## *Lab 2 –Primitive Data Types and Operations*
***Answer the following questions.***

**Use Scanner class for prompting the users for input.**

Instructor-led Demo:

Write a program that reads a number in feet, converts it to meters, and displays the result. One foot is 0.305 meters.

EXERCISE:

1. Write a program that reads a Fahrenheit degree in double, then converts it to Celsius and displays the result on the console. The formula for the conversion is as follows:
   celsius = (Fahrenheit – 32) * 5 / 9

```java
import java.util.Scanner;

public class Lab2q1 {

    public static void main(String[] args) {
        // Create a Scanner object to read user input
        Scanner temp = new Scanner(System.in);

         // Prompt the user for a Fahrenheit temperature
        System.out.print("Enter a temperature in Fahrenheit: ");
        double fahrenheit = temp.nextDouble();

        // Convert Fahrenheit to Celsius
        double celsius = (fahrenheit - 32) * 5.0 / 9.0;
        // Note: Using 5.0 / 9.0 ensures floating-point division

        // Display the result
        System.out.println(fahrenheit + " degrees Fahrenheit is " + celsius + " degrees Celsius.");
    }
}
```

```
Output - Run (lab2q1)
--- exec:3.1.0:exec (default-cli) @ lab2q1 ---
Enter a temperature in Fahrenheit: 32
32.0 degrees Fahrenheit is 0.0 degrees Celsius.
```

2. Write a program that reads in the radius and length of a cylinder and computes volume using the following formulas:

area = radius * radius * PI
volume = area * length

Lab2q1.java | lab2q2.java

Source | History

```
9   public class lab2q2 {
10      public static void main(String[] args) {
11          // Create a Scanner object
12          Scanner input = new Scanner(System.in);
13
14          // Prompt for the radius and read the value
15          System.out.print("Enter the radius of the cylinder: ");
16          double radius = input.nextDouble();
17
18          // Prompt for the length and read the value
19          System.out.print("Enter the length of the cylinder: ");
20          double length = input.nextDouble();
21
22          // Calculate the base area
23          double area = radius * radius * Math.PI;
24
25          // Calculate the volume using the area
26          double volume = area * length;
27
28          // Display the results
29          System.out.println("The area of the cylinder's base is: " + area);
30          System.out.println("The volume of the cylinder is: " + volume);
31      }
32  }
```

Output - Run (lab2q2)

```
--- compiler:3.13.0:compile (default-compile) @ lab2q1 ---
Nothing to compile - all classes are up to date.

--- exec:3.1.0:exec (default-cli) @ lab2q1 ---
Enter the radius of the cylinder: 6
Enter the length of the cylinder: 8
The area of the cylinder's base is: 113.09733552923255
The volume of the cylinder is: 904.7786842338604
------------------------------------------------------------------------
BUILD SUCCESS
------------------------------------------------------------------------
Total time:  12.644 s
Finished at: 2025-09-21T18:46:07+08:00
------------------------------------------------------------------------
```

3. Write a program that reads an integer between 0 and 1000 and adds all the digits in the integer. For example, if an integer is 943, the sum of all its digit is 16.

Lab2q1.java | lab2q2.java | lab2q3.java

Source | History

```java
import java.util.Scanner;

public class lab2q3 {
    public static void main(String[] args) {
        // Create a Scanner object
        Scanner input = new Scanner(System.in);

        // Prompt for a number between 0 and 1000
        System.out.print("Enter an integer between 0 and 1000: ");
        int number = input.nextInt();

        // Extract the digits
        int firstDigit = number / 100;
        int remainingNumber = number % 100;
        int secondDigit = remainingNumber / 10;
        int thirdDigit = remainingNumber % 10;

        // Calculate the sum
        int sum = firstDigit + secondDigit + thirdDigit;

        // Display the sum of the digits
        System.out.println("The sum of the digits is " + sum);
    }
}
```

