anywhere"
    - Java code written in one machine can run on another machine

6. *What is meant by garbage collection??*

- Automatic De- allocation of objects is called garbage collection.

7. *What is the difference between while and do while?*

- While:
    - Entry level condition checking
- Do. While:
    - Exit level condition checking
    - Even if condition fails, it print one time

8. *What is the difference between break and continue??*

- Break:
    - It exit from the current loop
- Continue:
    - It will skip the particular iteration

9. *What is the use of polymorphism??*

- Poly many
- Morphism forms
- Taking more than one forms is called polymorphism
- One task is completed by many ways

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10. *What is the difference between method overloading and method over hiding?*

Method overloading :(static binding/compile time polymorphism)

- In a same class method name is same and the argument is different is called method overloading

- The argument is depends on

  - data types
  - data types count
  - data type order

Method overriding :(dynamic binding/run time polymorphism)

- In a different class , the method name should be same and argument name should be same is called overriding

11. *What is meant by abstraction??*

- Hiding the implementation part is called abstraction

- It has 2 types,

  1. Partially abstraction(abstract class)
  2. Fully abstraction(interface)

12. *What is the difference between abstract class and interface??*

Abstract class:

- It is partially abstraction
- It support both abstract method and non-abstract method
- Its using "extends" keyword
- Here "public abstract" have to mention
- We can use whatever access specifier we want

Interface:
- It is fully abstraction
- It support only abstract method
- It’s using "implement" keyword
- "Public Abstract" is default. no need to mention
- Here only use public(access specifier)

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13. *What is the super class of java??*

- Object

14. *What is default package of java??*

- java.lang

15. *Define heap memory???*

- The objects are stored in the heap memory

16. *What is meant by wrapper class and uses??*

- Classes of data types is called wrapper class
- It is used to convert any data types into objects

17. *What is meant by string????*

- Collections of character or word enclosed with double quotes is called string

18. *What is the difference between literal and non-literal string???*

Literal String:

- Its stored inside the heap memory(string pool or string constant).
- It share the memory if same value (duplicate value)

Non literal string:

- It’s stored in the heap memory.
- its create a new memory every time even if its duplicate value(same value)

19. *Define oops concept,*

- Object Oriented Programing Structure
- OOPS is a method of implementation in which programs are organized as collection of objects, class and methods

- Oops principles are
    1. Class
    2. Method
    3. Object

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4. Abstraction
5. Encapsulation
6. Inheritance
7. Polymorphism

20. What is meant by interface??

Interface:

- It will support only abstract method, won't support non abstract method
- In interface "public abstract" is default. we no need to mention
- It using implements keywords
- It is fully abstraction

21. Define abstraction:

ABSTRACTION:

- Hiding the implementation part is called abstraction
- It has 2 types,
    1. Partially abstraction(abstract class)
    2. Fully abstraction(interface)

1. Partially Abstraction(Abstract class):

22. variable??

- Long-8

23. What is the size of short variable??

- Short-2

24. What is the size of int variable??

- Int-4

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25. Define access specifier & its types??

ACCESS SPECIFIER:

1. Public
2. Protected
3. Default
4. Private

1. **Public:**
   - ➢ It is global level access(same package + different package)
2. **Private:**
   - ➢ It is a class level access
3. **Default :**
   - ➢ Package level access
   - ➢ Without access specifier within the package we can access

EX,

- ➢ public static public acces specifier(need to mention public)
- ➢ private static private access specifier(need to mention)
- ➢ static default access secifier(need not)

4. **Protected:**
   - ➢ Inside package + outside Package(Extends)
   - ➢ we can access inside package and outside package using extend keyword

26. What is meant by polymprphism???

POLYMORPHISM:

- Poly-many
- Morphism-forms
- Taking more than one forms is called polymorphism.
- One task is completed by many ways

- It has 2 types,

1. Method overloading (static binding/compile time polymorphism)
2. Method overriding (dynamic binding/run time polymorphism)

1. **Method overloading:**
   - ➢ In a same class method name is same and the argument is different is called method overloading

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- The argument is depends on
    - Data types
    - Data types count
    - Data type order

2. **Method overriding:**

- In a different class , the method name should be same and argument name should be same is called overriding

27. What is array??

- Collection of similar data
- The values are stored based on index
- The index will start from 0 to n-1

28. What is difference between hashmap and hashtable?

HashMap:

- Key allows single null
- Asynchronies(not thread safe)

Hashtable:

- Key and value won't allow null
- Synchronize(thread safe)

29. What is the difference between linked list and array list?

ArrayList: Worst case

- In ArrayList deletion and insertion is a worst one because if we delete/insert one index value after the entire index move to forward/backward.
- It makes performance issue.

