10-09-2023 - Assignment

Arithmetic Operators:

What are the basic arithmetic operators in Java?

+, -, *, /, %

Explain the difference between the division operator (/) and the modulo operator (%).

/ - Gives the quotient

% - Gives the remainder

Given two variables int a = 10 and int b = 3, what will be the result of a / b? What about a % b?

a/b = 3

a%b = 1

How do you perform exponentiation (raising a number to a power) in Java?

In java we can perform exponentiation using the Math.pow() method. The Math.pow() method is a built-in method that takes two arguments: the base and the exponent, and it returns the result of raising the base to the power of the exponent.

Example:

```
import java.util.Scanner;

public class Expo{
   public static void main(String[] args)
   {
      double base = 5.0;
      double exponent = 3.0;
      double res = Math.pow(base, exponent);
      System.out.println(base + " raised to the power of " + exponent + " is " + res);

   }
}
```

What happens if you try to divide a number by zero in Java?
In java if we try to divide a number by zero it will result in an exception being thrown at runtime. The specific exception thrown is called ArithmeticException. This exception occurs because dividing any number by zero is undefined in mathematics.

Explain the order of precedence of arithmetic operators in Java.

()
power
*, /, %
+, -

Data Types:
What are primitive data types in Java? Provide examples of each.
Primitive data types are basic data types that are used to represent simple values. There are 8 primitive data types in java.
byte - Eg: byte value = 5;
short - Eg: short num = 600;
int - Eg: int myValue = 456321;
long - Eg: long value = 56743218L;
float - Eg: float num = 55.4f;
double - Eg: double value = 3.14159;
boolean - Eg: boolean isTrue = true;
char - char myChar = 'A';

Explain the difference between int and double data types in Java.
int(Integer):

int data type is used to store whole numbers.
It occupies 4 bytes of memory.
The range of int values is from -2,147,483,648 to 2,147,483,647.

double(Double):

double data type is used to store real numbers, including decimal values, with a wide range of values and precision.
It occupies 4 bytes of memory.

Why is it important to choose an appropriate data type for variables in Java?

Choosing an appropriate data type says what type of values can be stored in that variable.

It is important for memory efficiency and better performance.

What is the default value of the int data type in Java if no value is assigned to it?

The default value of the int data type in Java if no value is assigned to it is '0'.

How do you declare and use character (char) data type in Java?

char myChar = 'A';

Or

char myChar;

What is the maximum value that can be stored in the long data type in Java?

The maximum value that can be stored in the long data type in Java is -2^63 to 2^63-1.

Variables in Java:

Explain the concept of a variable in Java. How does it differ from a constant?

A variable is a named storage location that can hold a value, and its value can change during the execution of a program. The value of a variable can be changed by assigning a new value to it.

Eg: int myValue = 46;

A constant is a special type of variable in Java whose value cannot be changed once it is assigned. Constants are declared using the final keyword.

Eg: final double PI = 3.14159;

How do you declare a variable in Java? Provide an example.

int myValue;

What are the naming rules and conventions for variables in Java?

Variable names can only consist of letters (both uppercase and lowercase), digits, and underscores (_). They must start with a letter or an _.
Variable names cannot be reserved words.
It is case sensitive.
Variable names should follow the camelCase convention.
Choose descriptive and meaningful names for the variables that convey their purpose or content.

What is the scope of a variable in Java? How does it affect its accessibility? Explain the difference between instance variables and local variables in Java. Can you reassign a new value to a variable after its declaration? Provide an example.

Yes, in Java, you can reassign a new value to a variable after its initial declaration. The ability to change the value of a variable is one of the fundamental features of variables in Java.