Output - Run (lab2q3)

```
Nothing to compile - all classes are up to date.

--- exec:3.1.0:exec (default-cli) @ lab2q1 ---
Enter an integer between 0 and 1000: 567
The sum of the digits is 18
------------------------------------------------------------------------
BUILD SUCCESS
------------------------------------------------------------------------
Total time:  14.827 s
Finished at: 2025-09-21T18:51:01+08:00
------------------------------------------------------------------------
```

**Breakdown (for 567):**

- **To get the last digit (7):** 567 % 10 gives the remainder, which is 7.
- **To get the middle digit (6):** First, you need to remove the last digit by integer division: 567 / 10 becomes 56. Then, take the modulo: 56 % 10 gives 6.
- **To get the first digit (5):** Divide the original number by 100: 567 / 100 gives 5 (integer division).
- **Sum all: first, middle and last digits, to get 18.**

4. Write a program that converts an uppercase letter to a lowercase letter.

```java
import java.util.Scanner;

public class Q4CaseConvertor {
    public static void main(String[] args) {
        // Create a Scanner object for user input
        Scanner input = new Scanner(System.in);

        // Prompt the user to enter an uppercase letter
        System.out.print("Enter an uppercase letter: ");
        String letter = input.next(); // Read the letter as a string

        // Convert the first character of the string to lowercase
        char lowercaseLetter = Character.toLowerCase(letter.charAt(0));

        // Display the result
        System.out.println("The lowercase letter is: " + lowercaseLetter);
    }
}
```

```
Output - Run (Q4CaseConvertor)
--- compiler:3.13.0:compile (default-compile) @ lab2q1
Nothing to compile - all classes are up to date.

--- exec:3.1.0:exec (default-cli) @ lab2q1 ---
Enter an uppercase letter: R
The lowercase letter is: r
------------------------------------------------------------
BUILD SUCCESS
```

5. Write a program that receives an ASCII code (an integer between 0 and 128) and displays its character. For example, if the user enters 97, the program displays character ‘a’.

```java
import java.util.Scanner;

public class Q5AsciiToChar {
    public static void main(String[] args) {
        // Create a Scanner object
        Scanner input = new Scanner(System.in);

        // Prompt the user for an ASCII code
        System.out.print("Enter an ASCII code (an integer between 0 and 128): ");
        int asciiCode = input.nextInt();

        // Cast the integer to a char
        char character = (char) asciiCode;

        // Display the result
        System.out.println("The character for ASCII code " + asciiCode + " is " + character);
    }
}
```

```
--- exec:3.1.0:exec (default-cli) @ lab2q1 ---
Enter an ASCII code (an integer between 0 and 128): 43
The character for ASCII code 43 is +
------------------------------------------------------------------------
BUILD SUCCESS
```

6. Write a program that prompts the user to enter the month and year, and displays the number of days in the month. For example, January is 31 days, February is 28 days, March is 31 and etc.

```java
public static void main(String[] args) {
    // Create a Scanner object
    Scanner input = new Scanner(System.in);

    // Prompt for the month and year
    System.out.print("Enter the month (1-12): ");
    int month = input.nextInt();
    System.out.print("Enter the year: ");
    int year = input.nextInt();

    // A boolean to check for leap year
    boolean isLeapYear = (year % 4 == 0 && year % 100 != 0) || (year % 400 == 0);

    // Use a switch statement to determine the number of days
    switch (month) {
        case 1:
        case 3:
        case 5:
        case 7:
        case 8:
        case 10:
        case 12:
            System.out.println("This month has 31 days.");
            break;
        case 4:
        case 6:
        case 9:
        case 11:
            System.out.println("This month has 30 days.");
            break;
        case 2:
            if (isLeapYear) {
                System.out.println("This month has 29 days.");
            } else {
                System.out.println("This month has 28 days.");
            }
            break;
        default:
            System.out.println("Invalid month entered.");
    }
    }
}
```

```
Output - Run (Q6DaysInMonth)
--- exec:3.1.0:exec (default-c
Enter the month (1-12): 2
Enter the year: 2024
This month has 29 days.
------------------------------
BUILD SUCCESS
```

7. Write a program that prompts the user to enter assignment marks and displays the grade of the keyed in marks. The grading table is as follows:

