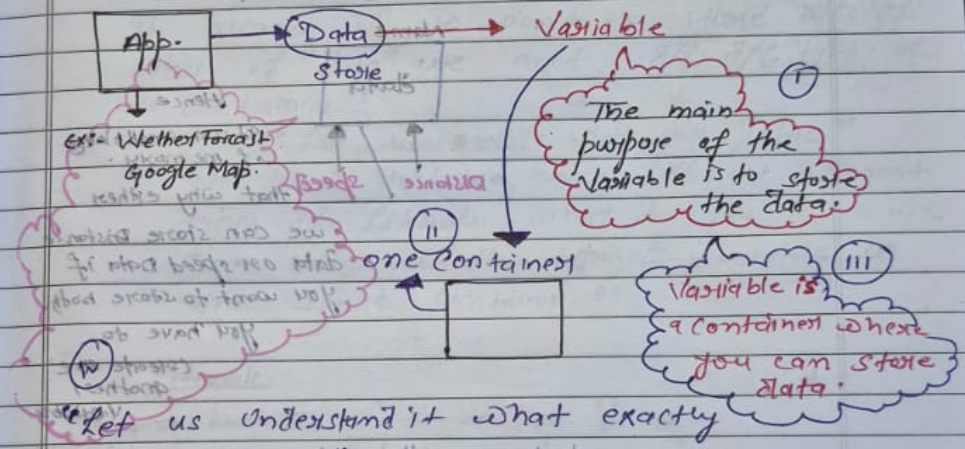
Topic :- Variable & Data Type

PAGE :
DATE : / /

"In the privious classes I had given you a scenario of FaceBook Let recall it or take any other application what ever you want" (example of)

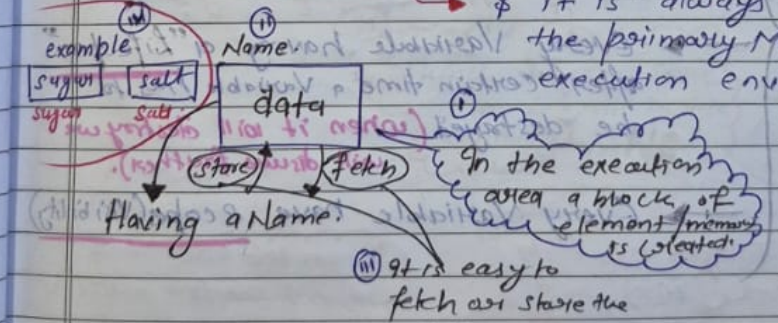
"Let us take your fav. social media Application that is 'Insta' or any Application"



"Let us understand it what exactly a Variable is"

→ Variable is a block of Memory.

→ & it is always created inside the primary Memory in the execution environment/Area



PAGE :
DATE :

(V)

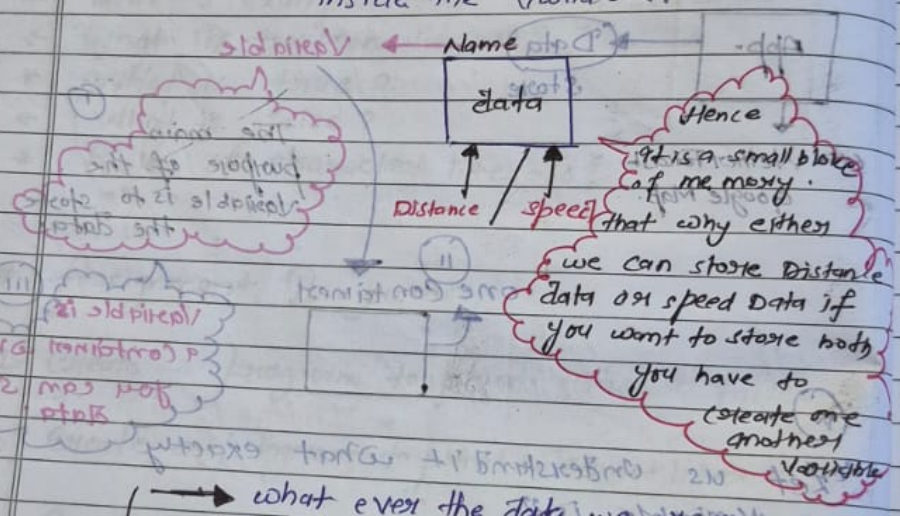
Defination:-

↳ It is a named block of memory.

