

Chapter 1 - The Language of Algebra

1. Identify the property that is illustrated by the following statement.

$$18 + 17 = 17 + 18$$

- A) Commutative property of addition C) Distributive property
B) Associative property of addition

Ans: A

Difficulty Level: Routine

Section: 1.1

2. Identify the property that is illustrated by the following statement.

$$(13 \cdot 4) \cdot 6 = 13 \cdot (4 \cdot 6)$$

- A) Commutative property of multiplication
B) Associative property of multiplication
C) Distributive property

Ans: B

Difficulty Level: Routine

Section: 1.1

3. Identify the property that is illustrated by the following statement.

$$20 \cdot 17 = 17 \cdot 20$$

- A) Commutative property of multiplication
B) Associative property of multiplication
C) Distributive property

Ans: A

Difficulty Level: Routine

Section: 1.1

4. Identify the property that is illustrated by the following statement.

$$15 \cdot (11 + 3) = 15 \cdot 11 + 15 \cdot 3$$

- A) Commutative property of multiplication
B) Associative property of addition
C) Associative property of multiplication
D) Distributive property

Ans: D

Difficulty Level: Moderate

Section: 1.1

5. Identify the property that is illustrated by the following statement.

$$(11 + 13) + 8 = 11 + (13 + 8)$$

- A) Commutative property of addition C) Distributive property
B) Associative property of addition

Ans: B

Difficulty Level: Routine

Section: 1.1

6. Verify that the following statement is true by evaluating each side of the equation separately and comparing the results.

$$2 \cdot (7 + 6) = 2 \cdot 7 + 2 \cdot 6$$

$$\text{Ans: } 2 \cdot (7 + 6) = 2 \cdot 7 + 2 \cdot 6$$

$$2 \cdot (13) = 14 + 12$$

$$26 = 26$$

Difficulty Level: Routine

Section: 1.1

7. Verify that the following statement is true by evaluating each side of the equation separately and comparing the results.

$$\frac{1}{4} \cdot (20 + 16) = \frac{1}{4} \cdot 20 + \frac{1}{4} \cdot 16$$

$$\text{Ans: } \frac{1}{4} \cdot (20 + 16) = \frac{1}{4} \cdot 20 + \frac{1}{4} \cdot 16$$

$$\frac{1}{4} \cdot (36) = 5 + 4$$

$$9 = 9$$

Difficulty Level: Routine

Section: 1.1

8. Verify that the following statement is true by evaluating each side of the equation separately and comparing the results.

$$3.7 + (2.2 + 7.1) = (3.7 + 2.2) + 7.1$$

$$\text{Ans: } 3.7 + (2.2 + 7.1) = (3.7 + 2.2) + 7.1$$

$$3.7 + 9.3 = 5.9 + 7.1$$

$$13 = 13$$

Difficulty Level: Routine

Section: 1.1

9. Use the distributive property to remove the parentheses in the following expression. Then simplify your result where possible.

$$2(9 + 8)$$

A) 34 B) 26 C) 19 D) 144

Ans: A

Difficulty Level: Moderate

Section: 1.1

10. Use the distributive property to remove the parentheses in the following expression. Then simplify your result where possible.

$$3.5(4 + 2)$$

A) 21 B) 16 C) 9.5 D) 28

Ans: A

Difficulty Level: Moderate

Section: 1.1

11. Use the distributive property to remove the parentheses in the following expression. Then simplify your result where possible.

