

Chapter 02: Using Data

True / False

1. A variable can hold more than one value at a time.

- a. True
- b. False

ANSWER: False

POINTS: 1

REFERENCES: 54

2. The `int` data type is the most commonly used integer type.

- a. True
- b. False

ANSWER: True

POINTS: 1

REFERENCES: 64

3. Multiplication, division, and remainder always take place after addition or subtraction in an expression.

- a. True
- b. False

ANSWER: False

POINTS: 1

REFERENCES: 95

4. The term *parse* means to break into component parts.

- a. True
- b. False

ANSWER: True

POINTS: 1

REFERENCES: 90

5. You can create a confirm dialog box with five arguments.

- a. True
- b. False

ANSWER: True

POINTS: 1

REFERENCES: 92

6. Once a variable has been declared and initialized, new values may not be assigned to the variable.

- a. True
- b. False

ANSWER: False

POINTS: 1

REFERENCES: 55

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7. The expression `boolean isTenLarger = (10 < 5)` will produce a value of `true`.

- a. True
- b. False

ANSWER: False

POINTS: 1

REFERENCES: 70

8. Even if a statement occupies multiple lines, the statement is not complete until the semicolon is reached.

- a. True
- b. False

ANSWER: True

POINTS: 1

REFERENCES: 56

9. You are limited to declaring a maximum of three variables in a single statement.

- a. True
- b. False

ANSWER: False

POINTS: 1

REFERENCES: 56

10. The **byte** and **short** data types occupy less memory and can hold only smaller values.

- a. True
- b. False

ANSWER: True

POINTS: 1

REFERENCES: 64

Multiple Choice

11. A data item is ____ when it cannot be changed while a program is running.

- a. variable
- b. constant
- c. primitive
- d. literal

ANSWER: b

POINTS: 1

REFERENCES: 54

12. A ____ is a named memory location that you can use to store a value.

- a. cast
- b. variable
- c. reference
- d. primitive

ANSWER: b

POINTS: 1

REFERENCES: 54

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13. Primitive types serve as the building blocks for more complex data types, called ____ types.

- a. integer b. literal
- c. reference d. data

ANSWER: c

POINTS: 1

REFERENCES: 54

14. ____ refers to the order in which values are used with operators.

- a. Associativity b. Initialization
- c. Declaration d. Floating

ANSWER: a

POINTS: 1

REFERENCES: 55

15. In Java, you use variables of type ____ to store integers, or whole numbers.

- a. num b. double
- c. var d. int

ANSWER: d

POINTS: 1

REFERENCES: 54, 64

16. A(n) ____ variable can hold only one of two values: true or false.

- a. integer b. boolean
- c. true d. comparison

ANSWER: b

POINTS: 1

REFERENCES: 70

17. The term ____ refers to the mathematical accuracy of a value.

- a. float data b. real integers
- c. significant digits d. single-precision floating-point number

ANSWER: c

POINTS: 1

REFERENCES: 71

18. A ____ data type can hold 14 or 15 significant digits of accuracy.

- a. double b. float
- c. char d. boolean

ANSWER: a

POINTS: 1

REFERENCES: 71

19. You use the ____ data type to hold any single character.

- a. single b. char

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c. byte d. float

ANSWER: b

POINTS: 1

REFERENCES: 72

20. In Java, ____ is a built-in class that provides you with the means for storing and manipulating character strings.

a. Escape b. Type
c. String d. Character

ANSWER: c

POINTS: 1

REFERENCES: 74

21. You can store any character, including nonprinting characters such as a backspace or a tab, in a(n) ____ variable.

a. int b. char
c. boolean d. set

ANSWER: b

POINTS: 1

REFERENCES: 75

22. The characters ____ move the cursor to the next line when used within a `println()` statement.

a. `/n` b. `\n`
c. `.+` d. `$`

ANSWER: b

POINTS: 1

REFERENCES: 75

23. In Java, when a numeric variable is concatenated to a `String` using the ____, the entire expression becomes a `String`.

