

Chapter 01, 02, 04
Special edition

Exercise solutions of
Java TM How to Program
Early Objects
TENTH edition
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Yet an another sample XD

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

- a) A(n) **{ left brace** begins the body of every method, and a(n) **right brace** ends the body of every method.
- b) You can use the **if** statement to make decisions.
- c) **//** begins an end-of-line comment.
- d) **Space, newlines and tabs** are called white space.
- e) **Keywords** are reserved for use by Java.
- f) Java applications begin execution at method **main**.
- g) 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) Comments cause the computer to print the text after the **//** on the screen when the program executes.

Ans: False. Comments are avoided by the compiler.

- 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. Variables are case-sensitive.

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

Ans: False. It also works with non-integer.

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

Ans: False. Some of them has higher priority.

2.3 Write statements to accomplish each of the following tasks:

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

```
1 int c, thisIsAVariable, q76354, number;
```

- b) Prompt the user to enter an integer.

```
1 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.

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

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

```
1 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.

```
1 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" .

```
1 if (number != 7)
```

```
2 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: There will be no semicolon after the condition of if.

b) if (c ==> 7)

```
System.out.println("c is equal to or greater than 7");
```

Ans: The condition has an invalid relational operation.

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.

```
1 // A program to calculate the product of three integer.
```

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

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

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

```
1 int x, y, z, result;
```

d) Prompt the user to enter the first integer.

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

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

```
1 x = input.nextInt();
```

f) Prompt the user to enter the second integer.

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

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

```
1 y = input.nextInt();
```

h) Prompt the user to enter the third integer.

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

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

```
1 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.

```
1 result = x * y * z;
```

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

```
1 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.

```
1 import java.util.Scanner;
2
3 /**
4  * Main
5  */
6 public class Main {
7     public static void main(String[] args) {
8         int x, y, z, result;
9         Scanner input = new Scanner(System.in);
10        System.out.print("Enter first integer: ");
11        x = input.nextInt();
12        System.out.print("Enter second integer: ");
13        y = input.nextInt();
14        System.out.print("Enter third integer: ");
15        z = input.nextInt();
16        input.close();
```

```

17
18     result = x * y * z;
19     System.out.printf("Product is %d%n", result);
20 }
21 }

```

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

- Comments** are used to document a program and improve its readability.
- A decision can be made in a Java program with a(n) **if**.
- Calculations are normally performed by **mathematical** statements.
- The arithmetic operators with the same precedence as multiplication are **division** and modulo **operator**.
- When parentheses in an arithmetic expression are nested, the **innermost** set of parentheses is evaluated first.
- 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:

- Display the message "Enter an integer: ", leaving the cursor on the same line.

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

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

```
1 a = b * c;
```

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

```
1 // This is a program to perform a sample payroll calculation
```

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

- Addition is executed first in the following expression: $a * b / (c + d) * 5$.

Ans: True.

- The following are all valid variable names: AccountValue, \$value, value_in_\$, account_no_1234, US\$, her_sales_in_\$, his_\$checking_account, X!, _\$_, a@b, and _name.

Ans: False. Because they can't contain special characters like @ or !.

- In $2 + 3 + 5 / 4$, addition has the highest precedence.

Ans: False. The division has more priority than addition.

d) The following are all invalid variable names: name@email.com, 87 , x%, 99er, and 2_.

Ans: True.

2.10 Assuming that x = 5 and y = 1, what does each of the following statements display?

a) `System.out.printf("x = %d%n", x + 5);`

Ans: x = 10

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

Ans: Value of 5 * 1 is 5

c) `System.out.printf("x is %d and y is %d", x, y);`

Ans: x is 5 and y is 1

d) `System.out.printf("%d is not equal to %d\n", (x + y), (x * y));`

Ans: 6 is not equal to 5

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

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

Ans: Modified.

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

Ans: Not modified.

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

Ans: Not modified.

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

Ans: Modified.