Advantage:-

↳ We can store/fetch the data using name.

→ we can store only one value inside the variable.



→ what ever the data we are going to store inside a variable is not permanent. It is temporary.

→ Every variable having a "Lifespan" after certain time a variable has to be destroyed (when it will destroy we will discuss further).

→ Every variable have scope (visibility)

Topic :- Syntax to Declare Variable

PAGE :
DATE : / /

* Data Type (which Type of data)

" Let us understand with a example ok "

" Suppose I want to store

water	we need	Bottle.
if " " " "	copy	" "	Bag
" " " "	clothe	" "	Almeria
" " " "	Human	" "	House.
	↓		↓
	Types of Data.		Types of Container.

It means if we want to store diff diff types of "data" we need diff diff types of "containers"

" Let us relate with our Topic "

" We know that we have different different types of Literals. What do you think we can store all this type of Variable in the same container. "

Literals

Types of Data
- → Numbers
- → Characters
- → String.
- → Boolean

store.

?

one Container

Can you think we can store all this literals in one Container. 'NO'

PAGE :
DATE :

So, The syntax to declare a Variable is:

Syntax:-

datatype identifier1;

datatype identifier1, identifier2, ... ;

we can declare multiple variable in single line.

(Variable Declaration Statment)

Example :- (Create Variable)

→ int :-

→ It refers to the Integer Number.

Step1 :- Create Variable ;

int age ;

syntax:-
datatype identifier;
ex:- int age;
int a;

→ age = 23

This is a data Integer type data (int)

Store int type of data

age

when we run the the code it will create a block of memory with the name "age"

Example:- (Store the Value in Variable)

Assingment operator (=) <- with the help of assingment operator we add the data

Step2:- Add the Value to the Container

age = 23;

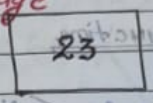
Assingment Statment

Syntax:-

identifier = data;

Ex:- age = 23;

a = 50;



Note:- Assingment operator work from "Right" to "Left" means what ever the value present inside the "Right side" will get store to the "Left side Variable"

Ex:- age = 23;

storing

Variable Name / Array Name / Object

data / Value

Step3:- Declare & Initialization Statment in a single line.

Syntax:-

datatype identifier = Literal / Data, ...;

int age = 23;

(i) Declaration statment

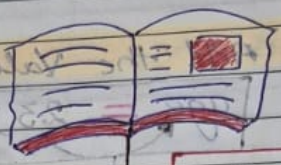
(ii) Initialization statment

Ex:- int a=1, b=2;

char ch1='a', ch2, ch3='b';

PAGE :
DATE :

Example 2:-



price : 125

Instruction	Memory
→ int price ; ✓ 1st	price → 125
price = 125 ; ✓ 2nd	
identifier	
operator	
Literal/value/data	
→ printing	
System.out.println(price);	

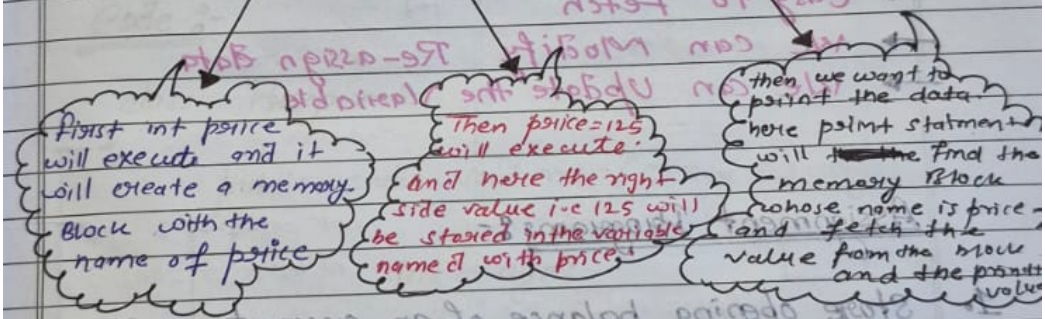
Inside point statment we pass the variable name, here point statment will the the memory block whose name is price and whatever the the value present inside the price variable it will come to point statment and the point the value

PAGE :
DATE :

Program:

```
class Program1 {
    public static void main(String[] a)
    {
        int price;
        price = 125;
        System.out.println(price);
    }
}
```

Start execution



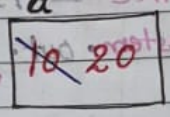
Imp. Question

* What is a Variable?
* Why do we need variable?
* Explain Characteristics of Variable?
* What is the syntax to create a Variable?
* Can we create multiple Variable in Single Statment?
* How many Values can be stored in a Variable?

