Object Oriented Programming using JAVA

By SK Sahil

DCST 4th Sem, Unit 1 & 2 with Codes & PYQ

Roadmaps

Course Introduction

Prerequisites - Installation Resources

. Variables & Data Types

Operators

1st Class

Conditional Statements

Loops (Flow Control)

Patterns (Part I)

Functions & Methods

Patterns (Part II) - Advanced

ARRAYS

To built Strong Logic

Solves 500+ Quizzes & Codes

2D Arrays

Strings

Bit Manipulation

Object Oriented Programming

. Recursion Basics

Covered

UNIT 1: Introduction to Java	5	7

1.1 Basics of Java, Background/History of Java, Java and the Internet, Advantages of Java
1.2 Java Virtual Machine & Byte Code
1.3 Java Environment Setup
1.4 Java Program Structure
1.5 Procedure-Oriented vs. Object-Oriented Programming concept
1.6 Basics of OOP: Abstraction, Inheritance, Encapsulation, Classes, subclasses and super classes, Polymorphism and Overloading, message communication
1.7 Compiling and running a simple "Hello World" program: Setting Up Your Computer,Writing a Program, Compiling, Interpreting and Running the program, Common Errors

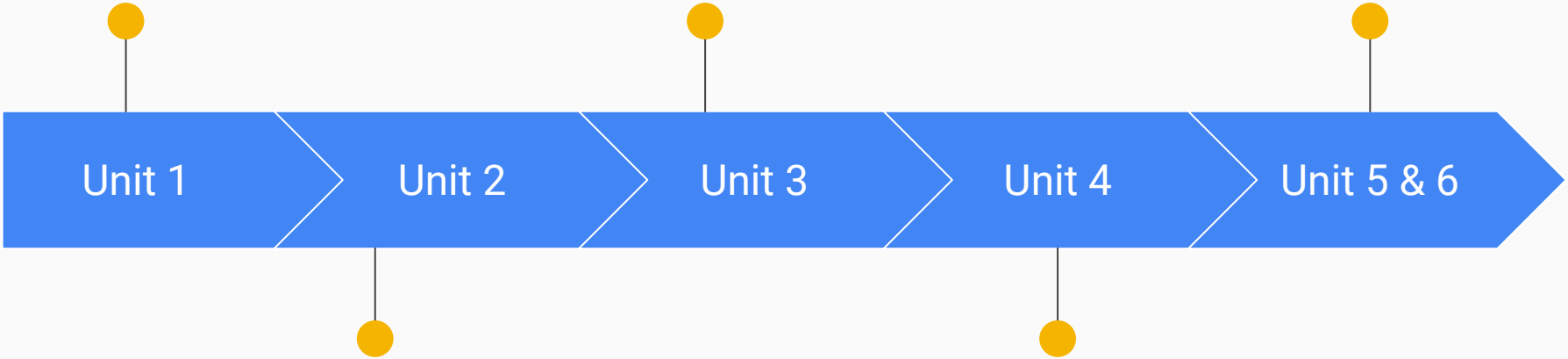
UNIT 2: Building Blocks of theLanguage	**8**	10

2.1 Primitive Data Types: Integers, FloatingPoint type, Characters, Booleans etc
2.2 User Defined Data Type
2.3 Identifiers & Literals
2.4 Declarations of constants & variables
2.5 Type Conversion and Casting
2.6 Scope of variables & default values ofvariables declared
2.7 Wrapper classes
2.8 Comment Syntax
2.9 Garbage Collection
2.10 Arrays of Primitive Data Types
2.11 Types of Arrays
2.12 Creation, concatenation and conversion of a string, changing case of string, character extraction, String Comparison, String Buffer
2.13 Different Operators: Arithmetic, Bitwise, Rational, Logical,Assignment, Conditional,
Ternary, Increment and Decrement, Mathematical Functions
2.14 Decision & Control Statements: Selection Statement (if, if...else, switch),Loops (while, do-while, for), Jump statements (break, continue, return & exit)