Eg:

```
public class Main {
   public static void main(String[] args) {
      int x = 10;
      System.out.println(x);
      x = 20;
      System.out.println(x);
   }
}
```

Output : 10
20

Data Types:

Declare a variable of type int and assign it the value 42.

```
int number = 42;
```

Declare a variable of type double and assign it the value 3.14159.

```
double pi = 3.14159;
```

Declare a variable of type char and assign it the character 'A'.

```
char letter = ‘A’;
```

Declare a variable of type boolean and assign it the value true.

```
boolean flag = true;
```

Declare a variable of type String and assign it the text "Hello, World!".

```
String message = “Hello, World!”;
```

Arithmetic Operators:

Write code to add two integers and print the result.

```
import java.util.Scanner;
public class Add
{
	public static void main(String[] args)
	{
	   Scanner sc = new Scanner(System.in);
	   System.out.print("Enter the first number : ");
	   int num1 = sc.nextInt();
	   System.out.print("Enter the second number : ");
	   int num2 = sc.nextInt();
	   int res = num1 + num2;
	   System.out.println("Addition of two numbers is : "+res);

	}
}
```

Write code to subtract one integer from another and print the result.

```
import java.util.Scanner;
public class Sub
{
	public static void main(String[] args)
	{
	   Scanner sc = new Scanner(System.in);
```

```
            System.out.print("Enter the first number : ");
            int num1 = sc.nextInt();
            System.out.print("Enter the second number : ");
            int num2 = sc.nextInt();
            int res = num1 - num2;
            System.out.println("Subtraction of two numbers is : "+res);

        }
}
```

Write code to multiply two integers and print the result.

```
import java.util.Scanner;
public class Multiply
{
        public static void main(String[] args)
        {
            Scanner sc = new Scanner(System.in);
            System.out.print("Enter the first number : ");
            int num1 = sc.nextInt();
            System.out.print("Enter the second number : ");
            int num2 = sc.nextInt();
            int res = num1 * num2;
            System.out.println("Multiplication of two numbers is : "+res);

        }
}
```

Write code to divide one integer by another and print the result.

```
import java.util.Scanner;
public class Div
{
        public static void main(String[] args)
        {
            Scanner sc = new Scanner(System.in);
            System.out.print("Enter the first number : ");
            int num1 = sc.nextInt();
```

```
            System.out.print("Enter the second number : ");
            int num2 = sc.nextInt();
            int res = num1 / num2;
            System.out.println("Division of two numbers is : "+res);

        }
}
```

Write code to find the remainder when dividing one integer by another and print the result.

```
import java.util.Scanner;
public class Remainder
{
        public static void main(String[] args)
        {
            Scanner sc = new Scanner(System.in);
            System.out.print("Enter the first number : ");
            int num1 = sc.nextInt();
            System.out.print("Enter the second number : ");
            int num2 = sc.nextInt();
            int res = num1 % num2;
            System.out.println("Remainder of two numbers is : "+res);

        }
}
```

Variables:

Create two integer variables, x and y, and swap their values without using a temporary variable.

```
import java.util.Scanner;
public class Swap
{
        public static void main(String[] args)
        {
            Scanner sc = new Scanner(System.in);
            System.out.print("Enter the first number : ");
```

```
        int x = sc.nextInt();
        System.out.print("Enter the second number : ");
        int y = sc.nextInt();
        System.out.println("Before Swapping : " + x +"  "+ y);
        x = x+y;
        y = x-y;
        x = x-y;
        System.out.println("After Swapping : " + x +"  "+ y);

    }
}
```

Calculate the area of a rectangle using variables length and width, and print the result.

```
import java.util.Scanner;
public class AreaOfRectangle
{
    public static void main(String[] args)
    {
        Scanner sc = new Scanner(System.in);
        System.out.print("Enter the length of a rectangle: ");
        int length = sc.nextInt();
        System.out.print("Enter the width of a rectangle: ");
        int width = sc.nextInt();
        int res = length * width;
        System.out.println("Area of Rectangle is: " + res);

    }
}
```

Write code to increment an integer variable count by 1.

```
import java.util.Scanner;
public class Increment
{
    public static void main(String[] args)
```

```
    {
        int count = 0;
        count++;
        System.out.println("Count : " + count);

    }
}
```