Example:- (Re-Initialization)

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

a = 20;
System.out.println(a); //20
```



Advantages of Variable:-

→ Easy to Fetch
→ We can Modify Re-assign data
→ We can Update the Variable

Assignment Programs:-

1. Store opening balance of an account as 2500, and perform the following transaction.

T1 ----------> Withdraw 250
T2 ----------> deposite 300
T3 ----------> transfer 400
T4 ----------> deposite 200
T5 ----------> maintainance charge 180
T6 ----------> display account balance

29/8/25

PAGE :
DATE : / /

Program 3.1 :-

Explanation :-

Instruction	Memory :
`int age;`	age [ ]
`age = 23;`	age 23
`// after 1 year`	
`age = age + 1;`	age ~~23~~ 24
Expression: `23 + 1` = 24	

Code :-

```
class Program2
{
    public static void main(String [] args)
    {
        int age;
        age = 23;
        System.out.println(age); // 23
        age = age + 1;
        age = 23 + 1
        age = 24
        System.out.println(age); // 24
    }
}
```

`int age;` → age [ ]

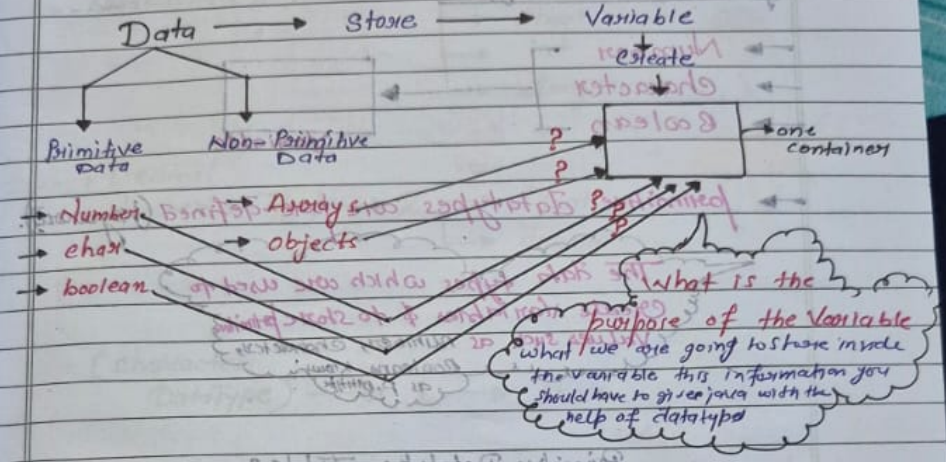
`age = 23;` → 23 → age

`System.out.println(age); // 23`

`age = age + 1;` → ~~23~~ 24 → age

`System.out.println(age); // 24`

Topic:- Data Types



Defination :-

This is used to create a variable