ArrayList: Best case

- In arraylist retrieve/searching is a best one
- For ex we have 100 index is there, if we going to print 60th value, we can easily search

LinkedList: Best case

- Insertion and deletion is a best one because

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- Here all values based on the separate nodes. So, here we can easily delete/insert one value(i.e.) if we delete one value, the next node will join to the previous one

LinkedList: Worst case

- Searching/retrieving is a worst
- For ex, if we have 100 nodes, we have to print 90th node value, it's communicate all the previous nodes and comes to first and then it will print.
- It's makes performance issue

30. Can we able to write any logic in interface?

- No. In class only we can write

31. What is the difference between mutable and immutable string?

Immutable string:

- We can store more duplicate value in same memory
- We can't change the value in memory
- In concord nation, we have to create new memory

Mutable string:

- We can't store duplicate value in same memory
- We can change the value in memory
- In concord nation, its takes same memory

32. What is the difference between thread safe and non-thread safe?

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Thread safe:

- synchronize we can access one by one

- ex. ticket booking

Non-thread safe:

- Asynchronies parallaly we can access

33. List will allow duplicate value?

- Yes. it will allow

34. What are all coding standards available in java? Where we use it?

Coding standards:

a. Pascal notation
b. Camel notation

- Pascal notation: Each word of first letter should be in capital
- Camel notation : First word should be small after every word of the first letter should be capital
- Pascal notation:
    1. Project name
    2. Class name

- Camel notation :
    1. Method name
    2. Variable name

35. What is NullPointException?

- If we give Null in the string, it will throw the Null point exception. Because default value of string is Null.

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36. What is meant by List and set?

List:

- It is all insertion order
- It allows duplicate value
- It is index based

Set:

- It is not maintaining any order(i.e.)

    - Hashset Random order
    - LinkedHashset Insertion order
    - Treeset Ascending order

- It is value based

- it will not allow duplicate value

37. How will you iterate map?

- Using entrySet() method we can iterate the map

38. What is the difference between ArrayList and Vector ?

ArrayList:

- Asynchronies
- It is not a thread safe

Vector:

- Synchronize
- Thread safe

Here,

Synchronize One by one (thread safe)
Asynchronies Paralally(not thread safe)

Ex, ticket booking,

39. Define map?

- It is key and value pair
- Here key + value is a one entry
- Key ignore the duplicate value and value allow the duplicate

- It has 5 types
  - Hashmap(c)
  - Linked hashmap(c)
  - Treemap(c)
  - Hashtable(c)
  - Concurrent hashmap(C)

40. Define generics?

- It will support particular datatypes or object only
- It is a one of the features of JDK 1.5
- In the generics, we can mention only wrapper class
- <> it is a generic symbol. it is used to define the particular data type
- If we need integer data type,
- Syntax:

```
List<Integer> ex=new ArrayList<Integer>();
```

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41. What is the difference between throw and throws?

Throw:

- Throw is a keyword, we can through any exception inside the method
- At a time we can throw only one exception

Throws:

- Throws is a keyword, it is used to declare the exception(in method level)
- At a time we can declare more than one exception

42. What is the difference between hashset,linked hashset and treeset

Hashset:

- ➢ It will print random order
- ➢ It will allow single Null value but won't allow duplicate Null

Linked hashset:

- ➢ It will print insertion order
- ➢ It will allow single Null value but won't allow duplicate Null

Treeset:

- ➢ It will print ascending order
- ➢ Treeset won't allow Null value

43. How many null values allow in treeset?

- ➢ Treeset won't allow Null value

44. What is the super class of all exceptions?

- ➢ Throwable

45. What is the difference between equal and double equals?

- = It is used to assigning the value
- == It is used for condition checking

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46. What is the difference between retain all and remove all?

removeAll():

- removeAll() is a method , it is used to compare the both list and remove all the list1 values in list 2

(i.e)

list2 = list2-list1 or a = a-b

retainAll():

- retainAll() is a method, it is used to compare both list and print the common values

47. How to create object for interface and abstract class?

- We won’t create object for interface and abstract class.

48. What are the advantages and dis advantages of arrays?

Advantage of array:

- In a single variable we can store multiple values

Disadvantage of arrays:

- It support only similar data types
- It is a fixed size
- Memory wastage is high
- To overcome these we go for collections

49. What is the difference between normal class and abstract class

Abstract class:

- It will support abstract method and non-abstract method
- We won’t create object for abstract class
- We won’t write any business logic in abstract method

Class:

- It support only in non-abstract method
- We can create object for class

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50. *Difference between final and finally?*

Final	Finally
1. A final class variable whose value cannot be changed. **2.** A final is declared as class level, they cannot be inherited. **3.** If final is declared as method level, they cannot be override.	**1.** It's a block of statement that definitely executes after the try catch block. **2.** If try block fails means, the final block will executes once.