Installation,
Introduction

OOPs Concepts

Exception Handling,
Multithreaded Programming &
File Handling



Conditional & Looping

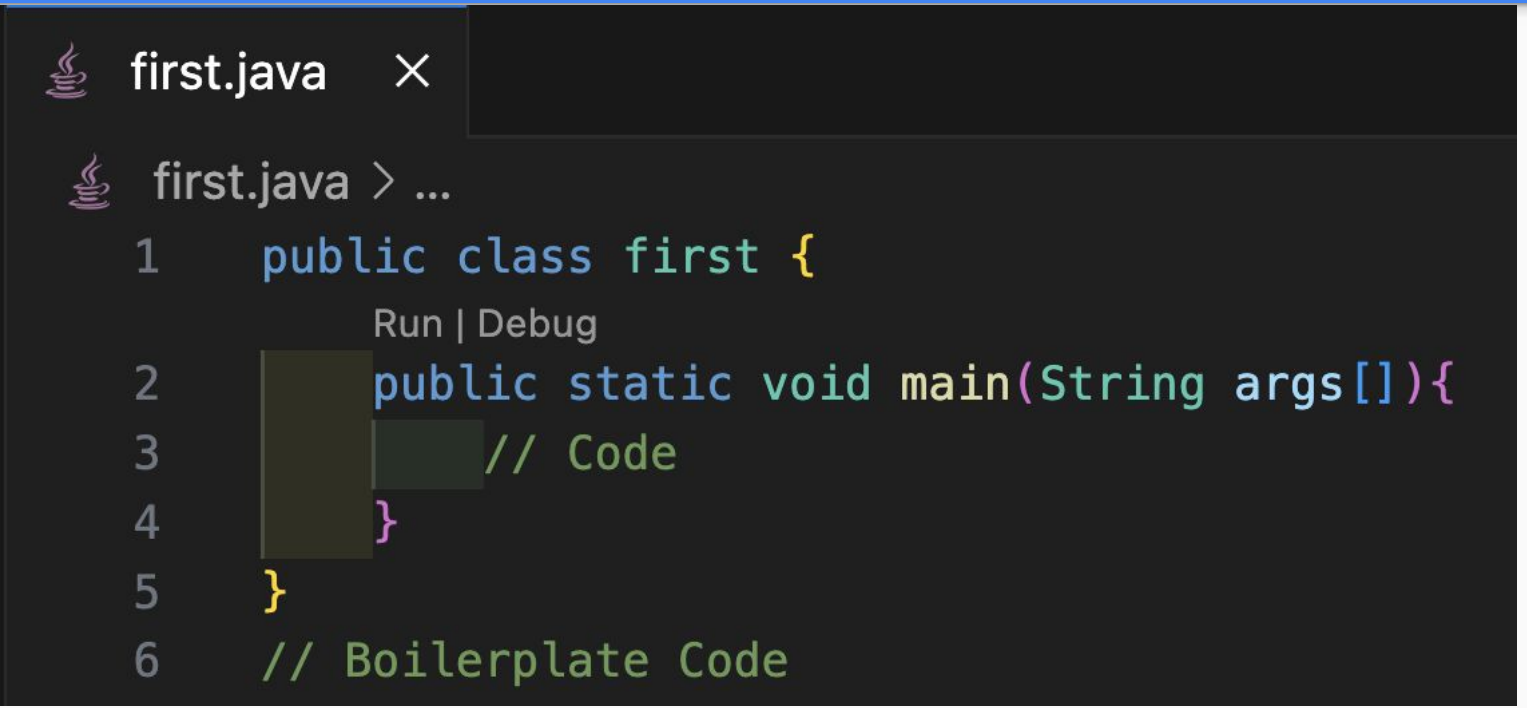
OOPS- 4 Pillars

Inheritance, Packages
& Interfaces

Create File

Extension: fileName **.java**

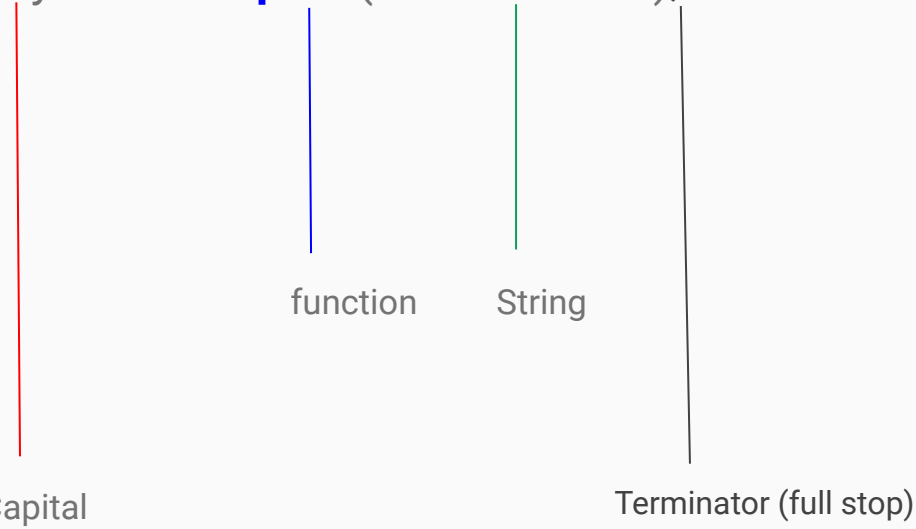
Boilerplate Code



Instruction: Don't Panic
OOPs start hobe proti ta keyword clear hobe.
Right now, ata memorize kore naw.
Proti ta code a ata lagbe

Output in Java

System.out.**print**(“Hello World”);

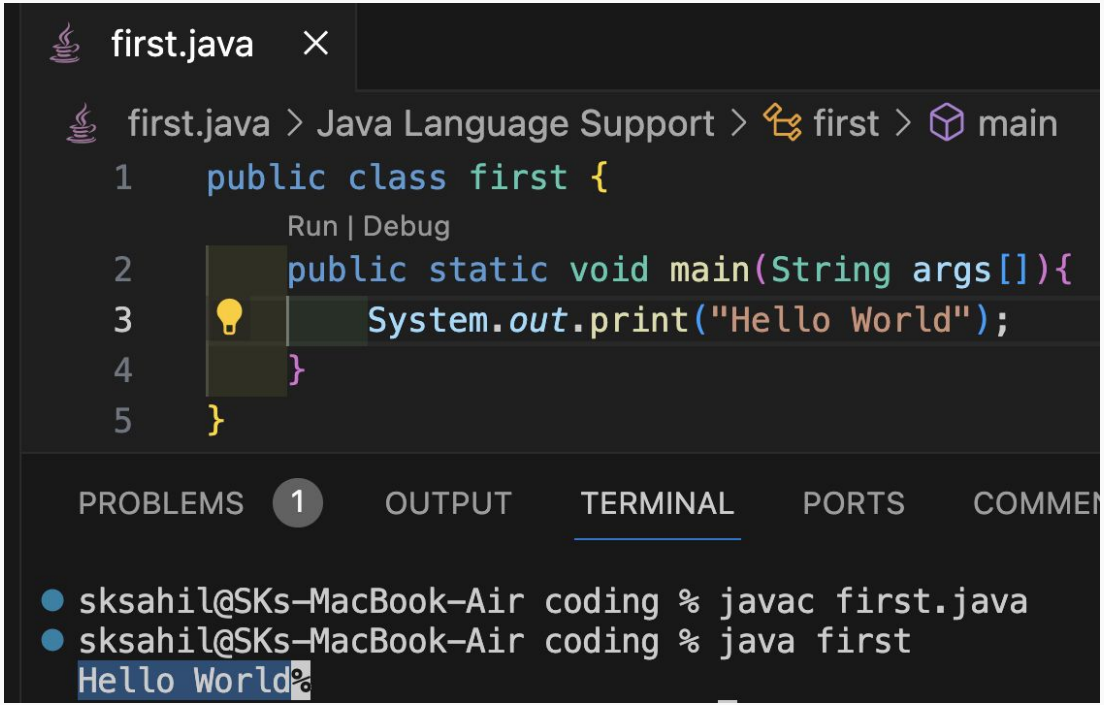


System.out.**println**(“Hello World”);

print vs println

Println por por dubar likhle next line a print hobe.
But print dubar likhle seta pasa pasi thakbe

WAP to print “Hello World” in Java.



Predict the output?

first.java

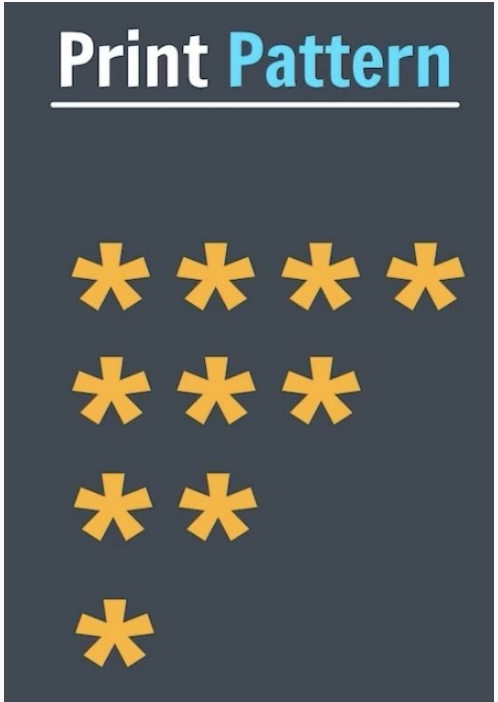
first.java > Java Language Support > first > main

```java
// Difference between print & println keyword.
public class first {
    Run | Debug
    public static void main(String args[]){
        System.out.print("Hello ");
        System.out.println("I am a student of EduTech");
        System.out.print("I am learning ");
        System.out.print("Java Programming");
    }
}
```

Answer:

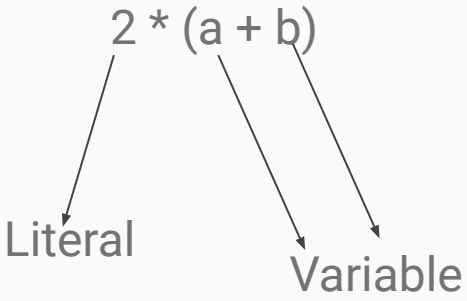
```
Hello I am a student of EduTech
I am learning Java Programming
```

Solve this.