Declare a constant variable PI with a value of 3.14159.

```
final double PI = 3.14159;
```

Calculate the simple interest using variables principal, rate, and time, and print the result.

```
import java.util.Scanner;
public class SimpleInterest
{
    public static void main(String[] args)
    {
        Scanner sc = new Scanner(System.in);
        System.out.print("Enter Principal amount : ");
        double principal = sc.nextFloat();
        System.out.print("Enter rate : ");
        double rate = sc.nextFloat();
        System.out.print("Enter time in years : ");
        double time = sc.nextInt();
        double SI = (principal*rate*time)/100;
        System.out.println("Simple Interest is : "+SI);

    }
}
```

Mixed Questions:

Calculate the area of a circle using the formula area = PI * radius * radius.

```
public class Area
{
	public static void main(String[] args)
	{
	   Scanner sc  = new Scanner(System.in);
	   System.out.println("Enter radius of circle: ");
		double radius = sc.nextDouble();
		final double PI = 3.14159;
		int area = PI*radius*radius;
		System.out.println("The area of the circle with radius " + radius + " is:
" + area);

	}
}
```

Calculate the hypotenuse of a right triangle using the Pythagorean theorem.

```
public class Main
{
	public static void main(String[] args)
	{
	   Scanner sc  = new Scanner(System.in);
	   System.out.println("Enter side1: ");
		double side1 = sc.nextDouble();
		System.out.println("Enter side2: ");
		double side2= sc.nextDouble();;
		double hypotenuse=Math.sqrt(side1*side1 + side2*side2);
		System.out.println("hypotenuse of Triangle is "+ hypotenuse);
	}

}
```

Convert a temperature in Celsius to Fahrenheit using the formula F = (C * 9/5) + 32.

```
public class Main
{
	public static void main(String[] args)
	{
	   Scanner sc  = new Scanner(System.in);
	   System.out.println("Enter celsius value: ");
	        double celsius=sc.nextDouble();
	        double fahrenheit=(celsius *9/5) + 32;
	        System.out.println(celsius + " C is equal to  " + fahrenheit + " F");

	}
}
```

Calculate the average of three numbers and print the result.

```
import java.util.Scanner;
public class Average
{
	public static void main(String[] args)
	{
	   Scanner sc = new Scanner(System.in);
	   System.out.print("Enter the first integer : ");
	   double num1 = sc.nextInt();
	   System.out.print("Enter the second integer : ");
	   double num2 = sc.nextInt();
	   System.out.print("Enter the third integer : ");
	   double num3 = sc.nextInt();
	   double avg = (num1+num2+num3)/3;
	   System.out.print("The average of integers "+ num1 + " , "+ num2 + " and
" + num3 + " is "+avg);
	}
}
```

Find the maximum of two integers and print the result.

```
import java.util.Scanner;
public class Maximum
{
	public static void main(String[] args)
	{
	   Scanner sc = new Scanner(System.in);
	   System.out.print("Enter the first integer : ");
	   int num1 = sc.nextInt();
	   System.out.print("Enter the second integer : ");
	   int num2 = sc.nextInt();
	   int res = Math.max(num1,num2);
	   System.out.print("The maximum of integers "+ num1 + " and "+ num2 + "
is " +res);
	}
}
```

Check if a given number is even or odd and print the result.

```
import java.util.Scanner;
public class EvenOrOdd
{
	public static void main(String[] args)
	{
	   Scanner sc = new Scanner(System.in);
	   System.out.print("Enter a number : ");
	   int num = sc.nextInt();
	   if(num%2==0)
	   {
	      System.out.println("The given number is even");
	   }
	   else
	   {
	      System.out.println("The given number is odd");
```

```
            }
        }
}
```

Convert a character to its ASCII value and print it.

```
import java.util.Scanner;
public class CharToAscii {
    public static void main(String[] args)
    {
        Scanner sc = new Scanner(System.in);
        System.out.print("Enter the character : ");
        char character = sc.next().charAt(0);
        int asciiValue = (int)character;

        System.out.println("The ASCII value of " + character + " is: " + asciiValue);
    }
}
```

