

Section 1**1. Difference between Primitive and Reference Datatypes.**

Primitive datatypes are data types that are already defined in java while Reference datatypes are used to store references or memory addresses that point to objects stored in memory.

2. Define the scope of a variable.

A global variable exists in the program for the entire time the program is executed while a local variable is created when the function is executed, and when finished, it is destroyed.

3. Why is initialization of variables required?

It can prevent unintended errors during the course of writing and running an application.

4. Differentiate between static, instance and local variables.

A static method belongs to the class itself and can be called directly on the class, while an instance method operates on instances of the class and can access instance variables while a local variables can only be used within the specific function, as they are defined locally.

5. Differentiate between widening and narrowing casting in java.

Widening casting safely converts smaller types to larger types while Narrowing casting requires explicit conversion from larger to smaller types and can lose data.

6. Fill in the table

TYPE	SIZE (IN BYTES)	DEFAULT VALUE	RANGE
boolean	1 bit	false	true, false
char	2	'\u0000'	'\0000' to '\ffff'
byte	1	0	-128 to 127
short	2	0	-215 to +215-1
int	4	0	-2 ³¹ to 2 ³¹ -1
long	8	0L	-2 ⁶³ to 2 ⁶³ -1
float	4	00.0f	-3.4E+38 to 3.4E+38
double	8	0.0d	-1.8E+308 to 1.8E+308

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Is a blueprint for creating objects.

8. Importance of classes in Java.

It provides the template for creating objects, which can bind code into data.

Section 2

1. User to enter their surname and current age then print the number of characters of their surname.

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

```
public class UserInformation {
```

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

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

```
        // Input surname and age
```

```
        System.out.print("Enter your surname: ");
```

```
        String surname = scanner.nextLine();
```

```
        System.out.print("Enter your current age: ");
```

```
        int age = scanner.nextInt();
```

```
        // Calculate the number of characters in the surname
```

```
        int numOfChars = surname.length();
```

```
        System.out.println("The number of characters is " + numOfChars);
```

```
        // Determine if the age is even or odd
```

```
        if (age % 2 == 0) {
```

```
            System.out.println("Your current age is an even number");
```

```
        } else {
```

```
            System.out.println("Your current age is an odd number");
```

```
    }  
}  
}
```

2. Enter the marks of the five units did last semester, compute average and display.

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

```
public class AvgMarks {
```

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

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

```
        int[] marks = new int[5];
```

```
        // Input marks
```

```
        System.out.println("Enter the marks for five units:");
```

```
        for (int i = 0; i < 5; i++) {
```

```
            marks[i] = scanner.nextInt();
```

```
        }
```

```
        // Calculate the average
```

```
        int sum = 0;
```

```
        for (int mark : marks) {
```

```
            sum += mark;
```

```
        }
```

```
        double average = (double) sum / marks.length;
```

```
        System.out.printf("The average marks are: %.2f%n", average);
```

```
    }
```

```
}
```

3. Helps kids learn divisibility test of numbers of integers.

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

```
public class DivisibilityTest {
```

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

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

```
        // Prompt user to enter an integer
```

```
        System.out.print("Enter an integer: ");
```

```
        int number = scanner.nextInt();
```

```
        // Checking divisibility for digits 1-9 (skipping 0 since division by 0 is undefined)
```

```
        System.out.println("Checking divisibility for digits 1-9:");
```

```
        for (int i = 1; i <= 9; i++) {
```

```
            if (number % i == 0) {
```

```
                String reason = getDivisibilityReason(number, i);
```

```
                System.out.println("The number " + number + " is divisible by " + i + reason);
```

```
            }
```

```
        }
```

```
    }
```

```
    // Helper method to generate a reason why the number is divisible
```

```
    private static String getDivisibilityReason(int number, int divisor) {
```

```
        switch (divisor) {
```

```
            case 2:
```

```
                return " because it is even.";
```

```

    case 3:
        return " because the sum of its digits is divisible by 3.";
    case 4:
        return number % 100 % 4 == 0 ? " because the last two digits form a number
divisible by 4." : ".";
    case 5:
        return number % 10 == 0 || number % 10 == 5 ? " because it ends in 5 or 0." : ".";
    case 6:
        return number % 2 == 0 && number % 3 == 0 ? " because it is divisible by both 2
and 3." : ".";
    case 7:
        return " because the difference between twice the last digit and the rest of the digits
is divisible by 7.";
    case 8:
        return number % 1000 % 8 == 0 ? " because the last three digits form a number
divisible by 8." : ".";
    case 9:
        return " because the sum of its digits is divisible by 9.";
    default:
        return ".";
    }
}
}

```

4. Display all the multiples of 2, 3 and 7 within the range 71 to 150.

```

public class Multiples {

    public static void main(String[] args) {
        System.out.println("Multiples of 2, 3, and 7 between 71 and 150:");

        for (int i = 71; i <= 150; i++) {

```

```

        if (i % 2 == 0 || i % 3 == 0 || i % 7 == 0) {
            System.out.println(i);
        }
    }
}
}
}

```

5. Calculator to help user perform basic operations.

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

```
public class Calculator {
```

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

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

```
        // Input number, operation, and another number
```

```
        System.out.print("Enter first number: ");
```

```
        double num1 = scanner.nextDouble();
```

```
        System.out.print("Enter an operation (+, -, *, /): ");
```

```
        char operation = scanner.next().charAt(0);
```

```
        System.out.print("Enter second number: ");
```

```
        double num2 = scanner.nextDouble();
```

```
        double result = 0;
```

```
        switch (operation) {
```

```
            case '+':
```

```
        result = num1 + num2;

        break;
    case '-':
        result = num1 - num2;

        break;
    case '*':
        result = num1 * num2;

        break;
    case '/':
        if (num2 != 0) {
            result = num1 / num2;
        } else {
            System.out.println("Error: Division by zero is not allowed.");
            return;
        }
        break;
    default:
        System.out.println("Error: Invalid operation.");
        return;
}

// Display the result
System.out.println("The result of the operation is: " + result);
}
}
```