Variables in Java

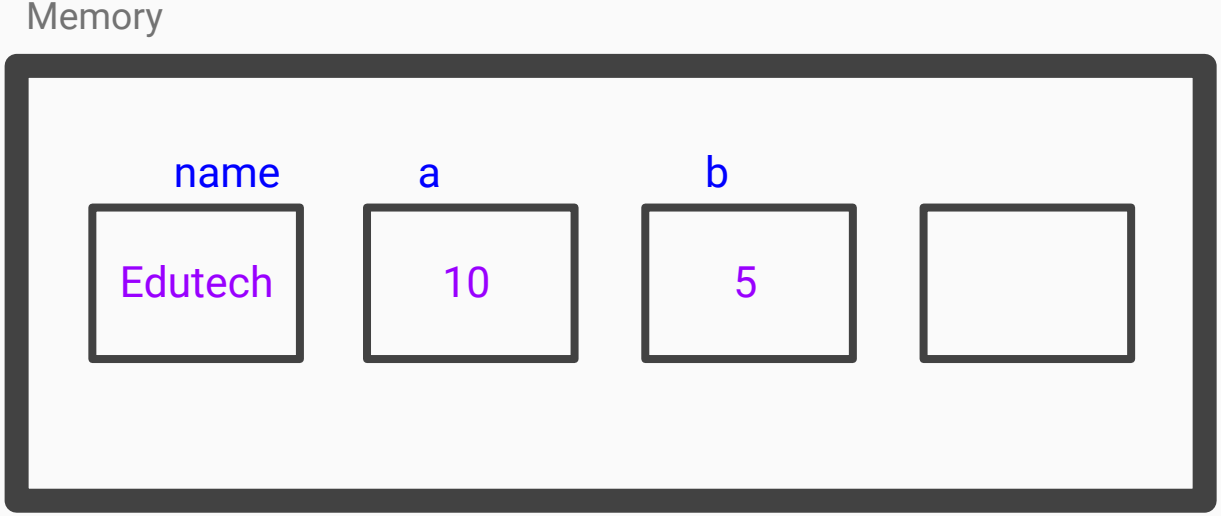
int a= 10, b= 5;



Def: It is the **name** given to the memory location.

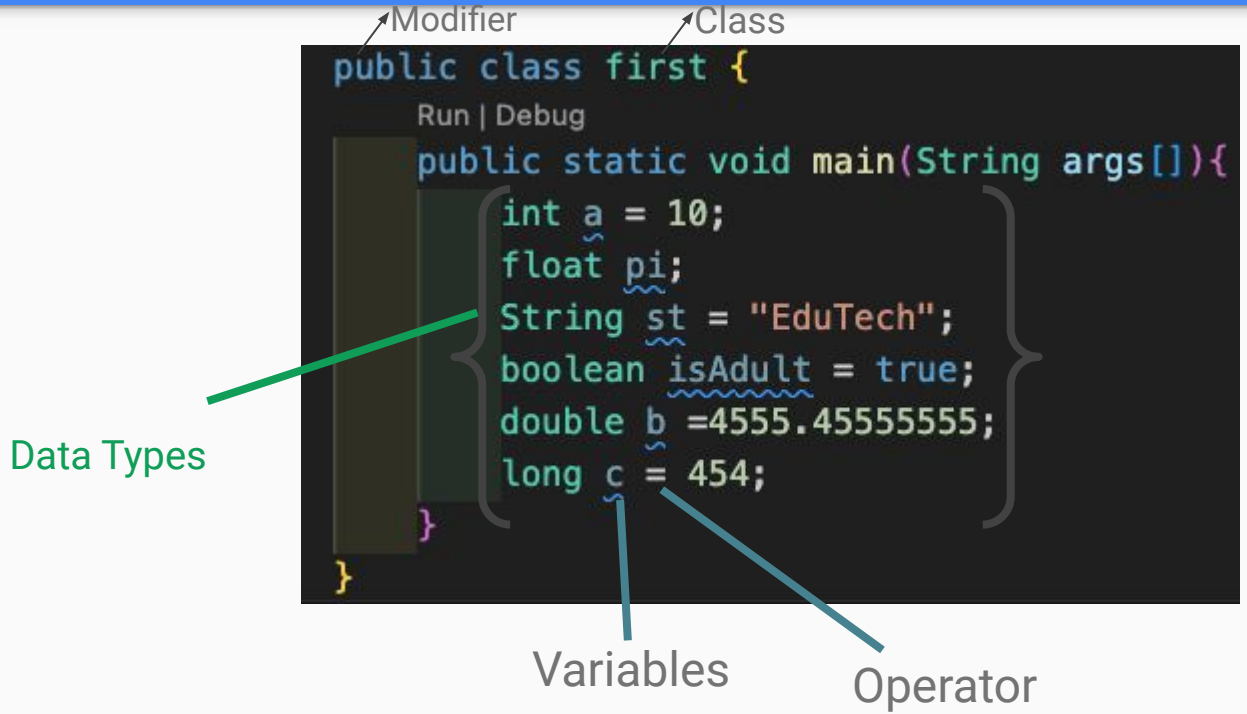
Keyword:
Container, Meaningful Name

Memory




```
String name = “Edutech”;
int a = 10;
int b = 5;
```

Understand Variable, Data Types & Operators

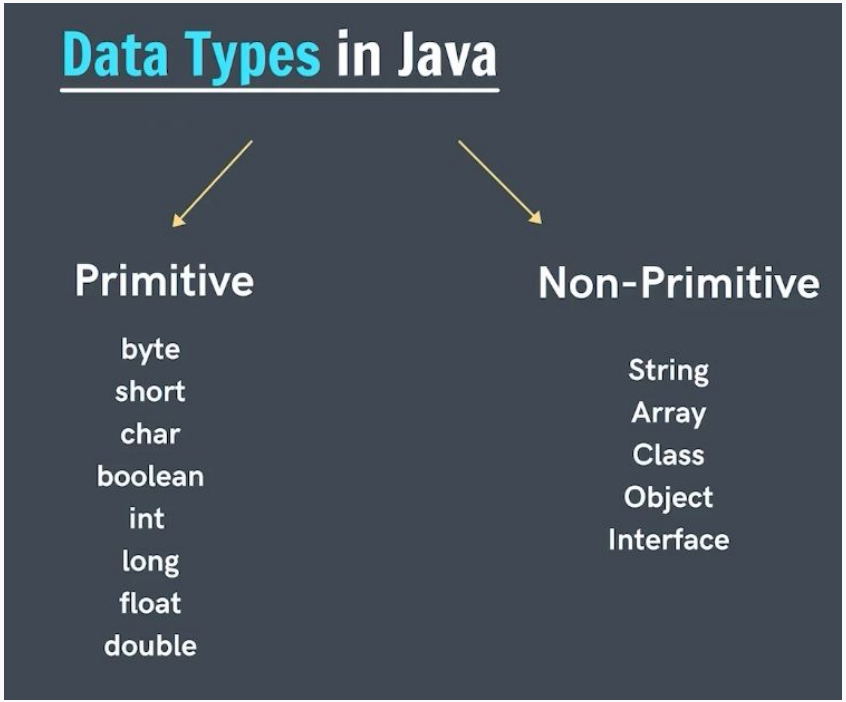


Q) What is the output?

```
public class JavaBasics {
    public static void main(String args[]) {
        int a = 10;
        int b = 5;
        System.out.println(a);
        System.out.println(b);
        String name = "Tony Stark";
        System.out.println(name);


        a = 50;
        System.out.println(a);
    }
}
```

