**Assignment - Chapter 2**

**2.1:** Fill in the blanks in each of the following statements:

1. A(n) left brace { begins the body of every method, and a(n) right brace } ends the body of every method.
2. You can use the if statement to make decisions.
3. // begins an end-of-line comment.
4. Blank lines, spaces, and tabs are called white space.
5. Keywords are reserved for use by Java.
6. Java applications begin execution at method main.
7. Methods System.out.print, System.out.println, and System.out.printf display information in a command window.

**2.2** State whether each of the following is true or false. If false, explain why.

**a)** False. Comments are ignored by the compiler and do not cause any text to be printed on the screen.

**b)** True. All variables in Java must be declared with a specific data type.

**c)** False. Java is case-sensitive, so number and NuMbEr are considered different variable names.

**d)** True. The remainder operator (%) is used to get the remainder of a division, which requires integer operands.

**e)** False. The arithmetic operators \*, /, and % have a higher precedence than + and -.

**2.3** Write statements to accomplish each of the following tasks:

**a)** Declare variables c, thisIsAVariable, q76354 and number to be of type int.

int c, thisIsAVariable, q76354, number;

**b)** Prompt the user to enter an integer. System.out.print("Enter an integer: ");

**c)** Input an integer and assign the result to int variable value. Assume Scanner variable input can be used to read a value from the keyboard. int value = input.nextInt();

**d)** Print "This is a Java program" on one line in the command window. Use method System.out.println. System.out.println("This is a Java program");

**e)** Print "This is a Java program" on two lines in the command window. The first line should end with Java. Use method System.out.printf and two %s format specifiers.

System.out.printf("This is a Java%nprogram%n");

**f)** If the variable number is not equal to 7, display "The variable number is not equal to 7” if (number != 7) { System.out.println("The variable number is not equal to 7"); }

**2.4** Identify and correct the errors in each of the following statements:

**a)** if (c < 7); System.out.println("c is less than 7");

Correction: The semicolon after the if condition is an error. It creates an empty statement, so the println statement will execute regardless of the condition.

There fore: if (c < 7) { System.out.println("c is less than 7"); }

**b)** if (c => 7) System.out.println("c is equal to or greater than 7");

Correction: The operator >= should be used instead of =>.

Therefore: if (c >= 7) { System.out.println("c is equal to or greater than 7"); }

**2.5** Write declarations, statements or comments that accomplish each of the following tasks:

**a)** State that a program will calculate the product of three integers.

// Program to calculate the product of three integers

**b)** Create a Scanner called input that reads values from the standard input.

Scanner input = new Scanner(System.in);

**c)** Declare the variables x, y, z and result to be of type int. int x, y, z, result;

**d)** Prompt the user to enter the first integer.

System.out.print("Enter the first integer: ");

**e)** Read the first integer from the user and store it in the variable x.

x = input.nextInt();

**f)** Prompt the user to enter the second integer.

System.out.print("Enter the second integer: ");

**g)** Read the second integer from the user and store it in the variable y.

y = input.nextInt();

**h)** Prompt the user to enter the third integer.

System.out.print("Enter the third integer: ");

**i)** Read the third integer from the user and store it in the variable z.

z = input.nextInt();

**j)** Compute the product of the three integers contained in variables x, y and z, and assign the result to the variable result. result = x \* y \* z;

**k)** Use System.out.printf to display the message "Product is" followed by the value of the variable result. System.out.printf("Product is %d%n", result);

**2.6** Using the statements you wrote in Exercise 2.5, write a complete program that calculates and prints the product of three integers.

import java.util.Scanner; public class ProductOfThreeIntegers {

public static void main(Stringargs) {

// Program to calculate the product of three integers

Scanner input = new Scanner(System.in);

Int x, y, z, result;

System.out.print("Enter the first integer: ");

x = input.nextInt();

System.out.print("Enter the second integer: ");

y = input.nextInt();

System.out.print("Enter the third integer: ");

z = input.nextInt(); result = x \* y \* z;

System.out.printf("Product is %d%n", result);

}

}

**2.7** Fill in the blanks in each of the following statements:

**a)** **Comments** are used to document a program and improve its readability.

**b)** A decision can be made in a Java program with an **if** statement.

**c)** Calculations are normally performed by assignment statements.

**d)** The arithmetic operators with the same precedence as multiplication are **division (/)** and **remainder (%)**.

**e)** When parentheses in an arithmetic expression are nested, the **innermost** set of parentheses is evaluated first.

**f)** A location in the computer’s memory that may contain different values at various times throughout the execution of a program is called a (n) **variable**.