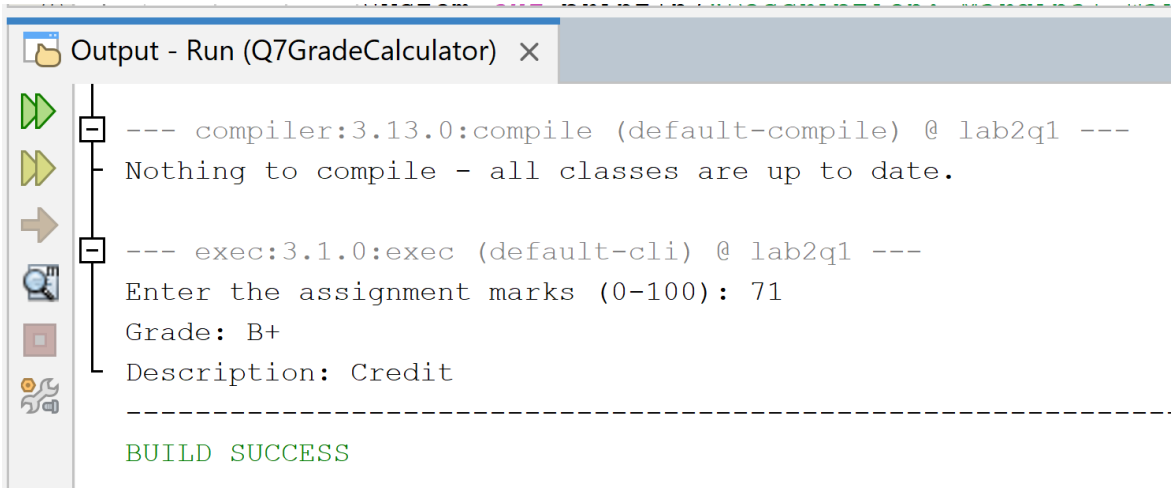
| Marks | Grade | Description |
|---|---|---|
| 0-40 | F | Fail |
| 40-49 | F+ | Marginal Fail |
| 50-54 | D | Pass |
| 55-64 | C | |
| 65-69 | B | Credit |
| 70-74 | B+ | |
| 75-79 | A | Distinction |
| 80-100 | A+ | |

```java
import java.util.Scanner;

public class Q7GradeCalculator {
    public static void main(String[] args) {
        // Create a Scanner object
        Scanner input = new Scanner(System.in);

        // Prompt for the assignment marks
        System.out.print("Enter the assignment marks (0-100): ");
        double marks = input.nextDouble();

        // Use if-else if statements to determine the grade
        if (marks >= 80 && marks <= 100) {
            System.out.println("Grade: A+");
            System.out.println("Description: Distinction");
        } else if (marks >= 75) {
            System.out.println("Grade: A");
            System.out.println("Description: Distinction");
        } else if (marks >= 70) {
            System.out.println("Grade: B+");
            System.out.println("Description: Credit");
        } else if (marks >= 65) {
            System.out.println("Grade: B");
            System.out.println("Description: Credit");
        } else if (marks >= 55) {
            System.out.println("Grade: C");
            System.out.println("Description: Pass");
        } else if (marks >= 50) {
            System.out.println("Grade: D");
            System.out.println("Description: Pass");
        } else if (marks >= 40) {
            System.out.println("Grade: F+");
            System.out.println("Description: Marginal Fail");
        } else if (marks >= 0) {
            System.out.println("Grade: F");
            System.out.println("Description: Fail");
        } else {
            System.out.println("Invalid marks entered. Please enter a number between 0 and 100.");
        }
    }
}
```


Output - Run (Q7GradeCalculator)
--- compiler:3.13.0:compile (default-compile) @ lab2q1 ---
Nothing to compile - all classes are up to date.
--- exec:3.1.0:exec (default-cli) @ lab2q1 ---
Enter the assignment marks (0-100): 71
Grade: B+
Description: Credit
BUILD SUCCESS

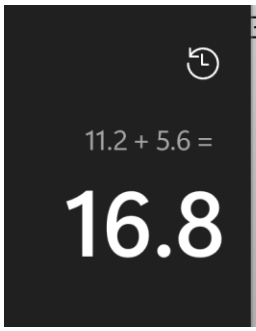
8. Write a program that sum up all the values in double typed of an array. The array capacity is 100. You are required to use for-each construct (enhanced for).