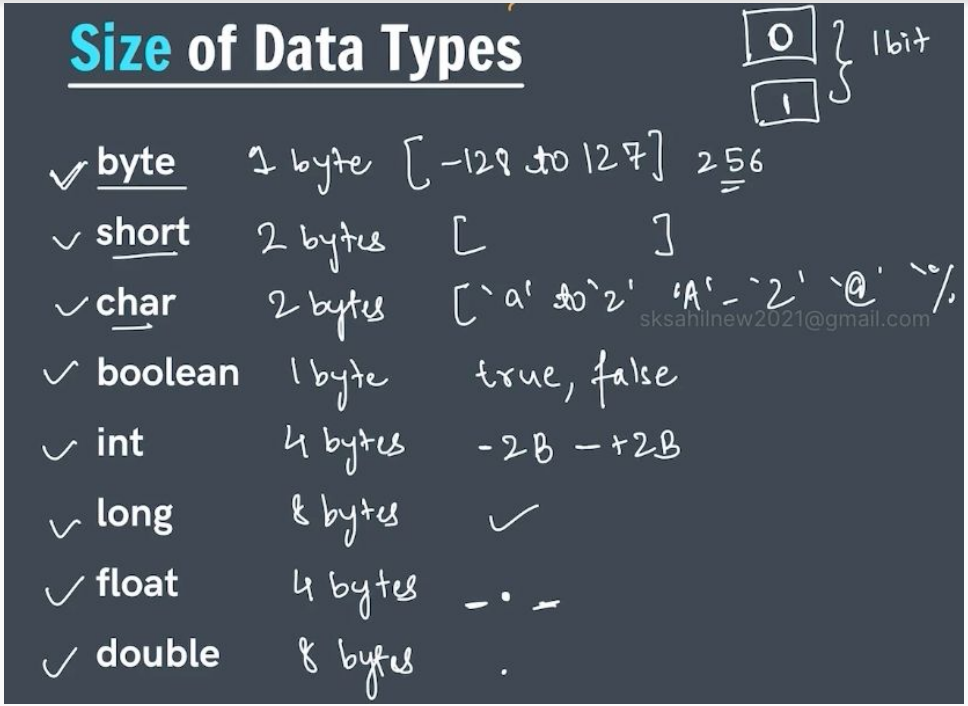
Output:

Types of Data Types




```java
byte b = 8;
System.out.println(b);
char ch = 'a';
System.out.println(ch);
boolean var = false;
float price = 10.5;
int number = 25;
//long
//double
```

Size & Range of Data Types



Sum of a & b

```
1   public class JavaBasics {
2       public static void main(String args[]) {
3           int a = 10;
4           int b = 5;
5           int sum = a + b;
6           System.out.println(sum);
7       }
8   }
9
```

Output: 15

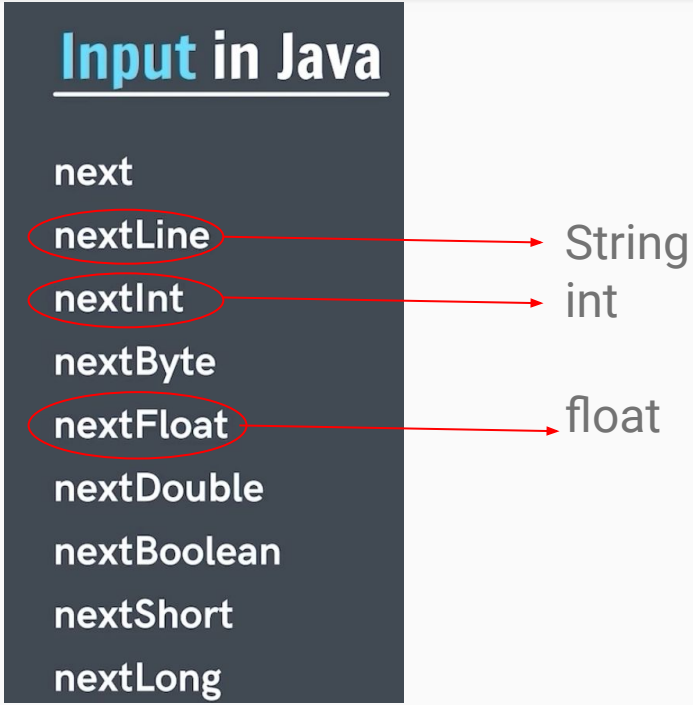
Comments in Java

```
// Single Line Comment
```

```
/*
      Multiline Comment
*/
```

That are not part of the program

Input in Java



Import package

```
import java.util.*;
```

Scanner Class & sc ta object. (object r nam je kono dewa jai)

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

Sum of a & b (input from user)

JavaBasics.java

```java
import java.util.*;

public class JavaBasics {
    public static void main(String args[]) {
        Scanner sc = new Scanner(System.in);
        int a = sc.nextInt();
        int b = sc.nextInt();
        int sum = a + b;
        System.out.println(sum);
    }
}
```

Product of a & b (input from user)

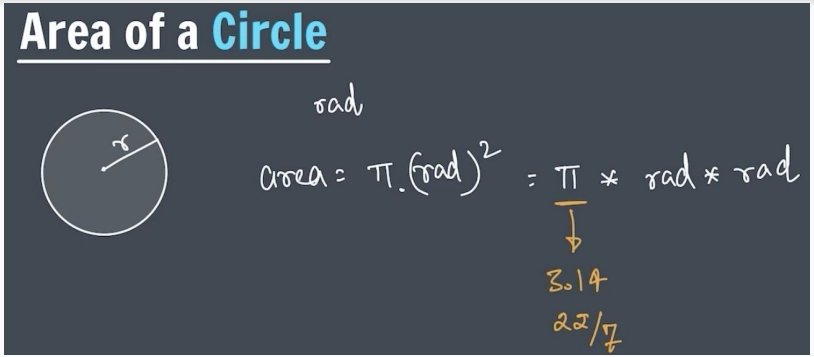
JavaBasics.java

```java
import java.util.*;

public class JavaBasics {
    public static void main(String args[]) {
        Scanner sc = new Scanner(System.in);
        int a = sc.nextInt();
        int b = sc.nextInt();
        //int sum = a + b;
        int product = a * b;
        System.out.println(product);
    }
}
```

Area of circle (input from user)

JavaBasics.java

```java
import java.util.*;

public class JavaBasics {
    public static void main(String args[]) {
        Scanner sc = new Scanner(System.in);
        float rad = sc.nextFloat();
        float area = 3.14f * rad * rad;
        System.out.println(area);
    }
}
```



Implicit
Conversion

You get this error

```
JavaBasics.java:6: error: incompatible types: possible lossy conversion
        int number = sc.nextFloat();
                                  ^
1 error
error: compilation failed
```

Type Conversion

Type Conversion

Conversion happens when:

a. type compatible

b. destination type > source type

Not possible

byte -> short -> int -> float -> long -> double

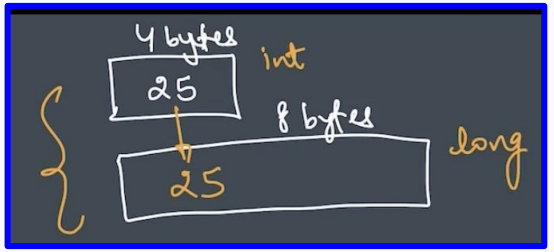
Possible

```
//      int a = 25;
//      long b = a;
    long a = 25;
    int b = a;
   System.out.println(b);
```

possible

Not possible

possible



Not possible

Type Casting

```
int marks = (int) (99.99f)
```

Narrowing Conversion
Explicit Conversion

Why is it risky?