51. *How to access one class property into another class?*

2 ways we can access

1. by using extends keyword(inheritance)
2. By creating object

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CORE JAVA PROGRAMS

1. Sum of odd number(1 to 100):

```
 public class SumofOddNum {
        public static void main(String[] args) {
                int count = 0;
                for (int i = 1; i <= 100; i++) {
                        if (i % 2 == 1) {
                                count = count + i;
                        }
                }
                System.out.println(count);
        }
}
```

Output:

```
2500
```

2. Sum of even number(1 to 100):

```
public class SumofEvenNum {
        public static void main(String[] args) {
                int count = 0;
                for (int i = 1; i <= 100; i++) {
                        if (i % 2 == 0) {
                                count = count + i;

                        }
                }
                System.out.println(count);
        }
}
```

Output:

```
2550
```

3. Count of odd number(1 to 100):

```
public class CountOfOddNumber {
        public static void main(String[] args) {
                int count = 0;
                for (int i = 1; i <= 100; i++) {
```

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```
                    if (i % 2 == 1) {
                         count = count + 1;
                    }
               }
               System.out.println(count);
          }
     }
```

Output:

```
50
```

4. Count of even number(1 to 100):

```
public class CountOfEvenNumbers {
          public static void main(String[] args) {
                    int count = 0;
                    for (int i = 1; i <= 100; i++) {
                              if (i % 2 == 0) {
                                        count = count + 1;

                              }
                    }
                         System.out.println(count);
          }

}
```

Output:

```
50
```

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5. Factorial number:

```
public class FactorialNumbers {

          public static void main(String[] args) {
                    int count = 1;
                    for (int i = 1; i <= 8; i++) { count =
                              count * i;
                    }
                    System.out.println(count);
          }
}
```

Output:

```
40320
```

6. Fibonacci series:

```
public class Fibanacci {
        public static void main(String[] args) { int a = 0, b =
                1; System.out.println(a);
                System.out.println(b);
                for (int i = 2; i <= 10; i++) { int c = a + b;
                        System.out.println(c);
                        a = b; b
                        = c;
                }}}
```

Output:

```
0

1

1

2

3

5

8

13

21

34
```

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7. To find even/odd number:

```
public class EvenoddNumber {
        public static void main(String[] args) { Scanner e = new
                Scanner(System.in); System.out.println("Enter a
                Number"); int n = e.nextInt();
                if (n % 2 == 0) {
                        System.out.println("Even number");
                } else {
                        System.out.println("Odd number");
                }
        }

}
```

Output:

```
Enter a Number
121
Odd number
```

8. Swapping numbers using third variable:

```
public class SwappingNumbersWithVar {

        public static void main(String[] args) {
                int a, b, c;
                Scanner sw = new Scanner(System.in);
                System.out.println("The numbers are"); a =
                sw.nextInt();
                b = sw.nextInt(); c = a;
                a = b; b
                = c;
                System.out.println("swapping numbers are");
                System.out.println(a); System.out.println(b);

        }

}
```

Output:

```
The numbers are
25
45

swapping numbers are
45
25
```

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9. Swapping numbers without using third variable:

```
public class SwappingNumWithoutVar {
        public static void main(String[] args) {
                int a, b;
                Scanner sw = new Scanner(System.in);
```

```
                    System.out.println("The numbers are"); a =
                    sw.nextInt();
                    b = sw.nextInt(); a = a
                    + b;
                    b = a - b;
                    a = a - b;
                    System.out.println("swapping numbers are");
                    System.out.println(a); System.out.println(b);

          }

}
```

Output:

```
The numbers are
20
40

Swapping numbers are
40
20
```

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10. Reverse the number:

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

                    Scanner rn = new Scanner(System.in);
                    System.out.println("Enter a number"); int n =
                    rn.nextInt();
                    int a, i = 0, j = 0;

                    a = n;
                    while (a > 0) {
                              i = a % 10;
                              j = (j * 10) + i; a = a /
                              10;
                    }
                    System.out.println("Reverse number is=" + j);

          }

}
```

Output:

```
Enter a number
12345
Reverse number is=54321
```

11. To check palindrome number:

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

                int n, a, i = 0, j = 0;
                Scanner an = new Scanner(System.in);
                System.out.println("Enter a number"); n =
                an.nextInt();
                a = n;
                while (a > 0) {
                        i = a % 10;
                        j = (j * 10) + i; a = a /
                        10;

                }
                if (n == j) {
                        System.out.println("palindrome");
                } else {
                        System.out.println("Not palindrome Number");
                }
        }
}
```

Output:

```
Enter a number
141
palindrome
```

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12. To print palindrome number(1 to 100):

```
public class PolyndromeNumbers {
        public static void main(String[] args) {
                for (int n = 1; n <= 100; n++) {
                        int a, i = 0, j = 0; a = n;
                        while (a > 0) {
                                i = a % 10;
                        j = (j * 10) + i; a = a /
                        10;

                    }
                    if (n == j) {
                        System.out.println(n);

                    }

                }
            }
        }
```

Output:

```
1

2

3

4

5

6

7

8

9

11

22

33

44

55

66

77

88

99
```

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13.To count palindrome number(1 to 1000):

```
public class palindromeNum{
        public static void main(String[] args) {
                int c = 0;
                for (int n = 1; n <= 1000; n++) {
                        int a, i = 0, j = 0; a = n;
                        while (a > 0) {
                                i = a % 10;
                                j = (j * 10) + i; a = a /
                                10;

                        }
                        if (n == j) {
                                c++;