**2.8** Write Java statements that accomplish each of the following tasks:

**a)** Display the message "Enter an integer: ", leaving the cursor on the same line: System.out.print("Enter an integer: ");

**b)** Assign the product of variables b and c to variable a: a = b \* c;

**c)** Use a comment to state that a program performs a sample payroll calculation:

// This program performs a sample payroll calculation

**2.9** State whether each of the following is true or false. If false, explain why.

**a)** False. Java operators have precedence rules that determine the order of evaluation. ● b) True. These are all valid Java variable names.

**c)** False. Operator precedence rules apply in Java.

**d)** True. These are all invalid variable names because they start with a digit.

**2.10** Assuming that x = 2 and y = 3, what does each of the following statements display?

**a)** System.out.printf("x = %d%n", x); Output: x = 2

**b)** System.out.printf("Value of %d + %d is %d%n", x, x, (x + x)); Output: Value of 2 + 2 is 4

**c)** System.out.printf("x ="); Output: x =

**d)** System.out.printf("%d = %d%n", (x + y), (y + x)); Output: 5 = 5

**2.11** Which of the following Java statements contain variables whose values are modified?

**a)** p = i + j + k + 7; (Modifies p)

**d)** value = input.nextInt(); (Modifies value)

**2.12** Given that y = ax³ + 7, which of the following are correct Java statements for this equation?

**a)** y = a \* x \* x \* x + 7;

**d)** y = (a \* x) \* x \* x + 7;

**e)** y = a \* (x \* x \* x) + 7;

**2.13** State the order of evaluation of the operators in each of the following Java statements, and show the value of x after each statement is performed:

**a)** x = 7 + 3 \* 6 / 2 - 1;

1. 3 \* 6 (Result: 18)

2. 18 / 2 (Result: 9)

3. 7 + 9 (Result: 16)

4. 16 - 1 (Result: 15) x = 15

**b)** x = 2 % 2 + 2 \* 2 - 2 / 2;

1. 2 % 2 (Result: 0)

2. 2 \* 2 (Result: 4)

3. 2 / 2 (Result: 1)

4. 0 + 4 (Result: 4)

5. 4 - 1 (Result: 3) x = 3

**c)** x = (3 \* 9 \* (3 + (9 \* 3 / 3)));

1. 9 \* 3 (Result: 27)

2. 27 / 3 (Result: 9)

3. 3 + 9 (Result: 12)

4. 3 \* 9 (Result: 27)

5. 27 \* 12 (Result: 324) x = 324

**2.14** Write an application that displays the numbers 1 to 4 on the same line, with each pair of adjacent numbers separated by one space.

**a)** Use one System.out.println statement.

System.out.println("1 2 3 4");

b) Use four System.out.print statements.

System.out.print("1 "); System.out.print("2 "); System.out.print("3 "); System.out.print("4");

c) Use one System.out.printf statement.

System.out.printf("%d %d %d %d%n", 1, 2, 3, 4);

**2.15** (Arithmetic) Write an application that asks the user to enter two integers, obtains them from the user and prints their sum, product, difference and quotient: import java.util.Scanner;

public class Arithmetic { public static void main(Stringargs) {

Scanner input = new Scanner(System.in);

System.out.print("Enter the first integer: ");

int number1 = input.nextInt();

System.out.print("Enter the second integer: ");

int number2 = input.nextInt();

int sum = number1 + number2;

int product = number1 \* number2;

int difference = number1 - number2;

int quotient = number1 / number2;

System.out.printf("Sum: %d%n", sum);

System.out.printf("Product: %d%n", product);

System.out.printf("Difference: %d%n", difference);

System.out.printf("Quotient: %d%n", quotient);

}

}

**2.16** (Comparing Integers) Write an application that asks the user to enter two integers, obtains them from the user and displays the larger number followed by the words "is larger". If the numbers are equal, print the message "These numbers are equal".:

import java.util.Scanner;

public class ComparingIntegers {

public static void main(String[] args) {

Scanner input = new Scanner(System.in);

// Prompt user for two integers

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

int number1 = input.nextInt();

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

int number2 = input.nextInt();

// Compare numbers

if (number1 > number2) {

System.out.println(number1 + " is larger.");

} else if (number2 > number1) {

System.out.println(number2 + " is larger.");

} else {

System.out.println("These numbers are equal.");

}

input.close(); // Close scanner

}

}

**2.17** (Arithmetic, Smallest and Largest) Write an application that inputs three integers from the user and displays the sum, average, product, smallest and largest of the numbers:

import java.util.Scanner;

public class SmallestLargest {

public static void main(String[] args) {

Scanner input = new Scanner(System.in);

// Prompt user for three integers

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

int num1 = input.nextInt();

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

int num2 = input.nextInt();

System.out.print("Enter the third number: ");

int num3 = input.nextInt();

// Calculate sum, average, and product

int sum = num1 + num2 + num3;

int average = sum / 3;

int product = num1 \* num2 \* num3;

// Determine smallest and largest using Math functions

int smallest = Math.min(num1, Math.min(num2, num3));

int largest = Math.max(num1, Math.max(num2, num3));