a. plus sign b. equal sign
c. concatenate statement d. string statement

ANSWER: a

POINTS: 1

REFERENCES: 58

24. You use ____ operators to perform calculations with values in your programs.

a. calculation b. arithmetic
c. integer d. precedence

ANSWER: b

POINTS: 1

REFERENCES: 93

25. ____ occurs when both of the operands are integers.

a. Data modeling b. Type cast
c. Integer division d. Unlike assignment

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ANSWER: c
POINTS: 1
REFERENCES: 94

26. The percent sign is the ____ operator.
- a. remainder b. remaining
 - c. percentage d. integer division

ANSWER: a
POINTS: 1
REFERENCES: 94

27. What is the value of `result` after the following statement is executed?
- ```
int result = 2 + 3 * 4;
```

- a. 9      b. 10
- c. 14      d. 20

*ANSWER:* c  
*POINTS:* 1  
*REFERENCES:* 95

28. The \_\_\_\_ is the type to which all operands in an expression are converted so that they are compatible with each other.
- a. unifying type      b. data type
  - c. numbered      d. primitive

*ANSWER:* a  
*POINTS:* 1  
*REFERENCES:* 101

29. A(n) \_\_\_\_ dialog box asks a question and provides a text field in which the user can enter a response.
- a. question      b. `JOptionPane`
  - c. confirm      d. input

*ANSWER:* d  
*POINTS:* 1  
*REFERENCES:* 87

30. Each primitive type in Java has a corresponding class contained in the `java.lang` package. These classes are called \_\_\_\_ classes.

- a. case      b. primitive
- c. type-wrapper      d. show

*ANSWER:* c  
*POINTS:* 1  
*REFERENCES:* 89

31. A(n) \_\_\_\_ dialog box typically displays the options Yes, No, and Cancel.
- a. confirm      b. input
  - c. message      d. answer

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ANSWER: a  
POINTS: 1  
REFERENCES: 91

32. Which of the following is NOT a component of a variable declaration statement?

- a. data type identifier      b. symbolic constant
- c. variable name            d. ending semicolon

ANSWER: b  
POINTS: 1  
REFERENCES: 55

33. You may declare an unlimited number of variables in a statement as long as the variables are \_\_\_\_.

- a. the same data type      b. initialized to the same value
- c. properly commented    d. floating point numbers

ANSWER: a  
POINTS: 1  
REFERENCES: 56

34. When a numeric variable is concatenated to a `String`, the entire expression becomes a(n) \_\_\_\_.

- a. `int`                      b. constant
- c. method                d. `String`

ANSWER: d  
POINTS: 1  
REFERENCES: 58

35. Which escape sequence will move the cursor to the beginning of the current line?

- a. `\b`      b. `\r`
- c. `\\`      d. `\n`

ANSWER: b  
POINTS: 1  
REFERENCES: 75

### Completion

36. A(n) \_\_\_\_\_ is a simple data type.

ANSWER: primitive type  
POINTS: 1  
REFERENCES: 54

37. A(n) \_\_\_\_\_ operator compares two items and the result has a Boolean value.

ANSWER: relational  
comparison  
POINTS: 1  
REFERENCES: 70

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38. A(n) \_\_\_\_\_ number contains decimal positions.

ANSWER:       floating-point  
                  float  
                  double

POINTS:        1

REFERENCES: 71

39. \_\_\_\_\_ forces a value of one data type to be used as a value of another type.

ANSWER:       Type casting  
                  type casting

POINTS:        1

REFERENCES: 102

40. When you write programs that accept \_\_\_\_\_, there is a risk that the user will enter the wrong type of data.

ANSWER:       user input

POINTS:        1

REFERENCES: 83

### Matching

*Match each term with the correct statement below.*

- a. operand
- b. cast operator
- c. assignment
- d. operator precedence
- e. garbage value
- f. primitive type
- g. float
- h. boolean
- i. escape sequence

REFERENCES: 93

102

55

95

56

54

71

70

75

41. true or false

ANSWER: h

POINTS: 1

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42. The operator that is represented by an equal sign (=)