2.12 Given that $y = ax^2 + 5x + 2$, which of the following are correct Java statements for this equation?

a) `y = a * x * x + 5 * x + 2;`

Ans: Correct.

b) `y = a * x * x + (5 * x) + 2;`

Ans: Correct.

c) `y = a * x * x + 5 * (x + 2);`

Ans: Not correct.

d) `y = a * (x * x) + 5 * x + 2;`

Ans: Correct.

e) `y = a * x * (x + 5 * x) + 2;`

Ans: Not correct.

f) `y = a * (x * x + 5 * x + 2);`

Ans: Not correct.

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: First there will be multiplication and then division. Later other arithmetic. So the result will be 15.

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

Ans: Here modulo operation, multiplication and division will occur first then addition, so the result will be 3.

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

Ans: First innermost operation $9 * 3 / 3$ will be executed and later on addition and multiplication. So the result will be, 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. Use the following techniques:

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

b) Use four `System.out.print` statements.

c) Use one `System.out.printf` statement.

```
1 /**
2  * Main
3  */
4 public class Main {
5     public static void main(String[] args) {
6         System.out.println(1 + " " + 2 + " " + 3 + " " + 4);
7
8         System.out.print(1 + " ");
9         System.out.print(2 + " ");
10        System.out.print(3 + " ");
11        System.out.print(4 + " ");
12
13        System.out.printf("%n%d %d %d %d%n", 1, 2, 3, 4);
14    }
15 }
```

2.15 (Arithmetic) Write an application that asks the user to enter two integers, obtains them from the user and prints the square of each, the sum of their squares, and the difference of the squares (first number squared minus the second number squared). Use the techniques shown in Fig. 2.7.

```
1 import java.util.Scanner;
2 public class Main {
```



```

3  public static void main(String[] args) {
4      Scanner input = new Scanner(System.in);
5      System.out.print("Enter first integer: ");
6      int first = input.nextInt();
7      System.out.print("Enter second integer: ");
8      int second = input.nextInt();
9      input.close();
10
11     System.out.printf("First: %d\nSecond: %d\n", first, second);
12     System.out.printf("First squared: %d\nSecond squared: %d\n", first *
first, second * second);
13     System.out.printf("Sum of squares: %d\nDifference of squares: %d
%n", first * first + second * second, first * first - second * second);
14 }
15 }

```

2.16 (Comparing Integers) Write an application that asks the user to enter one integer, obtains it from the user and displays whether the number and its square are greater than, equal to, not equal to, or less than the number 100. Use the techniques shown in Fig. 2.15.

```

1  import java.util.Scanner;
2
3  public class Main {
4      public static void main(String[] args) {
5          Scanner input = new Scanner(System.in);
6          int number = input.nextInt();
7          input.close();
8
9          int square = number * number;
10         if (number > 100) {
11             System.out.printf("%d's square is greater than 100\n", number);
12         }
13         else if (number < 100) {
14             System.out.printf("%d's square is less than 100\n", number);
15         }
16         else if (number == 100) {
17             System.out.printf("%d's square is equal to 100\n", number);
18         }
19     }
20 }

```


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. Use the techniques shown in Fig. 2.15. [Note: The calculation of the average in this exercise should result in an integer representation of the average. So, if the sum of the values is 7, the average should be 2, not 2.3333....]

```
1 import java.util.Scanner;
2
3 public class Main {
4     public static void main(String[] args) {
5         Scanner input = new Scanner(System.in);
6         int num1, num2, num3, sum, product, smallest, largest;
7         double average;
8
9         System.out.print("Enter first integer: ");
10        num1 = input.nextInt();
11
12        System.out.print("Enter second integer: ");
13        num2 = input.nextInt();
14
15        System.out.print("Enter third integer: ");
16        num3 = input.nextInt();
17        input.close();
18
19        sum = num1 + num2 + num3;
20        product = num1 * num2 * num3;
21        average = sum / 3.0;
22
23        smallest = num1;
24        if (num2 < smallest) {
25            smallest = num2;
26        }
27        if (num3 < smallest) {
28            smallest = num3;
29        }
30
31        largest = num1;
32        if (num2 > largest) {
33            largest = num2;
34        }
35        if (num3 > largest) {
36            largest = num3;
```

```

37     }
38
39     System.out.printf("Sum is %d%n", sum);
40     System.out.printf("Average is %.2f%n", average);
41     System.out.printf("Product is %d%n", product);
42     System.out.printf("Smallest is %d%n", smallest);
43     System.out.printf("Largest is %d%n", largest);
44 }
45 }