→

```
float CGPA = 9.9f;
int cgpa = (int) CGPA;

SOP(cgpa); // 9
```

SOP- System.out.Println Shortform ata likhbo for time saving dry run r somoi & concept bojhar somoi. IDE te noi.....

Type Promotion in Expression

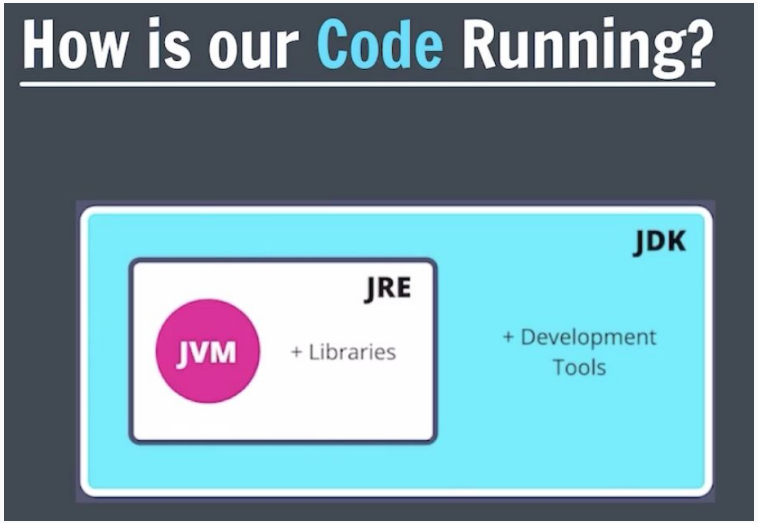
1. Java automatically promotes each byte, short, or char operand to int when evaluating an expression.
2. If one operand is long, float or double the whole expression is promoted to long, float, or double respectively.

Not include on your syllabus

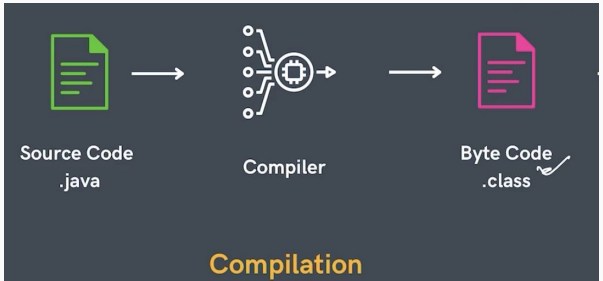
```
char a = 'a';
char b = 'b';
System.out.println((int)(b));
System.out.println((int)(a));
System.out.println(b-a);
```

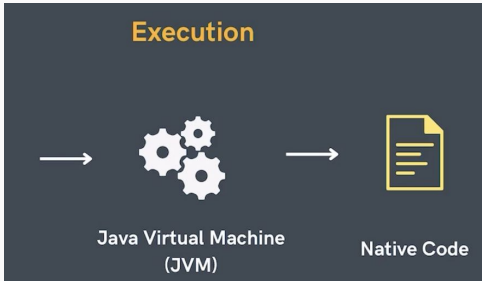
```
98
97
1
```

How does Java Code Run?



JVM: Java Virtual Machine
JRE: Java Runtime Environment
JDK: Java Development Kit



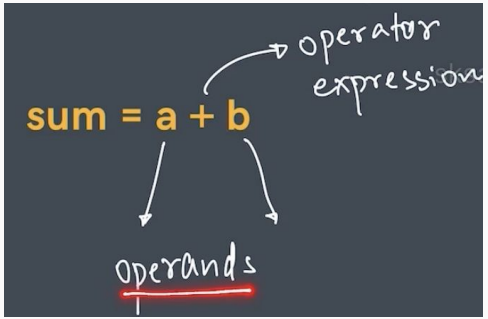


Operators & its types

Operators in Java

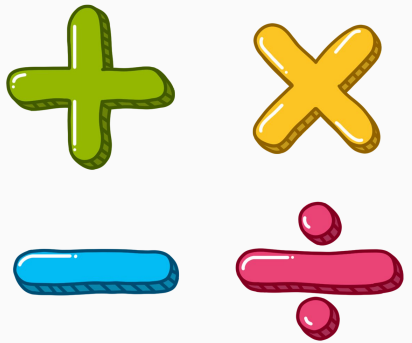
Symbols that tell compiler to perform some operation

```
sum = a + b
```



Types of Operators

- Arithmetic Operators (Binary/Unary)
- Relational Operators
- Logical Operators
- Bitwise Operators
- Assignment Operators



Bit Manipulation studies on Bitwise Operator

Arithmetic Operators

Binary

+

-

*

/

%

2 operands A + B

Unary

++

--

1 operand

A++

JavaBasics.java 1

```java
import java.util.*;

public class JavaBasics {
    Run | Debug
    public static void main(String args[]) {
        int A = 10;
        int B = 5;
        System.out.println("subtract = " + (A-B));
    }
}
```

Output:

JavaBasics.java 1

```java
import java.util.*;

public class JavaBasics {
    Run | Debug
    public static void main(String args[]) {
        int A = 10;
        int B = 5;
        System.out.println("modulo(remainder) = " + (A%B));
    }
}
```

Output:

Unary Operators

Unary			
a = a+1	++	a++	++a
a = a-1	--	a--	--a

Pre Increment	Post Increment
++a	a++

Value change
Then use

Value use
Then Change

```
int a = 10;
int b = ++a;
System.out.println(a);
System.out.println(b);
```

Output:
11
11

```
int a = 10;
int b = a++;
System.out.println(a);
System.out.println(b);
```

Output:
11
10

Relational Operators

==	Equal to (check equality)
!=	Not Equal to (check inequality)
>	Greater than
<	Less than
>=	Greater than or equal to
<=	Less than or equal to

```
public class JavaBasics {
    Run | Debug
    public static void main(String args[]) {
        int A = 10;
        int B = 5;
        System.out.println((A == B));
    }
}
```

// output:

```
int A = 10;
int B = 10;
System.out.println((A != B));
```

output:

Logical Operators

&&	(Logical AND)
||	(Logical OR)
!	(Logical NOT)

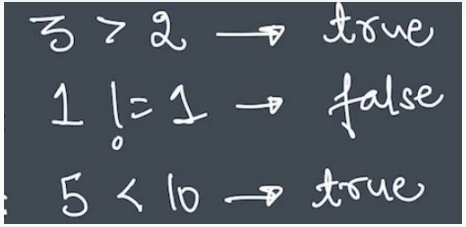
```
System.out.println( (3>2) && (5>0) );
```
output:

```
System.out.println( (3<2) && (5<0) );
```
output:

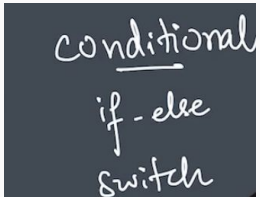
```
System.out.println( (3<2) || (5<0) );
```
output:

```
System.out.println( (3<2) || (5>0) );
```
output:

```
System.out.println( !(3>2) );
```



Logical Operator most of the used in :



Assignments Operators

Shorthand Operator

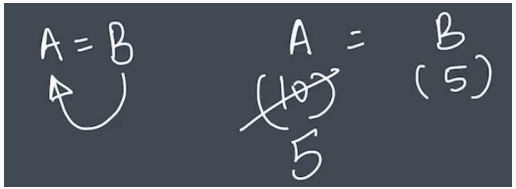
=

+=

-=

*=

/=




```java
int A = 10;
//A = A + 10;
A += 10;
System.out.println(A);
```

```java
int B = 5;
B *= 5; // B = B * 5
System.out.println(B);
```

```java
int B = 5;
B %= 5; // B = B % 5
System.out.println(B);
```

Operator Precedence

Operator precedence determines the order in which the operators in an expression are evaluated.

For eg –

*int x = 3 * 4 - 1;*

In the above example, the value of x will be 11, not 9. This happens because the precedence of * operator is higher than - operator. That is why the expression is evaluated as (3 * 4) - 1 and not 3 * (4 - 1).

Note - These notes are just for a quick glance. We don't have to memorize them all at once. Most of these rules are very logical and we have been following them in a lot of instances already.

Operators	Precedence
!, +, - (unary Operators)	First (Highest)
* , / , %	Second
+ , -	Third
< , <= , >=, >	Fourth
== , !=	Fifth
&&	Sixth
||	Seventh
= (assignment Operator)	Lowest

Q1)Predict the Output

Question : What will be the output of the following programs ?

```
public class Test {
public static void main(String[] args){
int x = 2, y = 5;
int exp1 = (x * y / x);
int exp2 = (x * (y / x));
System.out.print(exp1 + " , ");
System.out.print(exp2);
}
}
```

Q2)Predict the Output

```
public class Test {
public static void main(String[] args) {
int x = 200, y = 50, z = 100;
if(x > y && y > z){
System.out.println("Hello");
}
if(z > y && z < x){
System.out.println("Java");
}
if((y+200) < x && (y+150) < z){
System.out.println("Hello Java");
}
}
}
```

Q3)Predict the Output

```
public class Test {
public static void main(String[] args){
int x, y, z;
x = y = z = 2;
x += y;
y -= z;
z /= (x + y);
System.out.println(x + " " + y + " " + z);
```

Q4)Predict the Output

```
public class Test {
public static void main(String[] args){
int x = 9, y = 12;
int a = 2, b = 4, c = 6;
int exp = 4/3 * (x + 34) + 9 * (a + b * c) + (3 + y * (2 +
a)) / (a + b*y);
System.out.println(exp);
}
```

Q5)Predict the Output

```
public class Test {
public static void main(String[] args){
int x = 10, y = 5;
int exp1 = (y * (x / y + x / y));
int exp2 = (y * x / y + y * x / y);
System.out.println(exp1);
System.out.println(exp2);
}
```

Solutions

Solution 1: Output is : 5 , 4

Solution 2: Output is : Java

Solution 3: Output is : 4, 0, 0

Solution 4: Output is : 278

Solution 5: Output is : 20, 20

Roadmaps

Course Introduction

Prerequisites - Installation Resources

. Variables & Data Types

Operators

1st Class

Conditional Statements

Loops (Flow Control)

Patterns (Part I)

Functions & Methods

Patterns (Part II) - Advanced

ARRAYS

To built Strong Logic

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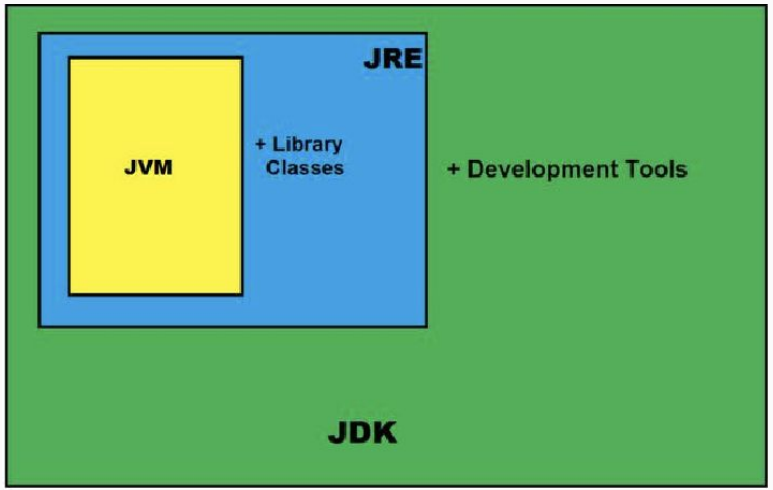
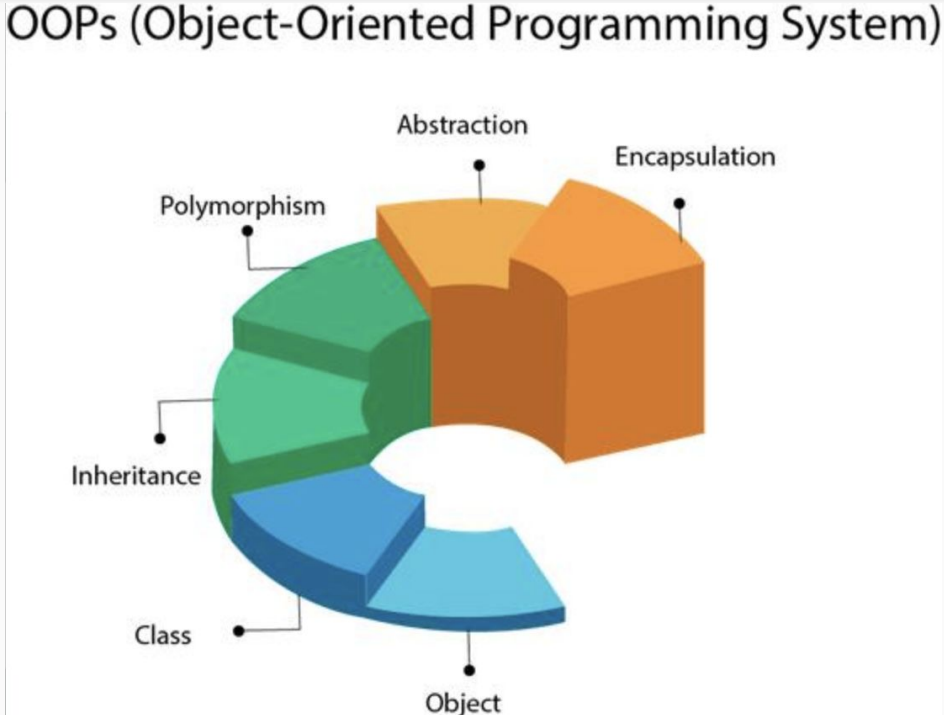
Bit Manipulation

Object Oriented Programming

. Recursion Basics

Memorize this

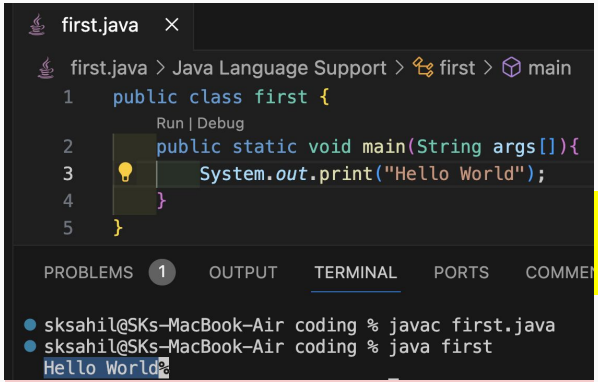




Cheat Sheet

Output: **S**ystem.out.print**ln**( );

Extension: fileName**.java**



Class: **first**
File Name: **first**

Class name & file name should be same.