// Display results

System.out.println("\n--- Results ---");

System.out.println("Sum: " + sum);

System.out.println("Average: " + average);

System.out.println("Product: " + product);

System.out.println("Smallest: " + smallest);

System.out.println("Largest: " + largest);

input.close(); // Close the scanner

}

}

**2.18** (Displaying Shapes with Asterisks) Write an application that displays a box, an oval, an arrow and a diamond using asterisks (\*):

public class AsteriskShapes {

public static void main(String[] args) {

// Box

System.out.println("\*\*\*\*\*\*\*\*");

System.out.println("\* \*");

System.out.println("\* \*");

System.out.println("\*\*\*\*\*\*\*\*");

System.out.println(); // Blank line for spacing

// Oval

System.out.println(" \*\*\* ");

System.out.println(" \* \* ");

System.out.println("\* \*");

System.out.println(" \* \* ");

System.out.println(" \*\*\* ");

System.out.println(); // Blank line for spacing

// Arrow

System.out.println(" \* ");

System.out.println(" \*\*\* ");

System.out.println(" \*\*\*\*\* ");

System.out.println(" \* ");

System.out.println(" \* ");

System.out.println(" \* ");

System.out.println(); // Blank line for spacing

// Diamond

System.out.println(" \* ");

System.out.println(" \* \* ");

System.out.println(" \* \* ");

System.out.println(" \* \* ");

System.out.println(" \* \* ");

System.out.println(" \* \* ");

System.out.println(" \* ");

}

}

2.19 What does the following code print? System.out.printf("\*%n\*\*%n\*\*\*%n\*\*\*\*%n\*\*\*\*\*%n");?

:

\*

\*\*

\*\*\*

\*\*\*\*

\*\*\*\*\*

2.20 What does the following code print?

System.out.println("\*");

System.out.println("\*\*\*");

System.out.println("\*\*\*\*\*");

System.out.println("\*\*\*\*");

System.out.println("\*\*");

Output:

\*

\*\*\*

\*\*\*\*\*

\*\*\*\*

\*\*

2.21 What does the following code print?

System.out.print("\*");

System.out.print("\*\*\*");

System.out.print("\*\*\*\*\*");

System.out.print("\*\*\*\*");

System.out.println("\*\*");

Output:Everything is printed on the same line because print() does not add a new line:

\*\*\*\*\*\*\*\*\*\*\*\*

2.22 What does the following code print?

System.out.print("\*");

System.out.println("\*\*\*");

System.out.println("\*\*\*\*\*");

System.out.print("\*\*\*\*");

System.out.println("\*\*");

Output:

\*\*\*\*

\*\*\*\*\*

\*\*\*\*

\*\*

2.23 What does the following code print?

System.out.printf("%s%n%s%n%s%n", "\*", "\*\*\*", "\*\*\*\*\*");

Output:

\*

\*\*\*

\*\*\*\*\*

**2.24 (Largest and Smallest Integers)** Write an application that reads five integers and determines and prints the largest and smallest integers in the group.

Answer:

import java.util.Scanner;

public class LargestSmallest {

public static void main(String[] args) {

Scanner input = new Scanner(System.in);

System.out.print("Enter five integers: ");

int num1 = input.nextInt();

int num2 = input.nextInt();

int num3 = input.nextInt();

int num4 = input.nextInt();

int num5 = input.nextInt();

int smallest = num1;

int largest = num1;

if (num2 < smallest) smallest = num2;

if (num3 < smallest) smallest = num3;

if (num4 < smallest) smallest = num4;

if (num5 < smallest) smallest = num5;

if (num2 > largest) largest = num2;

if (num3 > largest) largest = num3;

if (num4 > largest) largest = num4;

if (num5 > largest) largest = num5;

System.out.println("Smallest: " + smallest);

System.out.println("Largest: " + largest);

}

}

2.25 (Odd or Even) Write an application that reads an integer and determines and prints whether it’s odd or even.

Answer:

import java.util.Scanner;

public class OddOrEven {

public static void main(String[] args) {

Scanner input = new Scanner(System.in);

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

int number = input.nextInt();

if (number % 2 == 0)

System.out.println("The number is even.");

else

System.out.println("The number is odd.");

}

}

**2.26 (Multiples)** Write an application that reads two integers, determines whether the first is a multiple of the second and prints the result.

Answer:

import java.util.Scanner;

public class Multiples {

public static void main(String[] args) {

Scanner input = new Scanner(System.in);

System.out.print("Enter the first integer: ");

int num1 = input.nextInt();

System.out.print("Enter the second integer: ");

int num2 = input.nextInt();

if (num1 % num2 == 0)

System.out.println(num1 + " is a multiple of " + num2);

else

System.out.println(num1 + " is not a multiple of " + num2);

}

}