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

// Prompt the user for the number of elements
System.out.print("Enter the number of elements in the array: ");
int arraySize = input.nextInt();

// Create an array with the user-specified size
double[] values = new double[arraySize];

// Prompt the user to enter the values
System.out.println("Enter " + arraySize + " double values:");
for (int i = 0; i < values.length; i++) {
    System.out.print("Enter value " + (i + 1) + ": ");
    values[i] = input.nextDouble();
}
// Initialize a variable to store the sum
double sum = 0.0;
// Use a for-each loop to iterate through the array and sum the elements
for (double element : values) {
    sum += element;
}
// Display the total sum
System.out.println("The sum of all values in the array is: " + sum);
}
```



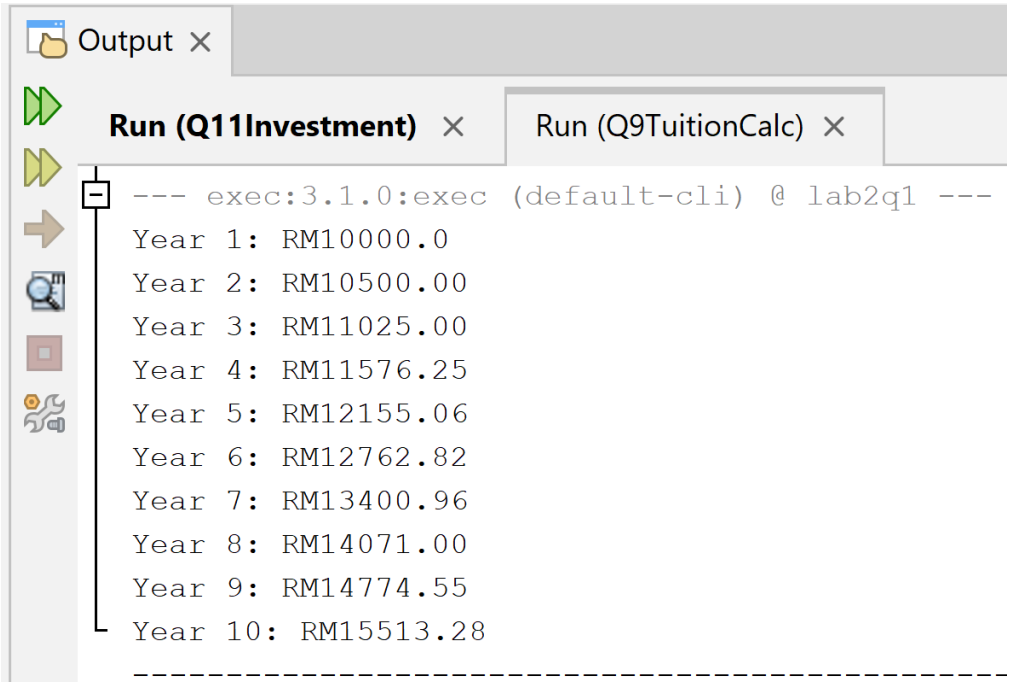

```
--- exec:3.1.0:exec (default-cli) @ lab2q1 ---
Enter the number of elements in the array: 5
Enter 5 double values:
Enter value 1: 1
Enter value 2: 2.3
Enter value 3: 3.4
Enter value 4: 4.5
Enter value 5: 5.6
The sum of all values in the array is: 16.799999999999997
```

9. Suppose that the tuition of a university is RM10000 this year and this tuition fee increases 5% every year. Write a program that uses a loop to compute the tuition in ten years.