                        }

                }
                System.out.println(c);
        }

}
```

Output:

```
108
```

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14.To check Armstrong number:

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

                int n, a, i = 0, j = 0;
                Scanner an = new Scanner(System.in);
                System.out.println("Enter a number"); n =
                an.nextInt();
                a = n;

                while (a > 0) {
                        i = a % 10;
                        j = j + (i * i * i); a = a / 10;

                }
                if (n == j) {
                    System.out.println("Armstrong number");

                } else {
                    System.out.println("Not armstrong Number");
                }

        }
}
```

Output:

```
Enter a number
153
Armstrong number
```

15. To print Armstrong number(1 to 1000):

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

                for (int n = 1; n <= 1000; n++) {
                        int a, i = 0, j = 0; a = n;
                        while (a > 0) {
                                i = a % 10;
                                j = j + (i * i * i); a = a / 10;

                        }
                        if (n == j) {
                                System.out.println(n);

                        }

                }
        }}
```

Output:

```
1

153

370

371

407
```

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16. To count Armstrong number(1 to 1000):

```
public class ArmsrongNumberCount {
        public static void main(String[] args) {
                int c = 0;

                for (int n = 1; n <= 1000; n++) {
                        int a, i = 0, j = 0; a = n;
                        while (a > 0) {
                                i = a % 10;
                                j = j + (i * i * i); a = a / 10;

                        }
                        if (n == j) {

                                c++;
                        }

                }
                System.out.println(c);

        }

}
```

Output:

```
5
```

17. Triangle program:

```
public class Triangle {
        public static void main(String[] args) {
                for (int i = 1; i <= 5; i++) {
                        for (int j = 1; j <= i; j++) {
                                System.out.print("*");
                        }
                        System.out.println();
                }
        }

}
```

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Output:

```
*

**

***

****

*****
```

18. Reverse triangle:

```
public class ReverseTriangle {
        public static void main(String[] args) {
                for (int i = 1; i <= 5; i++) {
                        for (int j = 5; j >= i; j--) {
                                System.out.print("*");
                        }
                        System.out.println();
                }
        }

}
```

Output:

```
*****

****

***

**

*
```

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19. To check prime number:

```
public class PrimeNumberChecking {
        public static void main(String[] args) {
                int n;
                Scanner input = new Scanner(System.in);
                System.out.println("enter the number"); n =
                input.nextInt();
                int count = 0;
                for (int i = 2; i <= n / 2; i++) {
                    if (n % i == 0) {
                        count = 1;
                    }
                }
                if (count == 0) {
                    System.out.println("prime");
                } else {
                    System.out.println("not prime");
                }
        }
}
```

Output:

```
enter the number
17
prime



enter the number
21
not prime
```

20. To print prime number(1 to 10):

```
public class PrimeNumber {
        public static void main(String[] args) {
                int count;
                for (int i = 1; i <= 10; i++) { count = 0;
                        for (int j = 2; j <= i / 2; j++) {
                                if (i % j == 0) {
                                        count++;
                                }
                        }
                        if (count == 0) {

                                    System.out.println(i);

                        }
                }

        }

}
```

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Output:

```
1

2

3

5

7
```

21. To count prime number(1 to 100):

```
public class PrimeNumberCount {
        public static void main(String[] args) {
                int count, c = 0;
                for (int i = 1; i <= 100; i++) { count = 0;
                        for (int j = 2; j <= i / 2; j++) {
                                if (i % j == 0) {
                                        count++;
                                }
                        }
                         if (count == 0) { c++;

                        }
                }
                System.out.println(c);

        }

}
```

Output:

```
26
```

22. Student grade:

```
public class StudentsGrade {
        public static void main(String[] args) { Scanner sm =
                new Scanner(System.in);
                System.out.println("enter value:"); int n =
                sm.nextInt();
                if (100 >= n && n >= 90) { System.out.println("S
                        grade");
                } else if (89 >= n && n >= 80) {
                        System.out.println("A grade");

                } else if (79 >= n && n >= 70) {
```

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```
				System.out.println("B grade");

			} else if (69 >= n && n >= 60) {
				System.out.println("C grade");
			}

			else if (59 >= n) {
				System.out.println("Fail");
			}

		}

}
```

Output:

```
enter value:

67

C grade
enter value:
55

Fail
```

23. Multiplication table:

```
public class MultiflicationTable {
		public static void main(String[] args) {
			int n, j;
			Scanner mt = new Scanner(System.in);
			System.out.println("Enter the Table"); n =
			mt.nextInt(); System.out.println("table upto");
			j = mt.nextInt();
			for (int i = 1; i <= j; i++) {
				int c = n * i;
				System.out.println(i + "*" + n + "=" + c);
			}
		}

}
```

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Output:

```
Enter the Table
6
table upto
10
1*6=6

2*6=12

3*6=18

4*6=24

5*6=30

6*6=36

7*6=42

8*6=48

9*6=54

10*6=60
```

