Variables and Data Types in Java

1.What is a Variable in Java?

A **variable is like a box** that stores data in memory.
You give the box a **name**, so you can use the data later.

Example in real life:

- You have a box named **age**
- You put **20** inside it

2.Syntax of Variable in Java

dataType variableName = value;

Example:

int age = 20;

- int → type of data
- age → variable name
- 20 → value stored

3.Types of Variables in Java

Java has **3 main types of variables**:

1.Local Variable

Created inside a method (function)

```
class Test {

   public void show() {

      int x = 10;   // local variable

      System.out.println(x);

   }

}
```

Only works inside that method
Memory is deleted after method finishes

2.Instance Variable

Created inside class but outside method
Each object gets its own copy

```
class Student {

   int age = 18;   // instance variable

}
```

Belongs to object
Different objects can have different values

3.Static Variable

Created using static keyword
Shared by all objects (one copy only)

```
class College {

   static String name = "IIT";

}
```

Same value for everyone
Stored once in memory

Name	Width	Range
long	64	–9,223,372,036,854,775,808 to 9,223,372,036,854,775,807
int	32	–2,147,483,648 to 2,147,483,647
short	16	–32,768 to 32,767
byte	8	–128 to 127

Name	Width in Bits	Approximate Range
double	64	4.9e–324 to 1.8e+308
float	32	1.4e–045 to 3.4e+038

4.Primitive Data Type Variables

Java has **8 primitive types** (basic types):

Type	Size	Example
byte	1 byte	byte a = 10;
short	2 byte	short s = 100;
int	4 byte	int x = 10;
long	8 byte	long l = 1000L;
float	4 byte	float f = 10.5f;
double	8 byte	double d = 20.5;
char	2 byte(unicodes)	char c = 'A';
boolean	1 bit	boolean b = true;

5.Reference Variables (Non-Primitive)

They store **address of object** (not direct value)

String name = "Vijay"; // reference variable

Student s = new Student();

They point to objects in memory

Variable Naming Rules

Must start with letter, _ or $
Cannot start with number

Valid:

int age;

int _marks;

int $salary;

Invalid:

int 1age; // wrong

Difference: Variable vs Constant

Variable (can change)

int age = 20;

age = 25; // allowed

Constant (cannot change)

final int AGE = 20;

Memory Concept (Simple)

Variable = name
Value stored in RAM
Reference variable stores **address**

Think variable like:

Real Life	Java
Box	Variable
Box name	Variable name
Item inside box	Value

6.Identifier

(in Java) = the name you give to something.

It is just a **name for variables, methods, classes, objects, packages, etc.**

Simple Example

int age = 20;

Here:

- age 👉 identifier (name of variable)

```
class Student {

   void study() {}

}
```

- Student 👉 class identifier
- study 👉 method identifier

Rules

Can start with letter, _, or $
Cannot start with number

7.What is a Literal?

Literal = the actual value written directly in the code.

Example

```
int age = 20;
```

- 20 → literal (real value)
- age → identifier (name)

```
String name = "Vijay";
```

- "Vijay" → literal

8.Keyword (in Java)

special reserved word with fixed meaning.

Keywords are words that Java already uses, so you cannot use them as names.

public

class

static

void

int

if

else

for

while

return

new

Total = 68 Keywords

Example

int age = 20;

- int → keyword
- age → identifier
- 20 → literal

Keyword is a reserved word in Java that has a predefined meaning and cannot be used as an identifier.