**🔹 Java Interview Questions on Variables & Data Types**

Here are some **important interview questions** with proper explanations and answers.

**📌 1. What is the difference between instance and static variables?**

✅ **Answer:**

| **Feature** | **Instance Variable** | **Static Variable** |
| --- | --- | --- |
| **Declaration** | Inside a class, outside a method | Inside a class with static keyword |
| **Memory Allocation** | Created for each object separately | Created once for the class (shared) |
| **Access** | Accessed via an object (obj.variable) | Accessed using class name (ClassName.variable) |
| **Stored In** | Heap Memory | Method Area (Class Memory) |
| **Example** | String name; | static String company; |

✅ **Example Code:**

class Employee {

String name; // Instance Variable

static String company = "Google"; // Static Variable

}

**📌 2. Can we use a local variable without initializing it? Why?**

❌ **No, we cannot use a local variable without initializing it.**

🔹 **Reason:**

* Local variables **do not get default values** like instance and static variables.
* The compiler **forces us to initialize** them before use.

✅ **Example (Gives Compilation Error)**

public class Example {

public static void main(String[] args) {

int x; // Not initialized

System.out.println(x); // ❌ Error: Variable 'x' might not have been initialized

}

}

✅ **Correct Code:**

public class Example {

public static void main(String[] args) {

int x = 10; // Initialized

System.out.println(x); // ✅ No error

}

}

**📌 3. What is the default value of an int instance variable?**

✅ **Answer:**

* If an instance variable of type int is **not initialized explicitly**, Java assigns it a **default value of 0**.

✅ **Example:**

class Example {

int num; // Default value = 0

void display() {

System.out.println("Default int value: " + num);

}

public static void main(String[] args) {

Example obj = new Example();

obj.display(); // Output: Default int value: 0

}

}

**📌 4. Why is char in Java 2 bytes while byte is 1 byte?**

✅ **Answer:**

* In Java, char uses **2 bytes (16 bits)** because Java uses **Unicode characters**, which support **multiple languages**.
* byte uses **1 byte (8 bits)** and stores only numbers from **-128 to 127**.

✅ **Example:**

char ch = 'A'; // Uses 2 bytes (Unicode)

byte b = 100; // Uses 1 byte

System.out.println(ch + " " + b);

**📌 5. Where are instance, static, and local variables stored?**

✅ **Answer:**

| **Variable Type** | **Stored In** |
| --- | --- |
| **Instance Variable** | Heap Memory |
| **Static Variable** | Method Area |
| **Local Variable** | Stack Memory |

**📌 6. Can we declare a static variable inside a method?**

❌ **No, we cannot declare a static variable inside a method.**

✅ **Reason:**

* Static variables **belong to a class** and should be shared across all objects.
* Methods **execute at runtime**, so static variables **cannot be tied to a specific method**.

✅ **Example (Gives Error)**

public class Example {

void test() {

static int x = 10; // ❌ Error: Static variables cannot be declared inside a method

}

}

✅ **Correct Code:**

public class Example {

static int x = 10; // ✅ Correct: Declared at class level

}

**📌 7. What is typecasting? How is it done in Java?**

✅ **Answer:**  
Typecasting is **converting one data type into another**.

🔹 **Types of Typecasting in Java:**  
1️⃣ **Implicit Typecasting (Widening) → No data loss**  
2️⃣ **Explicit Typecasting (Narrowing) → Possible data loss**

✅ **Example:**

// Widening (No data loss)

int num = 10;

double d = num; // Implicit typecasting

// Narrowing (May lose data)

double pi = 3.14;

int x = (int) pi; // Explicit typecasting

**📌 8. What is the difference between float and double?**

✅ **Answer:**

| **Feature** | **float** | **double** |
| --- | --- | --- |
| **Size** | 4 bytes | 8 bytes |
| **Precision** | ~6 decimal places | ~15 decimal places |
| **Use Case** | Less memory, less precision | High precision calculations |
| **Example** | float x = 10.5f; | double y = 10.5; |

✅ **Example Code:**

float a = 3.1415926f; // Float (4 bytes, ~6 decimal places)

double b = 3.141592653589793; // Double (8 bytes, ~15 decimal places)

System.out.println(a);

System.out.println(b);

**📌 9. Why do we use L for long and f for float?**

✅ **Answer:**

* In Java, int is the **default type** for whole numbers, and double is the **default type** for decimal numbers.
* To indicate a **long integer**, we **must** add L.
* To indicate a **float**, we **must** add f.

✅ **Example:**

long bigNum = 10000000000L; // Without L, Java assumes it's an int (causes error)

float smallDecimal = 10.5f; // Without f, Java assumes it's a double (causes error)

**📌 10. What is the difference between == and .equals()?**

✅ **Answer:**

| **Operator** | **Used For** | **Compares** |
| --- | --- | --- |
| == | **Primitive data types** | Value |
| .equals() | **Objects (Strings, Wrapper Classes)** | Content |

✅ **Example:**

String s1 = new String("Java");

String s2 = new String("Java");

System.out.println(s1 == s2); // false (Different objects)

System.out.println(s1.equals(s2)); // true (Same content)

**🎯 Conclusion**

🔹 These are **must-know Java interview questions** on **variables & data types**.  
🔹 **Try writing code examples for each!**

**📌 Next Step: Do you want to continue with Loops (for, while)? 😊**