24. Biggest of 4 numbers:

```
public class BiggestNumberUsingif {
        public static void main(String[] args) {
                int a, b, c, d;
                Scanner bn = new Scanner(System.in);
                System.out.println("The four numbers are"); a =
                bn.nextInt();
                b = bn.nextInt(); c =
                bn.nextInt();     d     =
                bn.nextInt();
                if (a > b && a > c && a > d) {
                        System.out.println("the biggest number is=" + a);
                } else if (b > a && b > c && b > d) { System.out.println("the biggest
                        number is=" + b);

                } else if (c > a && c > b && c > d) { System.out.println("the biggest
                        number is=" + c);

                } else {
                        System.out.println("the biggest number is=" + d);
```

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```
                    }

          }

}
```

Output:

```
The four numbers are
23
45

56

22

The biggest number is=56
```

25. Find vowels and non-vowels count

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

                    String a = "welcome";
                    int vowels = 0;
                    int nonVowels = 0;

                    for (int i = 0; i < a.length(); i++) {
                              char ch = a.charAt(i);
                              if (ch == 'a' || ch == 'A' || ch == 'e' || ch == 'E' || ch == 'i'
                                                  || ch == 'I' || ch == 'o' || ch == 'O' || ch == 'u'
                                                  || ch == 'U') {
                               vowels++;

                              } else {
                              nonVowels++;
                                                                      }

                    }
                    System.out.println(vowels);
                    System.out.println(nonVowels);


          }
}
```

Output:

```
3

4
```

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26. Ascending order using array:

```
public class Ascending {
        public static void main(String[] args)
    {
            int n, temp;
            Scanner s = new Scanner(System.in);
            System.out.print("Enter no. of elements you want in array:"); n = s.nextInt();
            int a[] = new int[n]; System.out.println("Enter all the
            numbers:"); for (int i = 0; i < n; i++)
            {
                a[i] = s.nextInt();
            }
            for (int i = 0; i < n; i++)
            {
                for (int j = i + 1; j < n; j++)
                {
                    if (a[i] > a[j])
                    {
                        temp  =  a[i];  a[i]
                        =   a[j];   a[j]   =
                        temp;
                    }
                }
            }
            System.out.print("Ascending Order:");
            for (int i = 0; i < n - 1; i++)
            {
                System.out.print(a[i] + ",");
            }
            System.out.print(a[n - 1]);
}       }
```

Output:

```
Enter no. of elements you want in array:6
Enter all the numbers:
10

20

100

40

200

60

Ascending Order: 10,20,40,60,100,200
```

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27. Descending order using array:

```
public class DescendingOrder {
	public static void main(String[] args) {
		int n, temp;
		Scanner s = new Scanner(System.in);
		System.out.print("Enter no. of elements you want in array:"); n = s.nextInt();
		int a[] = new int[n]; System.out.println("Enter all the
		elements:"); for (int i = 0; i < n; i++) {
			a[i] = s.nextInt();
		}
		for (int i = 0; i < n; i++) {
			for (int j = i + 1; j < n; j++) {
				if (a[i] > a[j]) {
					temp = a[i]; a[i]
					= a[j]; a[j] =
					temp;
				}
			}
		}
		System.out.print("Descending Order:");
		for (int i = n - 1; i > 0; i--) {
			System.out.print(a[i] + ",");
		}
		System.out.print(a[0]);
	}
}
```

Output:

```
Enter no. of elements you want in array:6
Enter all the elements:
10

20

100

40

200

60

Descending Order:200,100,60,40,20,10
```

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28. Second minimum number:

```
public class SecondMinimumNumber {
	public static void main(String[] args) {
			int a[]={-12,45,-23,64,-100,24};
			for(int i=0;i<a.length;i++){
				for(int j=i+1;j<a.length;j++){ int
					temp=0; if(a[i]<a[j]){
						temp=a[j];
						a[j]=a[i];
						a[i]=temp;

					}
				}
			}
			for(int k=0;k<a.length;k++){
				System.out.println(a[k]);

			}
			System.out.println("The Second minimum number is" + a[a.length-2]
);

		}

}
```

Output:

```
64
45
24
-12
-23
-100
The Second minimum number is-23
```

29. First maximum number :

```
public class FirstLargest {
		public static void main(String[] args) {
			int a[]={-12,45,-23,64,-100,24};
			for(int i=0;i<a.length;i++){
				for(int j=i+1;j<a.length;j++){ int
					temp=0; if(a[i]<a[j]){
						temp=a[j];
						a[j]=a[i];
						a[i]=temp;

					}
				}
			}
			for(int k=0;k<a.length;k++){
				System.out.println(a[k]);
```

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```
                                        }
                                        System.out.println("The First maximum number is" + a[a.length-6]
);

                            }

}
```

Output:

```
64
45
24
-12
-23
-100
The First maximum number is64
```

30. Third maximum number:

```
public class ThirdLarge {
                            public static void main(String[] args) {
                                        int a[]={-12,45,-23,64,-100,24};
                                        for(int i=0;i<a.length;i++){
                                                    for(int j=i+1;j<a.length;j++){ int
                                                                temp=0; if(a[i]<a[j]){
                                                                            temp=a[j];
                                                                            a[j]=a[i];
                                                                            a[i]=temp;