It specifies what type of data is allowed in the variable

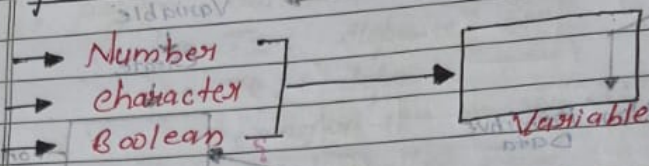
datatype

primitive Datatype

Non-primitive Datatype

PAGE :
DATE :

* Primitive Datatypes :-



→ primitive datatypes are pre-defined (keywords)

The data types which are used to create variables & to store primitive values such as numbers, characters, Booleans known as P.datatype

Primitive Datatype Table :-

Primitive Value		Primitive Data Types	Default Values	Size
Numbers	Integers (Whole Numbers) +ve to 0 to -ve	byte	0	1 byte
		short	0	2 byte
		int	0	4 byte
		long	0l / L	8 byte
	Floating Values	float	0.0f / F	4 byte
		double	0.0d / D	8 byte
Character		char	\u0000	2 byte
Boolean		boolean	false	1 bit

Note :- The number data type in increasing order of the capacity.

byte < short < int < long < float < double

PAGE :
DATE : / /

(Integer NumberDataType) → 4 → byte
→ short
→ int
→ long

(Decimal NumberDataType) → 2 → float
→ double

(character DataType) → 1 → char

(Boolean DataType) → 1 → boolean

8 → Total Number of primitive data type.

Since primitive Data types are pre-defined or it is a keyword so,

Every primitive datatype must be written in lower case.

Ex:-

Short ✗

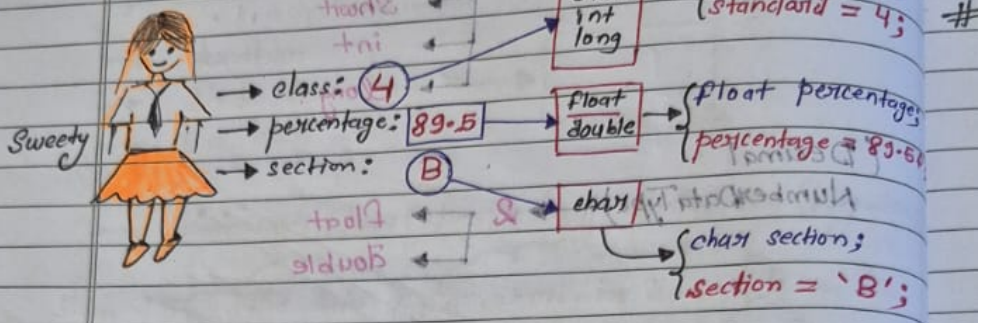
short ✓

Int ✗

int ✓

PAGE :
DATE :

Example :-



Code :-