ANSWER: c

POINTS: 1

43. A programming term for an unknown value

ANSWER: e

POINTS: 1

44. Java consistently specifies their size and format

ANSWER: f

POINTS: 1

45. A value that can be used on either side of an operator

ANSWER: a

POINTS: 1

46. Rules for the order in which parts of a mathematical expression are evaluated

ANSWER: d

POINTS: 1

47. A floating-point data type

ANSWER: g

POINTS: 1

48. Created by placing the desired result type in parentheses

ANSWER: b

POINTS: 1

49. Begins with a backslash followed by a character

ANSWER: i

POINTS: 1

### Subjective Short Answer

50. A variable declaration is a statement that reserves a named memory location. It includes what four elements?

ANSWER:       A data type that identifies the type of data that the variable will store  
                  An identifier that is the variable's name  
                  An optional assignment operator and assigned value, if you want a variable to contain an initial value  
                  An ending semicolon

POINTS: 1

REFERENCES: 55

51. Define an integer and then list and describe the four integer data types.

ANSWER:       An integer is a whole number without decimal places. The types `byte`, `short`, `int`, and `long` are all variations of the integer type. The `int` data type is the most commonly used integer type. A variable of type `int` can hold any whole number value from -2,147,483,648 to +2,147,483,647. The `byte` and



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`short` types occupy less memory and can hold only smaller values; the `long` type occupies more memory and can hold larger values.

**POINTS:** 1

**REFERENCES:** 64

52. Describe how to use the boolean data type. Show two examples of a boolean variable assignment; one that uses true or false and one that uses a relational operator.

**ANSWER:** Boolean logic is based on true or false comparisons. Whereas an `int` variable can hold millions of different values (at different times), a boolean variable can hold only one of two values—true or false. Besides assigning true and false, you also can assign a value to a Boolean variable based on the result of a comparison.

```
boolean isItPayday = false;
boolean isItPayday = (today=="Friday");
```

**POINTS:** 1

**REFERENCES:** 70

53. What is the difference between the `float` data type and the `double` data type?

**ANSWER:** Java supports two floating-point data types: `float` and `double`. A `float` data type can hold floating-point values of up to six or seven significant digits of accuracy. A `double` data type requires more memory than a `float`, and can hold 14 or 15 significant digits of accuracy. The term *significant digits* refers to the mathematical accuracy of a value. For example, a `float` given the value 0.324616777 displays as 0.324617 because the value is accurate only to the sixth decimal position.

**POINTS:** 1

**REFERENCES:** 71

54. What is an escape sequence and why would a Java programmer use it to store a character?

**ANSWER:** You can store any character—including nonprinting characters such as a backspace or a tab—in a `char` variable. To store these characters, you can use an escape sequence, which always begins with a backslash followed by a character—the pair represents a single character. You might want to use an escape sequence when you want to produce console output on multiple lines in the command window without using multiple `println()` methods.

**POINTS:** 1

**REFERENCES:** 75

55. Describe and give an example of operator precedence.

**ANSWER:** Operator precedence refers to the rules for the order in which parts of a mathematical expression are evaluated. The multiplication, division, and remainder operators have the same precedence. Their precedence is higher than that for the addition and subtraction operators. Addition and subtraction have the same precedence. In other words, multiplication, division, and remainder always take place from left to right prior to addition or subtraction in an expression. For example, the following statement assigns 14 to `result`: `int result = 2 + 3 * 4;`

**POINTS:** 1

**REFERENCES:** 95

56. In Java, how is it possible to perform mathematical operations on operands with unlike types?

**ANSWER:** When you perform arithmetic operations with operands of unlike types, Java chooses a unifying type for

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the result. The unifying type is the type to which all operands in an expression are converted so that they are compatible with each other. Java performs an implicit conversion; that is, it automatically converts nonconforming operands to the unifying type.