Package import: java.util.*;

Input: Scanner sc= new Scanner(System.in);

For storing value in the different values in the variables

```
int a = sc.nextInt( );
String b= sc.nextLine( );
float c= sc.nextFloat( );
```

Best Long Ques

Check your knowledge

Q1. What is Java? Describe Variable, Data Types, Operators & its types. Who is the father of Java? What's the extension of java file?

Java is a **platform-independent** programming languages.

Variable is the **name** given to memory location. (container, meaningful name)

Data Types are the **what kind of data. (10, 10.99f, 1.9999999, True/ False, "Edutech", 'A',**

Operator is the **performing some operation.** (Addition, subtraction & so on).

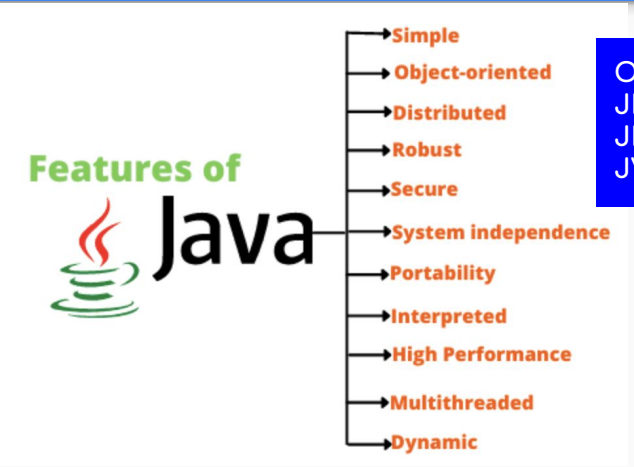
Types: Arithmetic, Assignment, Relational, Bitwise, Logical Operator

Java is used for **Mobile APP Development.**

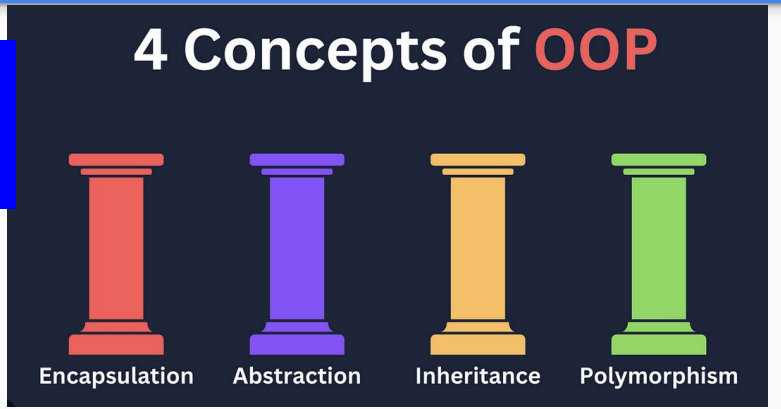
James Gosling is the **father** of **Java.**

Extension: fileName.**java**

Q2. Main 4 Pillars of OOPS? Full form of OOP, JRE, JDK, JVM. Uses , Features , Pros & Cons of Java Programming? IDE for java programming ?



OOP: Object Oriented Programming
JRE: Java Runtime Environment
JDK: Java Development Kit
JVM: Java Virtual Machine



Pros: Object-Oriented, Platform Independence

Cons: Memory Consumption, Slower Execution Speed

Q3. Write a java program to print “Hello World”. WAP to calculate addition, subtraction, multiplication, division, remainder, average, area of rectangle & triangle.

first.java

```
first.java > Java Language Support > first > main
1   public class first {
        Run | Debug
2       public static void main(String args[]){
3           System.out.print("Hello World");
4       }
5   }
```

PROBLEMS 1 OUTPUT TERMINAL PORTS COMME

```
sksahil@SKs-MacBook-Air coding % javac first.java
sksahil@SKs-MacBook-Air coding % java first
Hello World%
```

Main.java

```
1  class Main {
2      public static void main(String[] args) {
3          int a=10,b=5;
4          System.out.println(a+b); //Addition
5          System.out.println(a-b); // Subtraction
6          System.out.println(a*b); // Multiplication
7          System.out.println(a/b); // Division
8          System.out.println(a%b); // Modulo (Remainder)
9          System.out.println((a+b)/2); // Average
10         System.out.println(a*b);  // Area of rectangle
11         System.out.println(0.5f*b*a); // Area of triangle
12     }
13 }
```

Output

```
java -cp /
155
50
2
0
7
50
25.0
```

Q4. WAP to calculate remainder, average, percentage, area of rectangle & triangle. (input should be taken by user).

Main.java

```java
import java.util.*;
class Main {
    public static void main(String[] args) {
        Scanner sc= new Scanner(System.in);
        float a = sc.nextFloat();
        float b = sc.nextFloat();
        System.out.println(a+b); //Addition
        System.out.println(a-b); // Subtraction
        System.out.println(a*b); // Multiplication
        System.out.println(a/b); // Division
        System.out.println(a%b); // Modulo (Remainder)
        System.out.println((a+b)/2); // Average
        System.out.println(a*b);  // Area of rectangle
        System.out.println(0.5f*b*a); // Area of triangle
    }
}
```

Q5. WAP to find even or odd . (input should be taken by user)

Main.java

```java
import java.util.*;
class Main {
    public static void main(String[] args) {
        Scanner sc= new Scanner(System.in);
        int n = sc.nextInt();
        if(n%2 ==0){
            System.out.println("Even Number...");
        }else{
            System.out.println("Odd Number...");
        }
    }
}
```

Output

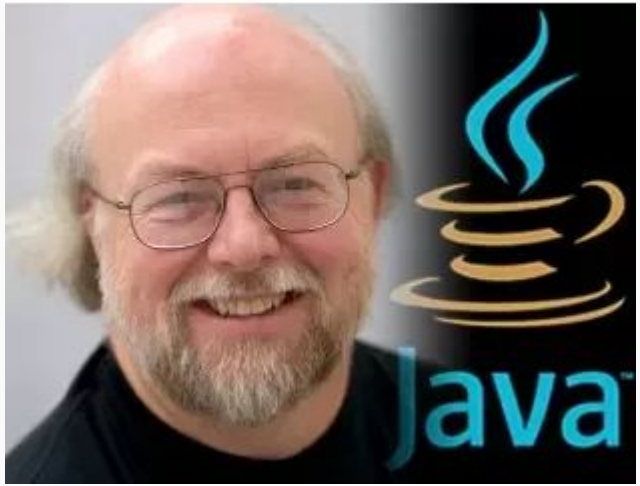
```
java -cp /tmp/y
10
Even Number...
```

Best 10 MCQ

Check your knowledge

Q1. Java Created By

1. Guido Van Rossum
2. Dennis Ritchie
3. **James Gosling**



Q2. Which order is correct?