```
class School
{
    public static void main (String[] args)
    {
        byte clas;
        clas = 4;

        float per;
        per = 89.5f;

        char sec;
        sec = 'B';

        System.out.println (clas);
        System.out.println (per);
        System.out.println (sec);
    }
}
```

PAGE :
DATE : / /

1

Difference b/w each Number DataTypes :-

Capacity :-

byte, short, int, long } use to store Integer value

float, double } use to store Decimal value

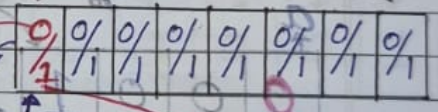
How Data will store inside the memory Let us understand by an example :-

11

Datatype identifier Size of datatype

byte a ; 1 byte. " 8-bit

It will create a memory block of 8-bit



Sign Bit or Flag Bit

if the we store positive no then first block it will store '0'

It is the representation of the no that is +ve or -ve

If the no. is a negative number then it will store '1'

PAGE :
DATE :

11

→ Suppose I want to store 25 in byte data type

+ve (25)$_{10}$ → ( )$_2$

Base is 10 because it is decimal no.

we need to convert it into Binary No.

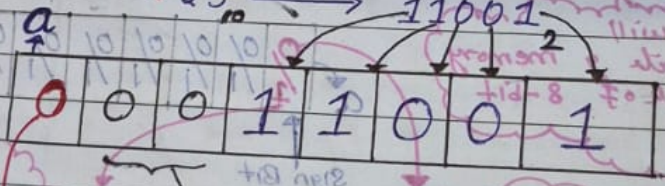
→ How to convert Decimal to binary?

+ve no so sign bit is '0'

2	25	
2	12	→ 1
2	6	→ 0
2	3	→ 0
	1	→ 1

→ Binary formate of 25

$+25_{10} \rightarrow 11001_2$



Because 25 is +ve number

Rest of the block filled with 0

This is how the data will get stored inside the memory and same thing happen for all the no. datatype

PAGE :
DATE :

Capacity (Range)

1) byte :
   - min : -128
   - max : 127

2) short :
   - min : -32768
   - max : 32767

3) int :
   - min : -2147483648
   - max : 2147483647

4) long :
   - min : -9223372036854775808
   - max : 9223372036854775807 (19 digit no.)

5) float :
   - min : 1.4E-45
   - max : 3.4028235E38 → 10^{38} (39 digit no.)

6) double :
   - min : 4.9 -324
   - max : 1.79769313486231570E308 → 10^{309} (309 digit no.)

PAGE :
DATE :

* Non-Primitive Data type :-

(i) (Non-primitive data is multi valued data) To, store this, we need more than 1 memory block.

(ii) **purpose**

The main purpose of Non-primitive variable is to store reference or address of another block of memory.

(iii) "Understand with an example"

① class Box { }

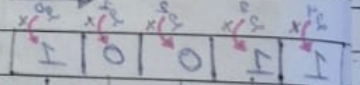
(i) "Box is the name of class"

(ii) "It is also a Non-primitive data type"

(iv) Note :- In Java we don't have any thing which is pre-defined Non-primitive data types

Every class we create the name of the class is non-primitive datatype.

(v)



(ii) class Book { }

1 = 1 (i) "Book is the name of class"

0 = 0 (ii) "It is also a Non-primitive data type."

0 = 0 × 2

8 = 1 × 2³

01 = 1 × 2⁴

→ Every class Name in Java is non-primitive data type. 8 + 0 + 0 + 1 =

Ex :- class Hero { }

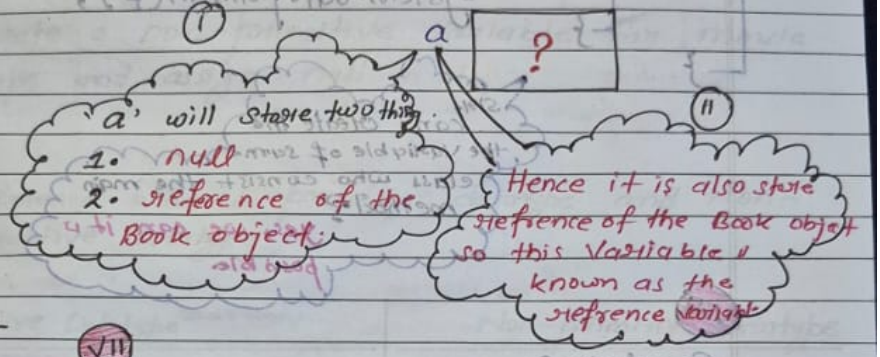
→ Hero is non-primitive datatype.

VI

→ Q, Sir Can i create a variable by using Non-primitive datatype? "Yes we can"

class Book
{
}

Syntax:-
datatype identifier;
Book a;



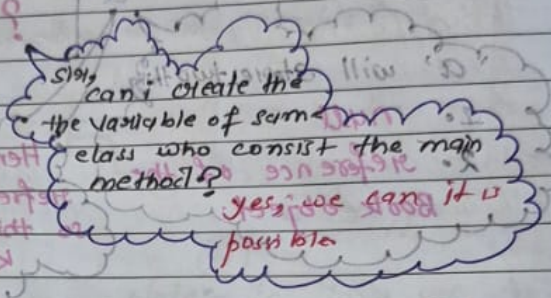
Code:-

VII

```
class Book {
}
class Program1
{
    public static void main(String[] args)
    {
        Book b;