```
public class Q9TuitionCalc {
    public static void main(String[] args) {
        double tuition = 10000.0; // Starting tuition
        double rate = 0.05;       // 5% increase rate

        System.out.println("Year 1: RM" + tuition);

        // Loop for the next 9 years (since Year 1 is the starting point)
        for (int i = 2; i <= 10; i++) {
            tuition = tuition + (tuition * rate); // Or simply tuition *= (1 + rate);
            System.out.printf("Year %d: RM%.2f%n", i, tuition);
        }
    }
}
```



10. Use do-while construct, write a program that prompts the users to continue the program execution. “Yes” to continue the program and “No” to terminate the program.

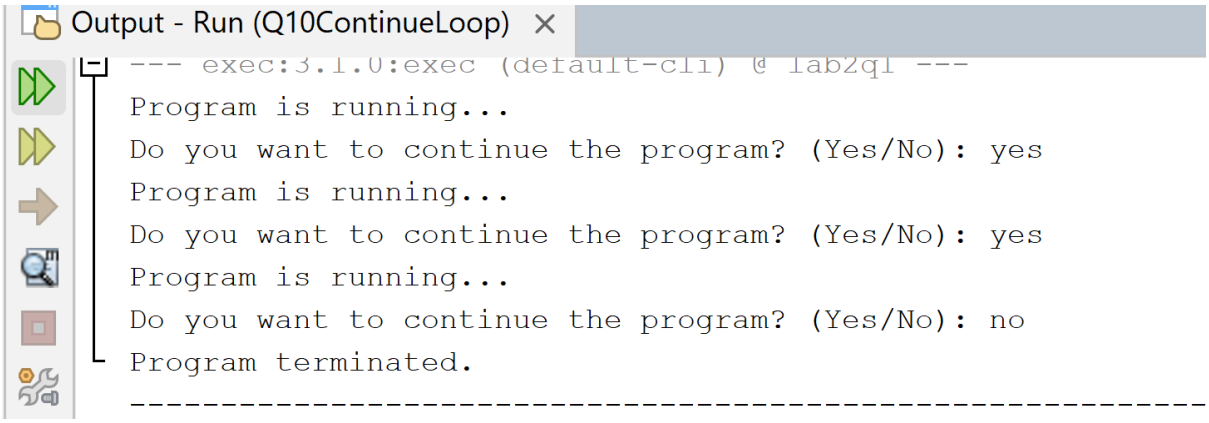
```
public static void main(String[] args) {
    Scanner cont = new Scanner(System.in);
    String choice;

    do {
        // Your program logic would go here.
        System.out.println("Program is running...");

        // Prompt the user to continue or terminate
        System.out.print("Do you want to continue the program? (Yes/No): ");
        choice = cont.next();

    } while (choice.equalsIgnoreCase("Yes"));

    System.out.println("Program terminated.");
    cont.close();
}
```



11. Write a program that reads in investment amount, annual interest rate, and number of years, and displays the future investment value using the following formula.
futureInvestmentVal = investmentAmount x (1 + monthlyInterestRate) $^{numberOfYears*12}$

```java
public class Q11Investment {
    public static void main(String[] args) {
        Scanner input = new Scanner(System.in);

        // Get user inputs
        System.out.print("Enter the investment amount: ");
        double investmentAmount = input.nextDouble();

        System.out.print("Enter the annual interest rate (e.g., 5 for 5%): ");
        double annualInterestRate = input.nextDouble();

        System.out.print("Enter the number of years: ");
        int numberOfYears = input.nextInt();

        // Convert annual rate to monthly rate and format
        double monthlyInterestRate = (annualInterestRate / 100) / 12;

        // Calculate the future investment value using the formula and Math.pow()
        double futureInvestmentValue = investmentAmount * Math.pow((1 + monthlyInterestRate), (numberOfYears * 12));

        // Display the result
        System.out.printf("The future investment value is: RM%.2f%n", futureInvestmentValue);
    }
}
```

```
Run (Q11Investment) ×   Run (Q11Investment) ×
--- exec:3.1.0:exec (default-cli) @ lab2q1 ---
Enter the investment amount: 40000
Enter the annual interest rate (e.g., 5 for 5%): 6
Enter the number of years: 3
The future investment value is: RM47867.22
------------------------------------------------------------
BUILD SUCCESS
```