Character Set: It is a set of characters that can be used in a program. It consists of alphabets(A…Z, a…z), digits(0…9), and special characters(&,:,;,*, space etc.).

Identifier: It is a symbolic name given by a programmer for any data item or function. The identifier is a sequence of characters taken from Java character set. The rules for formation of an identifier are:

- Can consist of alphabets, digits and special character underscore(_).
- Can start with an alphabet or underscore, but not with a digit.
- Java is case sensitive.

Variable: It is a location in the computer memory which can store data and is given a symbolic name for easy reference. It's value can change during program execution. The syntax for declaring a variable:

<data type> <variable name> [=<initial value>], … ;
Example:
char grade;
int a,b=10,c;

Data type has to be any one of the data types present in Java. The primitive data types available in Java are:

Data Type	Kind of value	Memory Used	Range of Values
byte	Integer	1 byte	-128 to 127
short	Integer	2 bytes	-32768 to 32767
int	Integer	4 bytes	-2,147,483,648 to 2,147,483,647
long	Integer	8 bytes	-9,223,372,036,8547,75,808 to 9,223,372,036,8547,75,807
float	Floating Point	4 bytes	$\pm 3.4 \times 10^{+38}$ to $\pm 1.4 \times 10^{-45}$
double	Floating Point	8 bytes	$+1.7 \times 10^{+308}$ to $\pm 4.9 \times 10^{-324}$
char	Single Character (Unicode)	2 bytes	All Unicode values from 0 to 65,355
boolean		1 bit	True or False

Keyword/Reserved word: A keyword is a reserved word that has a predefined meaning and purpose in the language. It cannot be used as an identifier by the user in his program. Eg. float

Operators: An operator is a symbol or letter used to indicate a specific operation on variables or values in a program. Following are the types of operators in Java:

i) **Unary operators**: Operators which operate on one operand. For eg. The increment(++), decrement(--), and the logical NOT(!) are the unary operators.

ii) **Binary operators**: Operators which operate on two operands, are called binary operators.For example, all arithmetic operators, all relational operators and the logical AND(&&), and OR(||) are the binary operators.

Punctuators/Separators: The following characters are used as punctuators/separators in Java: ( ) { } , ; : * [ ]

Constant/Literal: It is an identifier whose value does not change during program execution. The syntax for declaring a constant is
public static final <data type of constant> <name of constant> = <constant value> ;
For eg: public static final float pi=3.14;

Example of java program:

```
import java.util.Scanner;  //Gets the Scanner class from package(library)
                           //  java.util

public class Example
{
  public static void main(String[] args)
  {
    int a,b;
    Scanner input=new Scanner(System.in); //Object for taking input
    System.out.println("Enter a number:");
    a=input.nextInt();//Reads whole number from keyboard
    System.out.println("Enter a number:");
    b=input.nextInt();//Reads whole number from keyboard
    System.out.println("sum=" + (a+b));
   }
}
```

Output using Println: System.out.println statement is used to display a value on the screen.It takes a line feed after displaying the value.

Syntax:
System.out.println(value/variable/expression);
Example:

```
System.out.println("Enter a number:");
```

Input using System.in: We use class Scanner, which Java supplies, to accept keyboard input. We need to import the definition of the Scanner class from the package java.util by using the following statement:

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

An object of Scanner class has to be created using the statement:

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

For assigning the input value to a variable , use the following syntax:

```
variable =input.nextInt(); //nextInt() is for reading an integer value.
```

Assignment Statements: The equal sign, causes the value on right to be assigned to be assigned to the variable on the left. The statement which assign values to variables are called assignment statements.

Syntax:

Variable=value/variable/expression;

Example:

```
a=10;
```

Assignment Compatibilities: You can assign a value of any type on the following list to a variable of any type that appears further down on the list:

byte → short → int → long → float → double

Errors: There are three types of errors encountered in any programming language:

a) **Syntax Errors:** The errors which are traced by the compiler during compilation, due to wrong grammar for the language used in the program, are called syntax errors.
   For example: System.out.println(a) // Missing Semicolon

b) **Run-Time Errors:** The errors encountered during execution of the program, due to unexpected calculation or input or output, are called run-time errors.
   For Example: a=n/0; //Division by zero

c) **Logical Errors:** These errors are encountered when the program does not give the desired output, due to wrong logic of the program.
   For Example: remainder= b+c; // Wrong operator is used

Arithmetic Operators: The arithmetic operators available in Java are:

Operator	Usage
+	Used for addition
-	Used for subtraction
*	Used for multiplication
/	Used for division
%	This operator is called the ***remainder*** **or the** ***modulus*** **operator**. It is used to find the remainder when one integer value/variable is divided by another value/variable.

For eg.

```
int a=10,b=3;
System.out.println("Sum=" + (a+b));
System.out.println("Difference=" + (a-b));
```

Precedence Rules in Arithmetic Operators:

Highest Precedence → Lowest Precedence

Unary Operators(+, -, !, ++, and --) →Multiplication/Division(*,/,%) → Addition/Subtraction (+,-)

The expression is evaluated from left to right in case of operators with same precedence.

Assignment

Q1. Write the Java Code for taking the input of two numbers. The program should find and display their sum, difference, quotient, remainder, and product.

Q2. Write the Java code for taking the input for radius of a circle. The program should find and display the area and circumference of the circle.

Q3. Write a Java program to take the input of amount in Dollars, and then display the total number of $10, $1, $ 5, 50 cents, quarter, dime, and pennies which make up the total amount.

For example : amount=157.86
$ 10 =15
$ 5 =5
$ 1 =2
50 cents =1
Quarters= 1
Dime=1
Penny=1