```

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

```

1  import java.util.Scanner;
2
3  public class Main {
4      public static void main(String[] args) {
5          System.out.println("*****  ***  *      *");
6          System.out.println("*      * *  *  ***  * *");
7          System.out.println("*      * *  *  *****  * *");
8          System.out.println("*      * *  *  *      * *");
9          System.out.println("*      * *  *  *      * *");
10         System.out.println("*      * *  *  *      * *");
11         System.out.println("*      * *  *  *      * *");
12         System.out.println("*      * *  *  *      * *");
13         System.out.println("*****  ***  *      *");
14     }
15 }

```

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?

```

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

```

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

Ans:

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

2.21 What does the following code print?

```
1 System.out.print("*");
2 System.out.print("***");
3 System.out.print("*****");
4 System.out.print("*****");
5 System.out.println("**");
```

Ans:

```
*****
```

2.22 What does the following code print?

```
1 System.out.print("*");
2 System.out.println("***");
3 System.out.println("*****");
4 System.out.print("*****");
5 System.out.println("**");
```

Ans:

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

2.23 What does the following code print?

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

Ans:

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

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. Use only the programming techniques you learned in this chapter.

```
1 import java.util.Scanner;
```

```
2
3 public class Main {
4     public static void main(String[] args) {
5         Scanner input = new Scanner(System.in);
6         int number1;
7         int number2;
8         int number3;
9         int number4;
10        int number5;
11
12        number1 = input.nextInt();
13        number2 = input.nextInt();
14        number3 = input.nextInt();
15        number4 = input.nextInt();
16        number5 = input.nextInt();
17
18        input.close();
19
20        if (number1 > number2 && number1 > number3 && number1 >
number4 && number1 > number5) {
21            System.out.printf("%d is the largest number%n",
number1);
22        } else if (number2 > number1 && number2 > number3 &&
number2 > number4 && number2 > number5) {
23            System.out.printf("%d is the largest number%n",
number2);
24        } else if (number3 > number1 && number3 > number2 &&
number3 > number4 && number3 > number5) {
25            System.out.printf("%d is the largest number%n",
number3);
26        } else if (number4 > number1 && number4 > number2 &&
number4 > number3 && number4 > number5) {
27            System.out.printf("%d is the largest number%n",
number4);
28        } else if (number5 > number1 && number5 > number2 &&
number5 > number3 && number5 > number4) {
```

```

29         System.out.printf("%d is the largest number%n",
number5);
30     }
31
32     if (number1 < number2 && number1 < number3 && number1 <
number4 && number1 < number5) {
33         System.out.printf("%d is the smallest number%n",
number1);
34     } else if (number2 < number1 && number2 < number3 &&
number2 < number4 && number2 < number5) {
35         System.out.printf("%d is the smallest number%n",
number2);
36     } else if (number3 < number1 && number3 < number2 &&
number3 < number4 && number3 < number5) {
37         System.out.printf("%d is the smallest number%n",
number3);
38     } else if (number4 < number1 && number4 < number2 &&
number4 < number3 && number4 < number5) {
39         System.out.printf("%d is the smallest number%n",
number4);
40     } else if (number5 < number1 && number5 < number2 &&
number5 < number3 && number5 < number4) {
41         System.out.printf("%d is the smallest number%n",
number5);
42     }
43 }
44 }

```

2.25 (Divisible by 3) Write an application that reads an integer and determines and prints whether it's divisible by 3 or not.

```

1 import java.util.Scanner;
2
3 public class Main {
4     public static void main(String[] args) {
5         Scanner input = new Scanner(System.in);
6         System.out.print("Enter an integer: ");
7         int number = input.nextInt();

```

```

8     input.close();
9
10    if (number % 3 == 0) {
11        System.out.printf("%d is divisible by 3%n", number);
12    } else {
13        System.out.printf("%d is not divisible by 3%n", number);
14    }
15 }
16 }