        Book b1, b2, b3;
        b1 = b2 = b3 = null;
        System.out.println(b); //null
        System.out.println(b1); //null
        System.out.println(b2); //null
        System.out.println(b3); //null
    }
}
```

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



(VIII)

Conclusion:-

→ Every class Name is a Non-primitive datatype.

→ "null" keyword is the default value for all non-primitive datatypes.

→ We can create reference variable with the help of non-primitive datatypes.

Imp. Question:-

* What is non-primitive datatype?
* Why do we need non-primitive datatype?
* What is null?
* How to create reference variable in java?
* What is a class name in java?

PAGE :
DATE :

Assignment Programs :-

1) Create a non-primitive variable for bottle type and assign null in it.

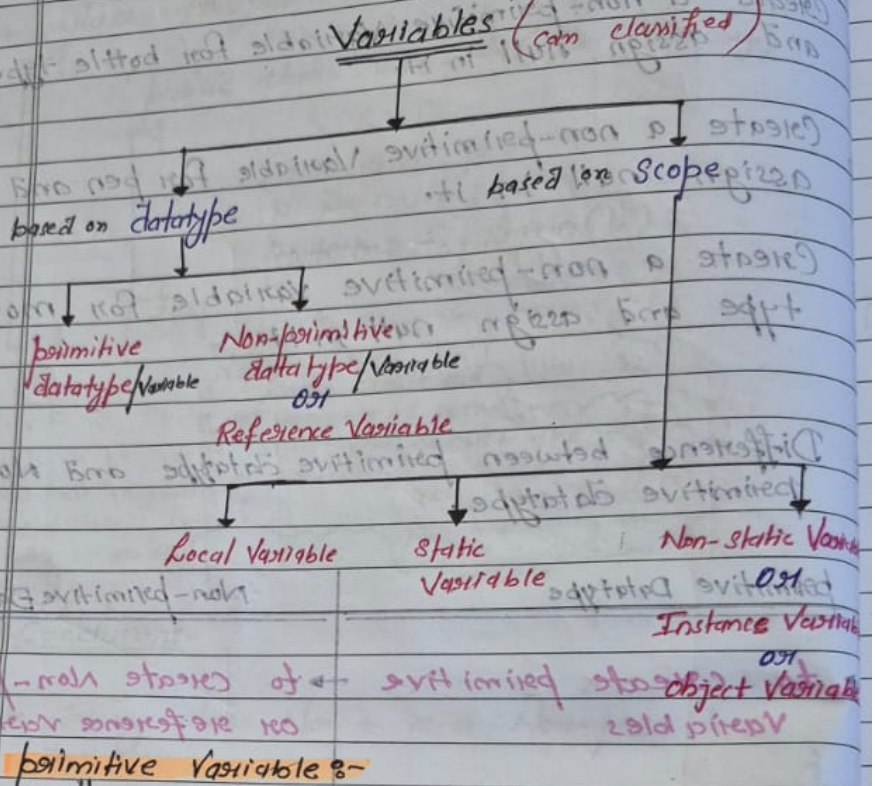
2) Create a non-primitive variable for pen and assign null in it.

3) Create a non-primitive variable for movie type and assign null in it.

* Difference between primitive datatype and Non-primitive datatype.

Primitive Datatype	Non-primitive Datatype
→ to create primitive variables	→ to create Non-primitive or reference variable
→ 8 primitive datatypes	→ infinite non-primitive datatypes.
→ User-defined is not allowed (pre-defined)	→ user-defined is allowed.

