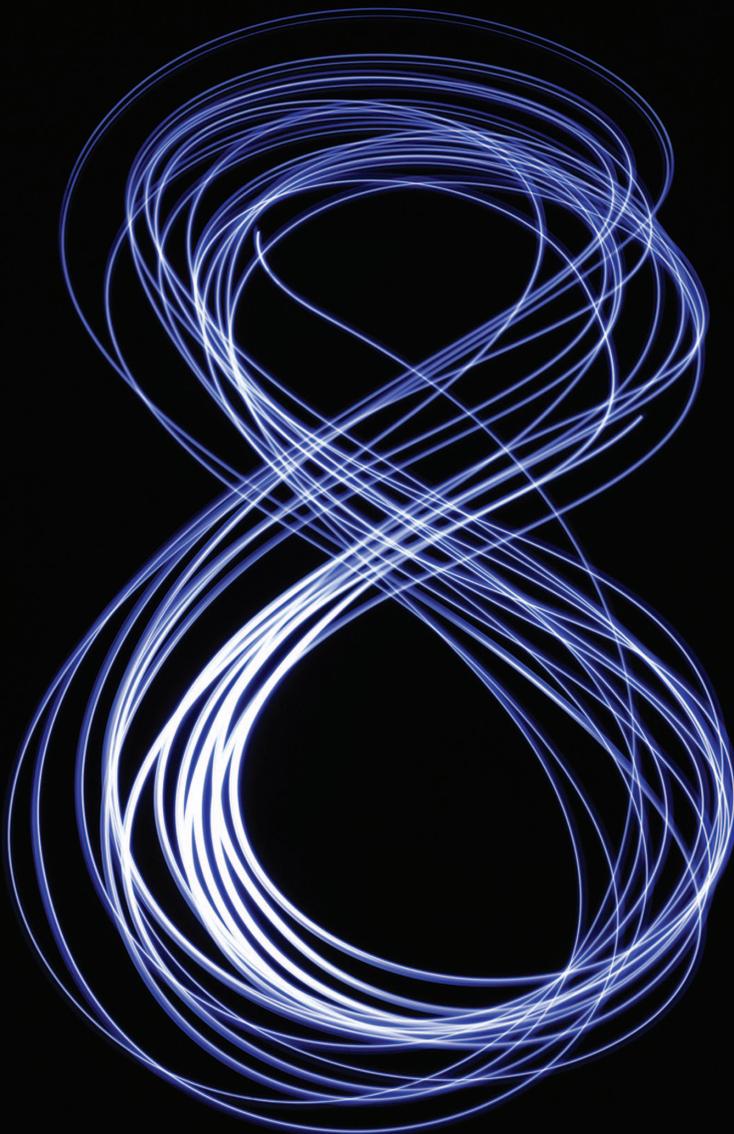# Introduction to Java Applications; Input/Output and Operators

2

What's in a name?
That which we call a rose
By any other name would
smell as sweet.
—William Shakespeare

The chief merit of language
is clearness.
—Galen

One person can make a
difference and every person
should try.
—John F. Kennedy

Objectives

In this chapter you'll:

■ Write simple Java applications.

■ Use input and output statements.

■ Learn about Java's primitive types.

■ Understand basic memory concepts.

■ Use arithmetic operators.

■ Learn the precedence of arithmetic operators.

■ Write decision-making statements.

■ Use relational and equality operators.

Self-Review Exercises

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

a)   A(n) _____ begins the body of every method, and a(n) _____ ends the body of every method.

ANS: left brace ({), right brace (}).

b)   You can use the _____ statement to make decisions.

ANS: `if`.

c)   _____ begins an end-of-line comment.

ANS: `//`.

d)   _____, _____ and _____ are called white space.

ANS: Space characters, newlines and tabs.

e)   _____ are reserved for use by Java.

ANS: Keywords.

f)   Java applications begin execution at method _____.

ANS: `main`.

g)   Methods _____, _____ and _____ display information in a command window.

ANS: `System.out.print`, `System.out.println` and `System.out.printf`.

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

a)   Comments cause the computer to print the text after the `//` on the screen when the program executes.

ANS: False. Comments do not cause any action to be performed when the program executes. They're used to document programs and improve their readability.

b)   All variables must be given a type when they're declared.

ANS: True.

c)   Java considers the variables `number` and `NuMbEr` to be identical.

ANS: False. Java is case sensitive, so these variables are distinct.

d)   The remainder operator (`%`) can be used only with integer operands.

ANS: False. The remainder operator can also be used with noninteger operands in Java.

e)   The arithmetic operators `*`, `/`, `%`, `+` and `-` all have the same level of precedence.

ANS: False. The operators `*`, `/` and `%` are higher precedence than operators `+` 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`.

ANS: `int c, thisIsAVariable, q76354, number;`

```
    or
int c;
int thisIsAVariable;
int q76354;
int number;
```

b)   Prompt the user to enter an integer.

ANS: `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.

ANS: `value = input.nextInt();`

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

ANS: `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.

ANS: System.out.printf("%s%n%s%n", "This is a Java", "program");

f) If the variable number is not equal to 7, display "The variable number is not equal to 7".

ANS: 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");

ANS: Error: Semicolon after the right parenthesis of the condition (c < 7) in the if.
    Correction: Remove the semicolon after the right parenthesis. [*Note:* As a result, the output statement will execute regardless of whether the condition in the if is true.]