**POINTS:** 1

**REFERENCES:** 101

57. Explain how you can override a unifying type imposed by Java. Show an example.

**ANSWER:** You can purposely override the unifying type imposed by Java by performing a type cast. Type casting forces a value of one data type to be used as a value of another type. To perform a type cast, you use a cast operator, which is created by placing the desired result type in parentheses. Using a cast operator is an explicit conversion. The cast operator is followed by the variable or constant to be cast.

Example:

```
double bankBalance = 189.66;
float weeklyBudget = (float) (bankBalance / 4);
```

**POINTS:** 1

**REFERENCES:** 102

58. How can you create and use an input dialog box in Java?

**ANSWER:** You can create an input dialog box using the `showInputDialog()` method. Six overloaded versions of this method are available, but the simplest version uses a single argument that is the prompt you want to display within the dialog box. The `showInputDialog()` method returns a `String` that represents a user's response; this means that you can assign the `showInputDialog()` method to a `String` variable and the variable will hold the value that the user enters.

**POINTS:** 1

**REFERENCES:** 87

59. How would you ask the user to confirm an action using a dialog box?

**ANSWER:** A confirm dialog box that displays the options Yes, No, and Cancel can be created using the `showConfirmDialog()` method in the `JOptionPane` class. Four versions of the method are available; the simplest requires a parent component (which can be null) and the `String` prompt that is displayed in the box. The `showConfirmDialog()` method returns an integer containing one of three possible values: `JOptionPane.YES_OPTION`, `JOptionPane.NO_OPTION`, or `JOptionPane.CANCEL_OPTION`.

**POINTS:** 1

**REFERENCES:** 91

60. Describe how the use of named constants can provide advantages over the use of literal values.

**ANSWER:** Using named constants makes programs easier to read and understand. When a constant is defined, you can change the constant at one location, which saves time and prevents you from missing other references. Using named constants reduces typographical errors that may not be recognized by the compiler. Constants can be easily identified when named conventionally (all caps).

**POINTS:** 1

**REFERENCES:** 57

61. Describe why it is important to assign an appropriate data type to variables in an application.

**ANSWER:** If you attempt to assign a value that is too large for the data type of the variable, the compiler issues an

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error message, and the application does not execute. If you choose a data type that is larger than you need, you waste memory.

**POINTS:** 1

**REFERENCES:** 65

62. Describe how the `Scanner` class works with the `System.in` object in order to provide flexibility. Provide an example of using the `Scanner` class with `System.in`.

**ANSWER:** The `System.in` object is designed to read bytes only. Since it is common to accept data of other types, the `Scanner` object can connect to the `System.in` property. This creates a `Scanner` object that will be connected to the default input device.

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

**POINTS:** 1

**REFERENCES:** 78

63. `100 = salesAmount;`

In terms of assignment operators, why is the above statement illegal?

**ANSWER:** This assignment operator has a right-to-left associativity. Associativity is the order in which values are used with operators. An identifier that can appear on the left side of an assignment operator sometimes is referred to as an lvalue, and an item that can appear only on the right side of an assignment operator is an rvalue. A variable can be used as an lvalue or an rvalue, but a literal constant can only be an rvalue. Since 100 is a numeric constant, it is an rvalue, which is an item that can appear only on the right side of the assignment operator.

**POINTS:** 1

**REFERENCES:** 55

64. Describe three ways in which a named constant differs from a variable.

**ANSWER:** In its declaration statement, the data type of a named constant is preceded by the keyword `final`. A named constant can be assigned a value only once, and then it cannot be changed later in the program. Usually you initialize a named constant when you declare it; if you do not initialize the constant at declaration, it is known as a blank final, and you can assign a value later. Either way, you must assign a value to a constant before it is used. Named constants conventionally are given identifiers using all uppercase letters, using underscores as needed to separate words.

**POINTS:** 1

**REFERENCES:** 56

65. Write the statement to declare an uninitialized integer value for `salesAmt`. Then write the statement to declare a constant named `SALESAMT` with a value of 20.99.

**ANSWER:** `int salesAmt;`

```
final double SALESAMT = 20.99;
```

**POINTS:** 1

**REFERENCES:** 56,57

66. Write the statement that will declare and assign two integer variables, `salesAmt` and `costAmt`, in a single statement. Assign values of your choice to the variables.