1. public static void main(string args[ ]){.....}
2. public void static main(String args[ ]){.....}
3. **public static void main(String args[ ]){.....}**
4. Public static void main(String args[ ]){.....}

Q3. Is the class name & file name should be

1. Same
2. Not same

Q4. Which statement is true about Java?

a) Java is a sequence-dependent programming language

b) Java is a code dependent programming language

c) Java is a platform-dependent programming language

d) **Java is a platform-independent programming language**

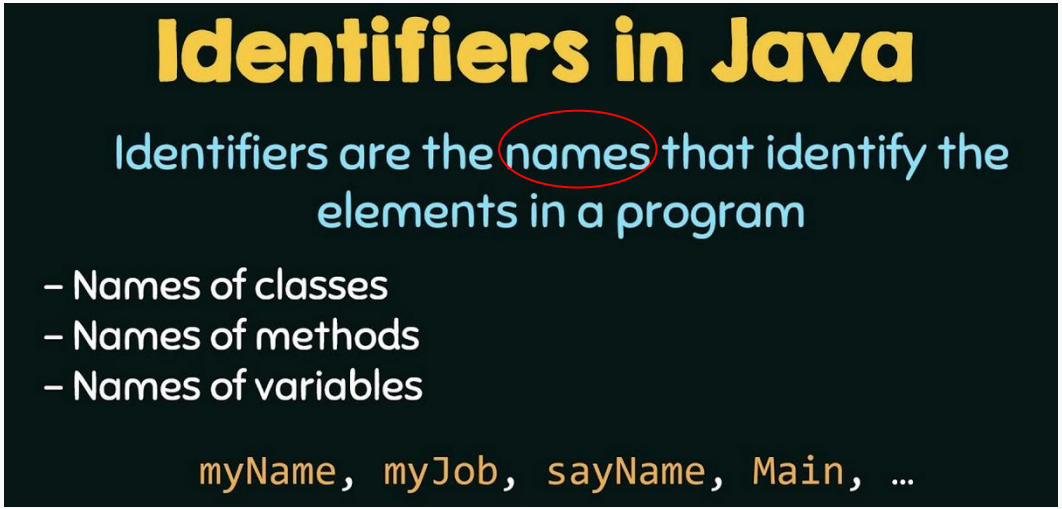
Q5. Which of these cannot be used for a variable name in Java?

a) identifier & keyword

b) identifier

c) **keyword**

d) none of the mentioned



Q6. What is the extension of java code files?

a) .js

b) .txt

c) .class

d) **.java**

Q7. What will be the output of the following Java code?

a) **32**

b) 33

c) 24

d) 25

```
1.    class increment {
2.        public static void main(String args[])
3.        {
4.            int g = 3;
5.            System.out.print(++g * 8);
6.        }
7.    }
```

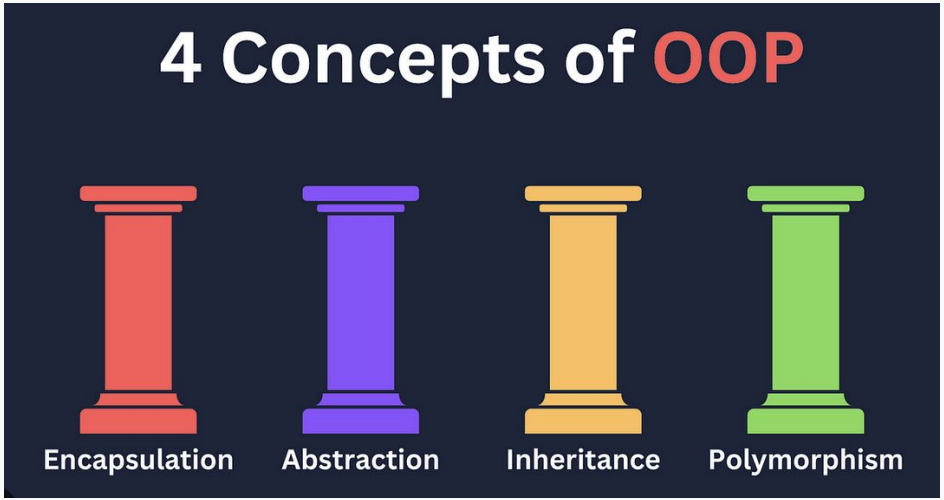
Q8. Which of the following is not an OOPS concept in Java?

a) Polymorphism

b) Inheritance

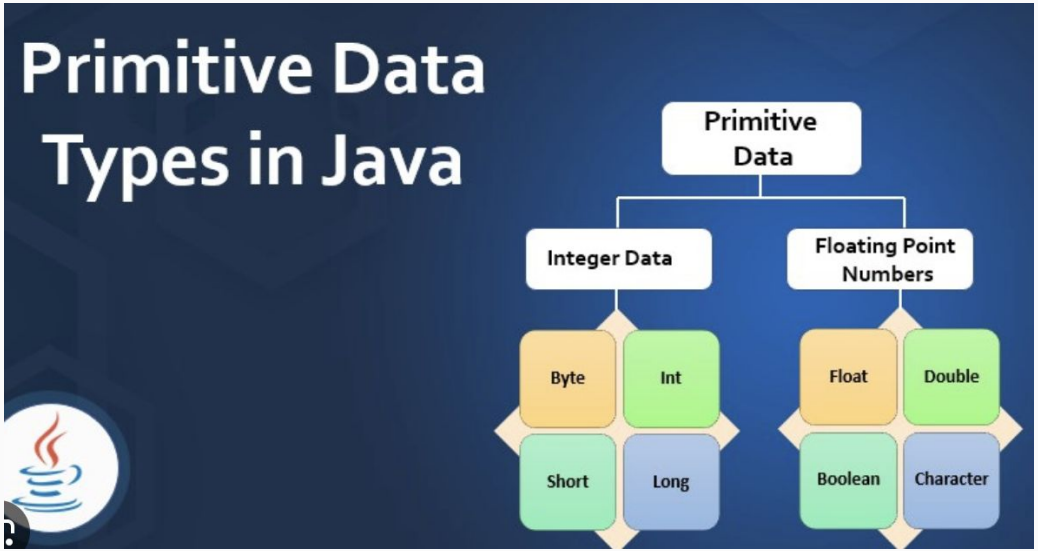
c) **Compilation**

d) Encapsulation



Q9. String is a

1. Primitive Data Type
2. Non-primitive Data Type



Q10. For output in java, we are using

1. system.output.println( );
2. System.output.println( )
3. **System.output.println( );**

Covered

What we have learned today.

- Boilerplate Code & Intro
- Output, Input
- Data Types (primitive & non primitive)
- Variable & Comments
- Operators & its types
- OOPs 4 pillars
- **Solve Best 27 Different Conceptual Questions with ans**

Thanks

Keep Learning
Keep Practicing
Keep Exploring