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

ANS: Error: The relational operator => is incorrect. Correction: Change => to >=.

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.

ANS: // Calculate the product of three integers

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

ANS: Scanner input = new Scanner(System.in);

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

ANS: int x, y, z, result;
    or
    int x;
    int y;
    int z;
    int result;

d) Prompt the user to enter the first integer.

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

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

ANS: x = input.nextInt();

f) Prompt the user to enter the second integer.

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

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

ANS: y = input.nextInt();

h) Prompt the user to enter the third integer.

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

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

ANS: 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.

ANS: result = x * y * z;

k) Use System.out.printf to display the message "Product is" followed by the value of the variable result.

ANS: 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.

   ANS:

```
1   // Ex. 2.6: Product.java
2   // Calculate the product of three integers.
3   import java.util.Scanner; // program uses Scanner
4
5   public class Product
6   {
7      public static void main(String[] args)
8      {
9         // create Scanner to obtain input from command window
10        Scanner input = new Scanner(System.in);
11
12        int x; // first number input by user
13        int y; // second number input by user
14        int z; // third number input by user
15        int result; // product of numbers
16
17        System.out.print("Enter first integer: "); // prompt for input
18        x = input.nextInt(); // read first integer
19
20        System.out.print("Enter second integer: "); // prompt for input
21        y = input.nextInt(); // read second integer
22
23        System.out.print("Enter third integer: "); // prompt for input
24        z = input.nextInt(); // read third integer
25
26        result = x * y * z; // calculate product of numbers
27
28        System.out.printf("Product is %d%n", result);
29     } // end method main
30  } // end class Product
```

```
Enter first integer: 10
Enter second integer: 20
Enter third integer: 30
Product is 6000
```

Exercises

NOTE: Solutions to the programming exercises are located in the **ch02solutions** *folder. Each exercise has its own folder named* **ex02_##** *where* **##** *is a two-digit number representing the exercise number. For example, exercise 2.14's solution is located in the folder* **ex02_14.**

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

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

   ANS: Comments.

   b) A decision can be made in a Java program with a(n) _____.

   ANS: `if` statement.

   c)   Calculations are normally performed by _____ statements.

   ANS: assignment statements.

   d) The arithmetic operators with the same precedence as multiplication are _____ and

   _____.

ANS: division (/), remainder (%)

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

ANS: innermost.

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) _____.

ANS: 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.

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

b) Assign the product of variables b and c to variable a.

ANS: `a = b * c;`

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

ANS: `// This program performs a simple payroll calculation.`

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

a) Java operators are evaluated from left to right.

ANS: False. Some operators (e.g., assignment, =) evaluate from right to left.

b) The following are all valid variable names: `_under_bar_`, `m928134`, `t5`, `j7`, `her_sales$`, `his_$account_total`, `a`, `b$`, `c`, `z` and `z2`.

ANS: True.

c) A valid Java arithmetic expression with no parentheses is evaluated from left to right.

ANS: False. The expression is evaluated according to operator precedence.

d) The following are all invalid variable names: `3g`, `87`, `67h2`, `h22` and `2h`.

ANS: False. Identifier `h22` is a valid variable name.

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);`

ANS: `x = 2`

b) `System.out.printf("Value of %d + %d is %d%n", x, x, (x + x));`

ANS: `Value of 2 + 2 is 4`

c) `System.out.printf("x =");`

ANS: `x =`

d) `System.out.printf("%d = %d%n", (x + y), (y + x));`

ANS: `5 = 5`

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

a) `p = i + j + k + 7;`

b) `System.out.println("variables whose values are modified");`

c) `System.out.println("a = 5");`

d) `value = input.nextInt();`

ANS: (a), (d).

2.12   Given that $y = ax^3 + 7$, which of the following are correct Java statements for this equation?

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

b) `y = a * x * x * (x + 7);`

c) `y = (a * x) * x * (x + 7);`

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

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

f) `y = a * x * (x * x + 7);`

ANS: (a), (d), (e).

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;
ANS: *, /, +, -; Value of x is 15.
b) x = 2 % 2 + 2 * 2 - 2 / 2;
ANS: %, *, /, +, -; Value of x is 3.
c) x = (3 * 9 * (3 + (9 * 3 / (3))));
ANS: x = (3 * 9 * (3 + (9 * 3 / (3))));
                4   5   3   1   2
      Value of x is 324.

2.19   What does the following code print?

```
System.out.printf("*%n**%n***%n****%n*****%n");
```

ANS:

```
*
**
***
****
*****
```

2.20   What does the following code print?

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

ANS:

```
*
***
*****
****
**
```

2.21   What does the following code print?

```
System.out.print("*");
System.out.print("***");
System.out.print("*****");
System.out.print("****");
System.out.println("**");
```

ANS:

```
***************
```

2.22   What does the following code print?

```
System.out.print("*");
System.out.println("***");
```

```
System.out.println("*****");
System.out.print("****");
System.out.println("**");
```

ANS:

```
****
*****
******
```

2.23   What does the following code print?

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

ANS:

```
*
***
*****
```

Solutions Manual for Java How to Program Early Objects 10th Edition by Deitel IBSN 9780133813432

Full Download: http://downloadlink.org/product/solutions-manual-for-java-how-to-program-early-objects-10th-edition-by-deitel-ib