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**COURSE:** CC1, INTL 1

**DATE:** May 22, 2023  
**SCHEDULE:** 1: 30 pm – 5: 20 pm MT

**TITLE:**        **Arithmetic Operators**

**LEARNING OBJECTIVES:**

At the end of this activity, the students should be able to:

1. Identify basic operations available in Java language in terms of assignment and arithmetic operations.
2. Perform the basic arithmetic operations as implemented in a Java program.
3. Determine the precedence or order of evaluation of these operators.
4. Create a complete Java program that simulates these basic operations.

**INSTRUCTIONS:**

1. Make sure you have your own individual account.
2. Always keep your account secret to others to avoid unauthorized access to your files.
3. Always save your work and log-off when not using the computer.
4. By now you should have been familiarized using your text editor.
5. By now you should know how to create, save, compile, execute, and debug programs in Java.
6. Use the skills and learning obtained in Prelim Laboratory Activity 1 and Prelim Laboratory Activity 2 in order for you to successfully finish the learning objectives of this module.

**DURATION: Two Meetings**

**HANDS-ON:**

1. Log-on using your own individual account. Use your own **username** and **password**.
2. Open the command prompt and set the path and classpath.
3. Write your next Java program:
  - 3.1. Write your next program by copying the source code shown below to your text e

```

/* Programmed by: <write your name here>
   Program title: ArithmeticOperators.java
   Program Date: <write the date today here> */

public class ArithmeticOperators{
    public static void main(String[] args){

        int op1 = 15;
        int op2 = 4;
        System.out.println("Sum = " + (op1+op2));
        System.out.println("Difference = " + (op1-op2));
        System.out.println("Product = " + (op1*op2));
        System.out.println("Quotient = " + (op1/op2));
        System.out.println("Remainder = " + (op1%op2));

    }
}

```

3.2. Save the program as **ArithmeticOperators.java** then Compile and Execute

4. Revise the program in order for you to store the result of each arithmetic operation in individual variables to be used inside the `System.out.println()` statement.

Write your revised code on the box provided:

```

/* Programmed by: Abenes, Enrico O.
   Program Title: ArithmeticOperators.java
   Program Data: May 22, 2023*/

public class ArithmeticOperators {
    public static void main(String[] args) {
        int op1 = 15;
        int op2 = 4;

        int addition = op1 + op2;
        int subtraction = op1 - op2;
        int multiplication = op1 * op2;
        int division = op1 / op2;
        int remainder = op1 % op2;

        System.out.println("Sum = " + addition);
        System.out.println("Difference = " + subtraction);
        System.out.println("Product = " + multiplication);
        System.out.println("Quotient = " + division);
        System.out.println("Remainder = " + remainder);

    }
}

```

- 4.1. Compile and Execute the program.  
What would be displayed as output?

```
Output - Running Single Java File x
Sum = 19
Difference = 11
Product = 60
Quotient = 3
Remainder = 3
```

- 4.2. Notice that the result of the division operation it is not displaying the actual quotient of the two (2) operands. Modify the program in order for it to output the correct quotient of the two (2) operands.

Write the statements you modified on the box.

```
double division = (double) op1 / op2;
```

- 4.3. Modify the program again and this time use only one (1) variable to store the results of each of the arithmetic operations to be used inside the `System.out.println()` statement.

Write your code on the box provided:

```
/* Programmed by: Abenes, Enrico O.
   Program Title: ArithmeticOperators.java
   Program Data: May 22, 2023*/

public class ArithmeticOperators {
    public static void main(String[] args) {
        int op1 = 15;
        int op2 = 4;

        double result;

        result = op1 + op2;
        System.out.println("Sum = " + result);

        result = op1 - op2;
        System.out.println("Difference = " + result);

        result = op1 * op2;
        System.out.println("Product = " + result);

        result = (double) op1 / op2;
        System.out.println("Quotient = " + result);

        result = op1 % op2;
        System.out.println("Remainder = " + result);
    }
}
```

5. Given the following code segment, simulate the order of how the operation is performed based on the precedence of the operators.

```
double op1 = 5;
double op2 = 7;
double op3 = 3;
double op4 = 20;
double op5 = 16;
double op6 = 2;

double result = 0;

result = op1 + op2 * op3 % op4 - op5 / op6;
```

- 5.1. Identify the order of how the operands will be evaluated.

1<sup>st</sup> Operation Performed: 5 + (21) % 20 - 16 / 2

2<sup>nd</sup> Operation Performed: 5 + 1 - 16 / 2

3<sup>rd</sup> Operation Performed: 5 + 1 - 8

4<sup>th</sup> Operation Performed: 6 - 8

5<sup>th</sup> Operation Performed: -2

- 5.2. Based on the given arithmetic expression, modify the statement by grouping the operands using parentheses to represent the order on how the expression will be evaluated

(op1 + (op2 \* op3 % op4)) - (op5 / op6)

6. Basing it on the code fragment written above, what value would be stored in the variable `result` if the expression is grouped as follows:

```
result = ((op1 + op2) * op3) % (op4 - op5 / op6);
result = ((5 + 7) * 3) % (20 - 16 / 2)
result = (12 * 3) % (20 - 8)
result = 36 % 12
result = 0
```

```
result = op1 + (op2 * (op3 % (op4 - op5))) / op6;
result = 5 + (7 * (3 % (20 - 16))) / 2
result = 5 + (7 * (3 % 4)) / 2
result = 5 + (7 * 3) / 2
result = 5 + 21 / 2
result = 5 + 10.5
result = 15.5
```

```
result = (((op1 + op2 * op3) % op4) - op5) / op6;
result = ((5 + 7 * 3) % 20 - 16) / 2
result = ((5 + 21) % 20 - 16) / 2
result = (26 % 20 - 16) / 2
```

```

result = (6 - 16) / 2
result = -10 / 2
result = -5

result = (op1 + op2) * ((op3 % (op4-op5)) / op6);
result = (5 + 7) * ((3 % (20 - 16)) / 2)
result = 12 * ((3 % 4) / 2)
result = 12 * (3 / 2)
result = 12 * 1.5
result = 18

result = (op1 + (op2 * (op3 % (op4 - (op5 / op6)))));
result = (5 + (7 * (3 % (20 - (16 / 2)))))
result = (5 + (7 * (3 % (20 - 8))))
result = (5 + (7 * (3 % 12)))
result = (5 + (7 * 3))
result = (5 + 21)
result = 26

```

7. Modify the program to make it display the area of a triangle computed as  $\text{Area} = \frac{1}{2} \text{Base} * \text{Height}$ , where Base = 10 and Height = 15. Aside from the area of a triangle, the program should also compute and display the computed area of a circle using the formula  $\text{Area} = \text{Pi} * \text{R}^2$ , where Pi = 3.1416 and R = 5.

Write your code here in the box

```

/* Programmed by: Abenes, Enrico O.
Program Title: ArithmeticOperators.java
Program Data: May 22, 2023*/

public class ArithmeticOperators {
    public static void main(String[] args) {

        /*Triangle*/
        double base = 10.0;
        double height = 15.0;
        double areaTriangle = 0.5 * base * height;

        /*Circle*/
        double pi = 3.1416;
        double radius = 5.0;
        double areaCircle = pi * radius * radius;

        System.out.println("Area of the Triangle(At) = " + areaTriangle);
        System.out.println("Area of the Circle(Ac) = " + areaCircle);
    }
}

```