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**ANSWER:**        `int salesAmt = 100, costAmt = 15;`

**POINTS:**        1

**REFERENCES:** 56

```
67. import javax.swing.JOptionPane;
public class salesJune
{
 public static void main(String[] args)
 {
int storeSales = 250;
 }
}
```

In the above code, complete the statement that will display a message dialog box that will appear centered on the screen and will display the following text:

Congratulations! June sales were \$250!

**ANSWER:**        `JOptionPane.showMessageDialog(null, "Congratulations! June sales were $" + storeSales + "!");`

**POINTS:**        1

**REFERENCES:** 59-60

```
68. final int COSTPERITEM = 10;
double sales2012 = amtSold * COSTPERITEM;
```

In the above statements, identify the named constant and describe how a programmer can recognize named constants.

**ANSWER:**        The named constant identifier is `COSTPERITEM`.  
Constant declaration statements use the `final` keyword.  
Constants are conventionally given identifiers in all uppercase letters.

**POINTS:**        1

**REFERENCES:** 56

69. Write the statement that will declare a `char` data type named `testScore` that will hold a letter grade of your choice.

**ANSWER:**        `char testScore = 'A';`

**POINTS:**        1

**REFERENCES:** 72

```
70. public class YourGrade
{
 public static void main(String[] args)
 {
int projectPoints = 89;
System.out.print("Your grade for this class is ");
System.out.print(projectPoints);
System.out.println("%");
 }
}
```

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Given the above code, what will be the output at the command prompt?

**ANSWER:** Output will be as follows:

Your grade for this class is 89%

A blank line will follow the output.

**POINTS:** 1

**REFERENCES:** 58-59

71. Describe the error message that will be produced when the following code is compiled.

```
public class SalesOct
{
 public static void main(String[] args)
 {
 int salesAmt;
 System.out.print("October sales are $");
 System.out.println(salesAmt);
 }
}
```

**ANSWER:** The second `println` statement will generate an error message because the variable used in the statement is undeclared. It is legal to declare an uninitialized variable, but it cannot be used in a `println()` statement uninitialized. If you assign a numeric value to `int salesAmt`, the program will compile.

**POINTS:** 1

**REFERENCES:** 63

```
72. public class EndValue
{
 public static void main(String[] args)
 {
 int aByte = 940;
 System.out.print("The ending value is " + aByte);
 }
}
```

When the above code is compiled, what error message will be generated and why?

**ANSWER:** The above code will result in the error message “possible loss of precision”. The assigned value of 940 to the `aByte` variable is larger than the maximum value allowed. A `byte` type can hold a value between -128 and 127. Thus, the accuracy of the number has been compromised.

**POINTS:** 1

**REFERENCES:** 67

73. Why is the following relational operator expression invalid? How could you rewrite the statement so that it is valid?

```
boolean isGradePassing = (grade => 70);
```

**ANSWER:** In this statement, the order of the operator symbols is reversed. It is illegal to use `=<`, `=>`, and `=!`.

The statement could be modified as follows:

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```
boolean isGradePassing = (grade >= 70);
```

*POINTS:* 1

*REFERENCES:* 70

```
74.char aCharacter = 2;
int aNumber = '2';
```

In the above statements, what values will be output after a `println()` statement is executed? Why are the output results different for the two statements?

*ANSWER:* aCharacter will output a blank.  
aNumber will output a value of 50.

Unicode values are used to assign a unique numeric code. Every computer stores each character it uses as a number and each character is assigned a unique Unicode numeric value.

*POINTS:* 1

*REFERENCES:* 73

75. How could you alter the following statement to display “Welcome” on one line and “back” on another line? Show two possible solutions.

```
System.out.println("Welcome back");
```

*ANSWER:* There are two possible options:

```
System.out.println("Welcome\nback");
```

and

```
System.out.println("Welcome");
System.out.println("back");
```

*POINTS:* 1

*REFERENCES:* 76