Concatenate two strings and print the result.

```
import java.util.Scanner;

public class ConcatenateStrings {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        System.out.print("Enter the first string: ");
        String firstString = sc.nextLine();
        System.out.print("Enter the second string: ");
        String secondString = sc.nextLine();
        String concatenatedString = firstString + secondString;
        System.out.println("Concatenated String: " + concatenatedString);
    }
}
```

Circle Properties:

Write a Java program that calculates and prints the circumference and area of a circle. The program should ask the user to enter the radius of the circle and then compute and display the circumference and area.

```
import java.util.Scanner;

public class Circle{
   public static void main(String[] args)
   {
      Scanner sc = new Scanner(System.in);
      System.out.print("Enter the radius of the circle : ");
      double r = sc.nextDouble();
      final double pi = 3.14159;
      double circumference = 2*pi*r;
      double area = pi*Math.pow(r,2);
      System.out.println("The Circumference of the circle is : "+circumference);
      System.out.println("The Area of the circle is : "+area);
   }
}
```

Fibonacci Series:

Write a Java program to generate and print the first n numbers in the Fibonacci series. The Fibonacci series starts with 0 and 1, and each subsequent number is the sum of the previous two numbers (e.g., 0, 1, 1, 2, 3, 5, 8, ...).

```
import java.util.Scanner;

public class Fibonacci{
   public static void main(String[] args)
   {
      Scanner sc = new Scanner(System.in);
      int n = sc.nextInt();
      int first = 0;
      int sec = 1;
      System.out.print(first + "," + sec);
```

```
        for(int i=2; i<n; i++)
        {
           int next = first+sec;
           System.out.print(","+next);
           first = sec;
           sec = next;
        }

    }
}
```

Swap Two Numbers:

Write a Java program to swap the values of two variables without using a temporary variable. The program should prompt the user to enter two numbers, perform the swapping, and then display the swapped values.

```
import java.util.Scanner;
public class Swap
{
        public static void main(String[] args)
        {
           Scanner sc = new Scanner(System.in);
           System.out.print("Enter the first number : ");
           int x = sc.nextInt();
           System.out.print("Enter the second number : ");
           int y = sc.nextInt();
           System.out.println("Before Swapping : " + x +"  "+ y);
           x = x+y;
           y = x-y;
           x = x-y;
           System.out.println("After Swapping : " + x +"  "+ y);

        }
}
```

Age Calculator:

Write a Java program that calculates and prints the age of a person based on the current year and the year of birth. The program should prompt the user to enter the current year and the year of birth, and then calculate and display the age.

```
import java.util.Scanner;
public class AgeCalculator{
   public static void main(String[] args)
   {
      Scanner sc = new Scanner(System.in);
      System.out.print("Enter the current year : ");
      int currentYear = sc.nextInt();
      System.out.print("Enter your year of birth : ");
      int birthYear = sc.nextInt();
      int age = currentYear - birthYear;
      System.out.print("Age is : "+ age);

   }
}
```

Distance between Two Points:

Write a Java program to calculate and print the distance between two points (x1, y1) and (x2, y2) in a 2D plane. The program should ask the user to enter the coordinates of the two points and then compute and display the distance

```
import java.util.Scanner;
public class Distance{
   public static void main(String[] args)
   {
      Scanner sc = new Scanner(System.in);
      System.out.print("Enter the coordinates x1,y1 : ");
      int x1 = sc.nextInt();
      int y1 = sc.nextInt();
      System.out.print("Enter the coordinates x2,y2 : ");
```

```
        int x2 = sc.nextInt();
        int y2 = sc.nextInt();
        double distance = Math.sqrt(Math.pow(x2-x1,2)+Math.pow(y2-y1,2));
        System.out.print("The distance between the given coordinates is :"+distance);

    }
}
```