                                                                }
                                                    }
                                        }
                                        for(int k=0;k<a.length;k++){
                                                    System.out.println(a[k]);

                                        }
                                        System.out.println("The Third maximum number is" + a[a.length-4]
); }}
```

Output:

```
64
45
24
-12
-23
-100
The Third maximum number is24
```

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31. Count the Small ,Caps, number and Special character in string:

```
package org.room.assign4;

public class LettersCount {
        public static void main(String[] args) {
                String s = "Hi Welcome To Java Classes Tommorow At 2.00 p.m!!";
                int count = 0; int
                count1 = 0; int
                count2 = 0; int
                count3 = 0;

                for (int i = 0; i < s.length(); i++) {
                        if (s.charAt(i) >= 'a' && s.charAt(i) <= 'z') {

                                count++;
                        } else if (s.charAt(i) >= 'A' && s.charAt(i) <= 'Z') {

                                count1++;
                        } else if (s.charAt(i) >= '0' && s.charAt(i) <= '9') {

                                count2++;
                        } else {

                                 count3++;
                        }

                }
                System.out.println("total no of small letters:" + count); System.out.println("total no of
                capital letters:" + count1); System.out.println("total no of digits :" + count2);
                System.out.println("total no of special characters:" + count3);
        }
}
```

Output:

```
total no of small letters:27 total no of
capital letters:7 total no of digits :3
total no of special characters:12
```

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32. Count of given number:

```
package org.room.assign4; import
java.util.Scanner; public class
CountOfGivenNum {
                public static void main(String[] args) {
                    int n,i=0; System.out.println("enter a no");
                    Scanner get=new Scanner(System.in);
                    n=get.nextInt();
                    while(n>0)
                    {
                            n=n/10;
                            i++;

                    }

                    System.out.println("no of digits present:"+i);
            }

    }
```

Output:

```
enter a no
5267546
no of digits present:7
```

33. Palindrome string:

```
package org.room.assign4;

import java.util.Scanner;

public class PoyindromeString {
        public static void main(String args[])
          {
               String original, reverse = ""; Scanner in = new
               Scanner(System.in);

               System.out.println("Enter a string to check if it is a palindrome"); original = in.nextLine();

               int length = original.length();

               for ( int i = length - 1; i >= 0; i-- ) reverse = reverse +
                    original.charAt(i);

               if (original.equals(reverse))
                    System.out.println("Entered string is a palindrome.");
               else
                    System.out.println("Entered string is not a palindrome.");

          }

}
```

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Output:

```
Enter a string to check if it is a palindrome madam
Entered string is a palindrome.
```

34. Reverse the String:

```
package org.room.assign4; import
java.util.Scanner; public class
ReverseString {
        public static void main(String args[]) {
                String original, reverse = ""; Scanner in = new
                Scanner(System.in);

                System.out.println("Enter a string to reverse"); original =
                in.nextLine();

                int length = original.length();

                for (int i = length - 1; i >= 0; i--)
                        reverse = reverse + original.charAt(i);

                System.out.println("Reverse of entered string is: " + reverse);
        }

}
```

Output:

```
Enter a string to reverse welcome
Reverse of entered string is: emoclew
```

35. Triangle with stars:

```
package org.room.assign4;

public class Triangle1 {
        public static void main(String[] args) {
                for (int i = 1; i <= 5; i++) {
                        for (int j = 1; j <= 5 - i; j++) {
                                System.out.print(" ");
                        }
                        for (int k = 1; k <= i; k++) {
                                System.out.print("* ");
                        }
                        System.out.println(" ");}}}
```

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Output:

```
    *
   * *
  * * *
 * * * *
* * * * *
```

36. Sum of give num:

```
package org.room.assign4;

public class SumOfGivenNum {
        public static void main(String args[]) {
                int m, n, sum = 0; m =
                12345;
                while (m > 0) {
                        n = m % 10;
                        sum = sum + n; m
                        = m / 10;
                }
                System.out.println("Sum of Digits:" + sum);
        }
}
```

Output:

```
Sum of Digits:15
```

37. Count of each word in the string:

```
        public class Count {
                public static void main(String args[]) {
                        {
                                String s = "vengat ram"; String[] s1
                                = s.split(" ");
                        HashMap<String, Integer> emp = new HashMap<String, Integer>();


                                for (String c : s1) {
                                        if (emp.containsKey(c)) { int x =
                                                emp.get(c); emp.put(c, x
                                                + 1);
                                        } else {

                                                  emp.put(c, 1);
                                        }
                                }

                                   System.out.println(emp);
                        }
```

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```
                }
        }
```