Topic:- Types of Variable



* **primitive Variable:-**

→ The Variables created from primitive data type is called is primitive Variable

Store

→ primitive Data:-
- Number Literal
- Character Literal
- boolean Literal

→ Values are stored inside the primitive variable.

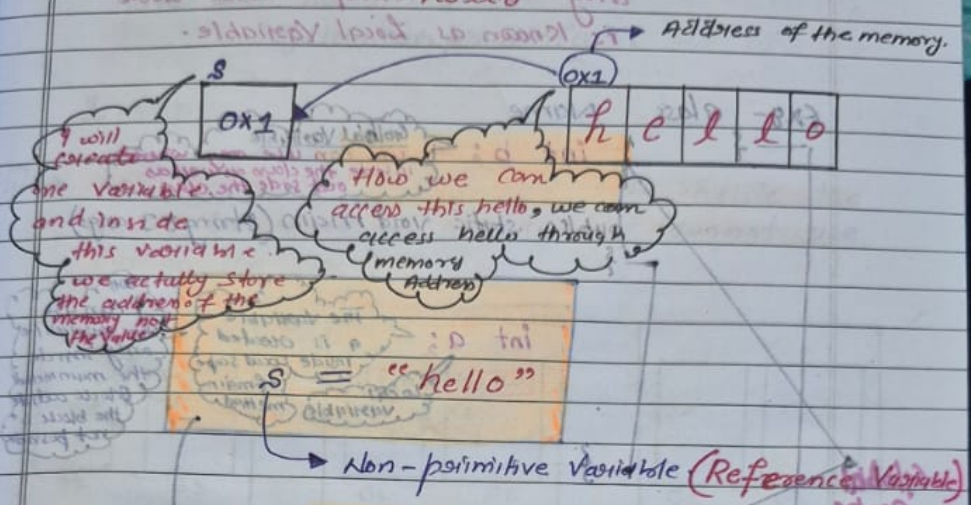
Ex:- `int a;` → primitive Variable.

`a = 20;`

a | 20

PAGE :
DATE : / /

* Non-primitive Variable :-

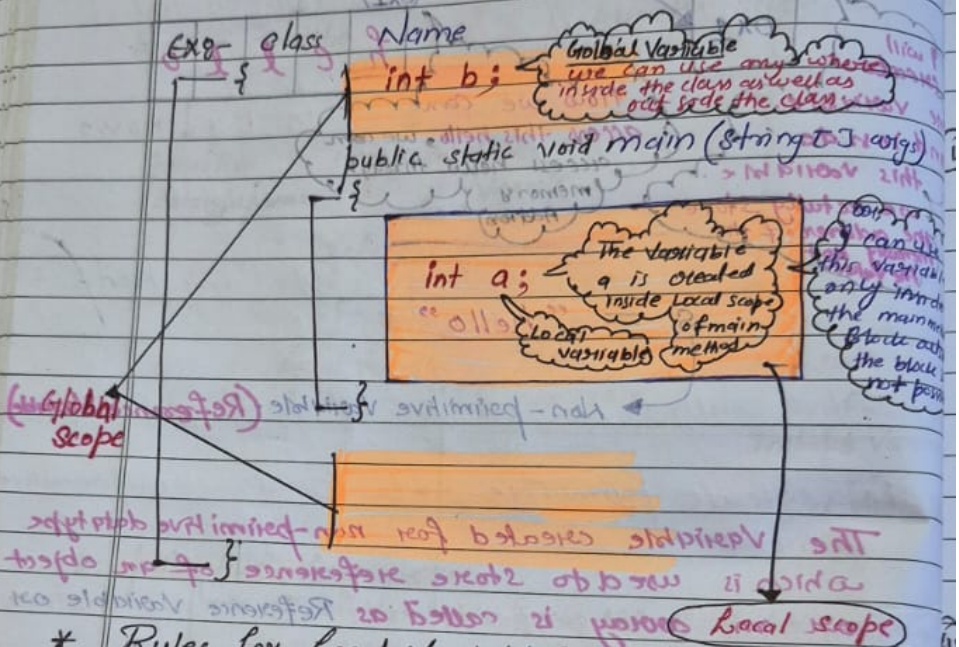


The Variable created for non-primitive datatype which is used to store reference of an object (or) and array is called as Reference Variable or Non-primitive Variable

PAGE :
DATE :

* Local Variable :

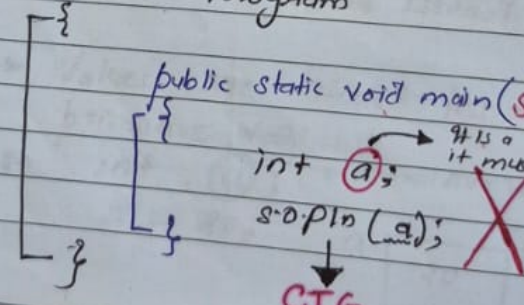
↳ A variable declared in method block or initializer block or any "block" except "class block" is known as Local Variable.



* Rules for Local Variable :

① → we can not use local variable without assigning data

Ex: class Program



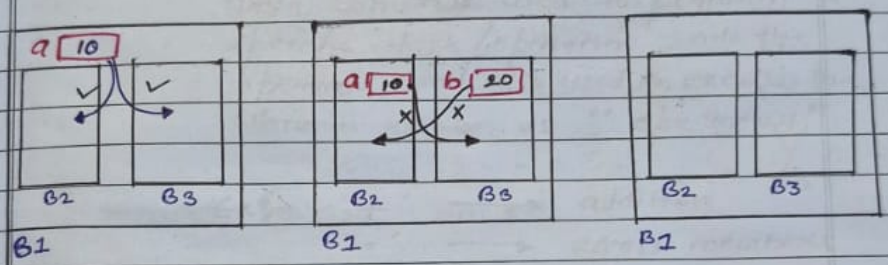
PAGE :
DATE : / /

error :-

program.java:5: error: variable a might not have been initialized.
System.out.println(a);
^

1 error

(ii) → we can use the variable only inside the block where it is declared (we cannot use outside the block)



(iii) → we can not declare 2 local variable with same name inside the same scope.