```

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

```

1  import java.util.Scanner;
2
3  public class Main {
4      public static void main(String[] args) {
5          Scanner input = new Scanner(System.in);
6          int num1, num2;
7          System.out.print("Enter first number: ");
8          num1 = input.nextInt();
9          System.out.print("Enter second number: ");
10         num2 = input.nextInt();
11         input.close();
12
13         if (num1 * 3 % (num2 * 2) == 0) {
14             System.out.printf("%d is a multiple of %d%n", num1 * 3, num2 * 2);
15         } else {
16             System.out.printf("%d is not a multiple of %d%n", num1 * 3, num2 *
17         }
18     }
19 }

```

2.27 (Checkerboard Pattern of Asterisks) Write an application that displays a checkerboard pattern:

```

1  import java.util.Scanner;
2
3  public class Main {
4      public static void main(String[] args) {
5          Scanner input = new Scanner(System.in);
6          System.out.println("Enter the size of the checkerboard: ");

```

```

7     int size = input.nextInt();
8     input.close();
9
10    for (int i = 0; i < size; i++) {
11        if (i % 2 == 0) {
12            System.out.print(" ");
13        }
14        for (int j = 0; j < size; j++) {
15            System.out.print("* ");
16        }
17        System.out.println();
18    }
19 }
20 }

```

2.28 (Diameter, Circumference and Area of a Circle)

```

1 import java.util.Scanner;
2
3 public class Main {
4     public static void main(String[] args) {
5         Scanner input = new Scanner(System.in);
6         System.out.print("Enter the radius of a circle: ");
7         int radius = input.nextInt();
8         System.out.printf("Diameter: %d\nCircumference: %f\nArea: %f\n",
2 * radius, 2 * Math.PI * radius,
9             Math.PI * radius * radius);
10        input.close();
11    }
12 }

```

2.29 (Integer Value of a Character)

```

1 import java.util.Scanner;
2
3 public class Main {
4     public static void main(String[] args) {
5         Scanner input = new Scanner(System.in);
6         System.out.print("Enter a character: ");
7         char character = input.next().charAt(0);
8         input.close();
9
10        System.out.printf("The character %c has the value %d\n", character,
((int) character));

```



```
11 }  
12 }
```

2.30 (Separating the Digits in an Integer)

```
1 import java.util.Scanner;  
2  
3 public class Main {  
4     public static void main(String[] args) {  
5         Scanner input = new Scanner(System.in);  
6         System.out.print("Enter a five-digit integer: ");  
7         int number = input.nextInt();  
8         input.close();  
9  
10        int digit1 = number / 10000;  
11        int digit2 = (number % 10000) / 1000;  
12        int digit3 = (number % 1000) / 100;  
13        int digit4 = (number % 100) / 10;  
14        int digit5 = number % 10;  
15  
16        System.out.printf("%d %d %d %d %d\n", digit1, digit2, digit3,  
digit4, digit5);  
17    }  
18 }
```

2.31 (Table of Squares and Cubes)

```
1 public class Main {  
2     public static void main(String[] args) {  
3         System.out.println("number    square    cube");  
4         for (int i=0; i <= 10; i++)  
5         {  
6             System.out.println(i + "        " + i * i + "        " + i * i * i);  
7         }  
8     }  
9 }
```

2.32 (Negative, Positive and Zero Values)

```
1 import java.util.Scanner;  
2  
3 public class Main {  
4     public static void main(String[] args) {  
5         Scanner input = new Scanner(System.in);  
6         int negativeCount = 0;
```

```
7  int positiveCount = 0;
8  int zeroCount = 0;
9
10 for (int i = 0; i < 5; i++) {
11     System.out.print("Enter a number: ");
12     int num = input.nextInt();
13
14     if (num < 0) {
15         negativeCount++;
16     } else if (num > 0) {
17         positiveCount++;
18     } else {
19         zeroCount++;
20     }
21 }
22 input.close();
23
24 System.out.println("Negative numbers: " + negativeCount);
25 System.out.println("Positive numbers: " + positiveCount);
26 System.out.println("Zero numbers: " + zeroCount);
27 }
28 }
```