Output:

```
{vengat=1, ram=1}
```

38. Count of each character in the string:

```
        public class ReverseString {
                public static void main(String args[]) {
                        {
                                String s = "vengatram";
                        HashMap<Character, Integer> emp = new HashMap<Character, Integer>();

                                char[] ch = s.toCharArray();

                                for (char c : ch) {
                                        if (emp.containsKey(c)) { int x =
                                                emp.get(c); emp.put(c, x
                                                + 1);
                                        } else {

                                                  emp.put(c, 1);
                                        }
                                }

                                System.out.println(emp);
                        }
                }
          }
```

Output:

```
{a=2, r=1, t=1, e=1, v=1, g=1, m=1, n=1}
```

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39. Assume a string "welcome to Polaris" remove space and print the string.

```
public class Dummy {
public static void main(String[] args) {
String s="Welcome to Polaris";
String x = s.replace(" ", "");
System.out.println(x);
}
}
```

Output:

```
WelcometoPolaris
```

40. Write a program to split and then reverse a string.

Reverse the string:

```
public class ReverseString {
public static void main(String args[]) {
String original, reverse = "";
Scanner in = new Scanner(System.in);
System.out.println("Enter a string to reverse");
original = in.nextLine();
int length = original.length();
for (int i = length - 1; i >= 0; i--) {
reverse = reverse + original.charAt(i); }
System.out.println("Reverse of entered string is: " + reverse);
}
}
```

Output:

```
Enter a string to reverse
HELLO
Reverse of entered string is: OLLEH
```

Split:

```
public class StringBasic {
public static void main(String[] args) {
String s1 = "Hello welcome to java class";
String[] x = s1.split(" "); // here we split by space
for(int i=0;i<x.length;i++){
System.out.println(x[i]);
}
}
}
```

Output:

```
Hello
welcome
to
java
class
```

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41. Construct the triangle

```
                9
              8 9 8
            7 8 9 8 7
          6 7 8 9 8 7 6
        5 6 7 8 9 8 7 6 5
      4 5 6 7 8 9 8 7 6 5 4
    3 4 5 6 7 8 9 8 7 6 5 4 3
  2 3 4 5 6 7 8 9 8 7 6 5 4 3 2
    1 2 3 4 5 6 7 8 9 8 7 6 5 4 3 21
```

Program:

```
public class ReverseString {
        public static void main(String[] args)
          {
            Scanner sc = new Scanner(System.in);

            System.out.println("How Many Rows You Want In Your Pyramid?");

            int noOfRows = sc.nextInt();
            int rowCount = 1;

            System.out.println("Here Is Your Pyramid");

            for (int i = noOfRows; i >= 1; i--)
            {
              //Printing i*2 spaces at the beginning of each row

              for (int j = 1; j <= i*2; j++)
              {
                System.out.print(" ");
              }

              //Printing j where j value will be from i to noOfRows

              for (int j = i; j <= noOfRows; j++)
              {
                System.out.print(j+" ");
              }

              //Printing j where j value will be from noOfRows-1 to i

              for (int j = noOfRows-1; j >= i; j--)
              {
                System.out.print(j+" ");
```

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```
                }

                System.out.println();

                //Incrementing the rowCount

                rowCount++;
            }
        }
    }
```

Output:

```
How Many Rows You Want In Your Pyramid?
9
Here Is Your Pyramid

                8
              8 9 8
            7 8 9 8 7
          6 7 8 9 8 7 6
        5 6 7 8 9 8 7 6 5
      4 5 6 7 8 9 8 7 6 5 4
    3 4 5 6 7 8 9 8 7 6 5 4 3
  2 3 4 5 6 7 8 9 8 7 6 5 4 3 2
1 2 3 4 5 6 7 8 9 8 7 6 5 4 3 21
```

42. Write a program to find sum of each digit in the given number using recursion?

Program:

```
public class MyNumberSumRec {

    int sum = 0;

    public int getNumberSum(int number){

        if(number == 0){
            return sum;
        } else {
            sum += (number%10);
            getNumberSum(number/10);
        }
        return sum;
```

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```
                    }

                    public static void main(String a[]){
                        MyNumberSumRec a = new MyNumberSumRec();
                        System.out.println("Sum is: "+a.getNumberSum(5678));
                    }
                        }
```

Output:

```
Sum is: 26
```

43. Longest substring without repeating characters

INPUT		**OUTPUT**
java2novice	**=**	**a2novice**
java_language_is_sweet	**=**	**uage_is**
java_java_java_java	**=**	**va_j, _jav**
abcabcbb	**=**	**bca, abc, cab**

program:

```
public class MyLongestSubstr {

    private Set<String> subStrList = new HashSet<String>();
    private int finalSubStrSize = 0;

    public Set<String> getLongestSubstr(String input){
        //reset instance variables
        subStrList.clear();
        finalSubStrSize = 0;
        // have a boolean flag on each character ascii value
        boolean[] flag = new boolean[256];
        int j = 0;
        char[] inputCharArr = input.toCharArray();
        for (int i = 0; i < inputCharArr.length; i++) {
            char c = inputCharArr[i];
            if (flag[c]) {
                extractSubString(inputCharArr,j,i);
                for (int k = j; k < i; k++) {
                    if (inputCharArr[k] == c) {
                        j = k + 1;
                        break;
                    }
                    flag[inputCharArr[k]] = false;
```

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```
            }
        } else {
            flag[c] = true;
        }
    }
    extractSubString(inputCharArr,j,inputCharArr.length);
    return subStrList;
}

private String extractSubString(char[] inputArr, int start, int end){

    StringBuilder sb = new StringBuilder();
    for(int i=start;i<end;i++){
        sb.append(inputArr[i]);
    }
    String subStr = sb.toString();
    if(subStr.length() > finalSubStrSize){
        finalSubStrSize = subStr.length();
        subStrList.clear();
        subStrList.add(subStr);
    } else if(subStr.length() == finalSubStrSize){
        subStrList.add(subStr);
    }

    return sb.toString();
}

public static void main(String a[]){
    MyLongestSubstr mls = new MyLongestSubstr();
    System.out.println(mls.getLongestSubstr("java2novice"));
    System.out.println(mls.getLongestSubstr("java_language_is_sweet"));
    System.out.println(mls.getLongestSubstr("java_java_java_java"));
    System.out.println(mls.getLongestSubstr("abcabcbb"));
}
        }
```

Output :

```
[a2novice]
[uage_is]
[va_j, _jav]
[bca, abc, cab]
```

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44. Kth largest or smallest element in an array

Example : if given array is [1,3,12,19,13,2,15] and you are asked for the 3rd largest element i.e., k=3 then your program should print 13

Program:

```
public class ThirdLarge {
        public static void main(String[] args) {
            int a[]={1,3,12,19,13,2,15};
            for(int i=0;i<a.length;i++){
                for(int j=i+1;j<a.length;j++){
                    int temp=0;
                    if(a[i]<a[j]){
                        temp=a[j];
                        a[j]=a[i];
                        a[i]=temp;

                    }
                }
            }
            for(int k=0;k<a.length;k++){
                System.out.println(a[k]);

            }
        System.out.println("The Third maximum number is :" + a[a.length-5] );
            }
        }
```

Output:

```
19
15
13
12
3
2
1
The Third maximum number is :13
```

45. Armstrong number:

Program:

```
public class ArmstrongNumberCheck {
```

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

        int n, a, i = 0, j = 0;
        Scanner an = new Scanner(System.in);
        System.out.println("Enter a number");
        n = an.nextInt();
        a = n;

        while (a > 0) {
                i = a % 10;
                j = j + (i * i * i);
                a = a / 10;

        }
        if (n == j) {
                System.out.println("Armstrong number");

        } else {
                System.out.println("Not armstrong Number");
        }

}
}
```

Output :

```
        Enter a number
        371
 Armstrong number
```

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46. Write a program to remove duplicates from sorted array
Input : 2,3,6,6,9,10,10,10,12,12
Output : 2,3,6,9,10,12

Program:

```
public class MyDuplicateElements {

    public static int[] removeDuplicates(int[] input){

        int j = 0;
        int i = 1;
        //return if the array length is less than 2
        if(input.length < 2){
            return input;
        }
        while(i < input.length){
            if(input[i] == input[j]){
                i++;
            }else{
                input[++j] = input[i++];
            }
        }
        int[] output = new int[j+1];
        for(int k=0; k<output.length; k++){
            output[k] = input[k];
        }

        return output;
    }

    public static void main(String a[]){
        int[] input1 = {2,3,6,6,8,9,10,10,10,12,12};
        int[] output = removeDuplicates(input1);
        for(int i:output){
            System.out.print(i+" ");
        }
    }
            }
```

Output:

```
2 3 6 8 9 10 12
```

47. Binary search

Program:

```
public class MyBinarySearch {

    public int binarySearch(int[] inputArr, int key) {

        int start = 0;
        int end = inputArr.length - 1;
        while (start <= end) {
            int mid = (start + end) / 2;
            if (key == inputArr[mid]) {
                return mid;
```

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```
        }
        if (key < inputArr[mid]) {
            end = mid - 1;
        } else {
            start = mid + 1;
        }
    }
    return -1;
}

public static void main(String[] args) {

    MyBinarySearch mbs = new MyBinarySearch();
    int[] arr = {2, 4, 6, 8, 10, 12, 14, 16};
    System.out.println("Key 14's position: "+mbs.binarySearch(arr, 14));
    int[] arr1 = {6,34,78,123,432,900};
    System.out.println("Key 432's position: "+mbs.binarySearch(arr1, 432));
}
        }
```

Output:

```
Key 14's position: 6
Key 432's position: 4
```

48. Butterfly shuffle:

Program:

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

public class SampleTest {
            public static void main(String[] args) {
             int a[] = { 1, 2, 3, 4, 5, 6, 7, 8, 9, 0 };
             int len = a.length / 2;
             for (int i = len - 1; i >= 0; i--) {
                    System.out.println(a[i]);
             }
             for (int i = a.length - 1; i >= len; i--) {
                         System.out.println(a[i]);
             }

            }
}
```

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Output:

```
5
4
3
2
1
0
9
8
7
6
```

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