$$\frac{1}{4}(20+16)$$

A) 21 B) 9 C) 20 D) 10

Ans: B

Difficulty Level: Difficult

Section: 1.1

12. Use the properties of addition and multiplication to complete the statement.

$$0 + 19 = \underline{\hspace{2cm}} + 0$$

Ans: 19

Difficulty Level: Routine

Section: 1.1

13. Use the properties of addition and multiplication to complete the statement.

$$(18 + 17) + 19 = 18 + (\underline{\hspace{1cm}} + 19)$$

Ans: 17

Difficulty Level: Routine

Section: 1.1

14. Use the properties of addition and multiplication to complete the statement.

$$12 \cdot 0 = 0 \cdot \underline{\hspace{2cm}}$$

Ans: 12

Difficulty Level: Routine

Section: 1.1

15. Use the properties of addition and multiplication to complete the statement.

$$10 \cdot (3 + 12) = 10 \cdot \underline{\hspace{1cm}} + 10 \cdot 12$$

Ans: 3

Difficulty Level: Moderate

Section: 1.1

16. Use the properties of addition and multiplication to complete the statement.

$$10 \cdot (19 \cdot 1) = (\underline{\hspace{1cm}} \cdot 19) \cdot 1$$

Ans: 10

Difficulty Level: Routine

Section: 1.1

17. Use the indicated property to write an expression that is equivalent to the following expression.

$$4 + 14 \quad (\text{commutative property of addition})$$

Ans: $14 + 4$

Difficulty Level: Moderate

Section: 1.1

18. Use the indicated property to write an expression that is equivalent to the following expression.

$$(17 \cdot 4) \cdot 8 \quad (\text{associative property of multiplication})$$

Ans: $17 \cdot (4 \cdot 8)$

Difficulty Level: Moderate

Section: 1.1

19. Use the indicated property to write an expression that is equivalent to the following expression.

$$(4 + 20) + 14 \quad (\text{associative property of addition})$$

Ans: $4 + (20 + 14)$

Difficulty Level: Routine

Section: 1.1

20. Use the indicated property to write an expression that is equivalent to the following expression.

$$9 \cdot 3 + 9 \cdot 18 \quad (\text{distributive property})$$

Ans: $9 \cdot (3 + 18)$

Difficulty Level: Difficult

Section: 1.1

21. Use the indicated property to write an expression that is equivalent to the following expression.

$$13 \cdot 20 \quad (\text{commutative property of multiplication})$$

Ans: $20 \cdot 13$

Difficulty Level: Routine

Section: 1.1

22. Identify the property that is used.

$$2 \cdot (6 + 5) = (6 + 5) \cdot 2$$

A) Commutative property of multiplication

B) Associative property of addition

C) Distributive property

Ans: A

Difficulty Level: Routine

Section: 1.1

23. Add. $\frac{4}{5} + \frac{1}{10}$

A) $\frac{9}{10}$ B) $\frac{1}{3}$ C) $\frac{1}{2}$ D) $\frac{7}{10}$

Ans: A

Difficulty Level: Routine

Section: 1.2

24. Add. $14 + (-15)$
A) 29 B) -1 C) 1 D) -29
Ans: B
Difficulty Level: Moderate
Section: 1.2
25. Add. $-5.1 + 12.3$
A) 17.4 B) -7.2 C) 7.2 D) -17.4
Ans: C
Difficulty Level: Moderate
Section: 1.2
26. Add. $0 + (-4)$
Ans: -4
Difficulty Level: Moderate
Section: 1.2
27. Subtract. $6 - 15$
A) 21 B) -9 C) 9 D) -21
Ans: B
Difficulty Level: Moderate
Section: 1.2
28. Subtract. $\frac{5}{8} - \frac{13}{8}$
Ans: -1
Difficulty Level: Moderate
Section: 1.2
29. Subtract. $3.2 - 10.8$
A) 6.4 B) -6.4 C) 7.6 D) -7.6
Ans: D
Difficulty Level: Moderate
Section: 1.2
30. Subtract. $-20 - 3$
A) 23 B) 17 C) -17 D) -23
Ans: D
Difficulty Level: Moderate
Section: 1.2

31. Subtract. $-13 - (-2)$
 A) -11 B) -15 C) 15 D) 11

Ans: A

Difficulty Level: Moderate

Section: 1.2

32. ReNee has \$200 in her checking account. She deposits a check for \$48 and uses her ATM card to make a purchase of \$63. What is her new balance?
 A) \$89 B) \$185 C) \$215 D) \$311

Ans: B

Difficulty Level: Difficult

Section: 1.2

33. Evaluate. $3 + (-13) + 12 + (-16)$

Ans: -14

Difficulty Level: Difficult

Section: 1.2

34. Evaluate. $5 - (-7) - 15 - (-6)$

A) -23 B) 33 C) 7 D) 3

Ans: D

Difficulty Level: Difficult

Section: 1.2

35. Evaluate. $-\frac{1}{4} + \frac{1}{2} + \left(-\frac{9}{4}\right)$

A) -2 B) 2 C) $-\frac{9}{4}$ D) $\frac{9}{4}$

Ans: A

Difficulty Level: Difficult

Section: 1.2

36. Evaluate. $8.6 - (-4.7) + (-8.9)$

A) -5 B) 4.4 C) 22.2 D) 5.6

Ans: B

Difficulty Level: Difficult

Section: 1.2

37. Multiply. $(-2)(2)$

Ans: -4

Difficulty Level: Routine

Section: 1.3

38. Multiply. $\left(-\frac{3}{8}\right)(24)$

Ans: -9

Difficulty Level: Moderate

Section: 1.3

39. Multiply. $(-2.5)(20)$
A) 50 B) -50 C) 5 D) -5

Ans: B

Difficulty Level: Routine

Section: 1.3

40. Divide. $\frac{-18}{-3}$

Ans: 6

Difficulty Level: Routine

Section: 1.3

41. Divide. $\frac{-6}{0}$

A) -6 B) 0 C) Undefined D) 1

Ans: C

Difficulty Level: Moderate

Section: 1.3

42. Evaluate. $\frac{-15+6}{3}$
A) -3 B) 1 C) -1 D) 3

Ans: A

Difficulty Level: Difficult

Section: 1.3

43. Evaluate. $(-4)(10) + 28$

Ans: -12

Difficulty Level: Moderate

Section: 1.3

44. Evaluate. $(-10)^2 - 9^2$
A) -181 B) -19 C) 19 D) 181

Ans: C

Difficulty Level: Difficult

Section: 1.3

45. A man lost 36 pounds (lb) while dieting. If he lost 3 pounds each week, how long has he been dieting?

- A) 6 weeks B) 12 weeks C) 54 weeks D) 108 weeks

Ans: B

Difficulty Level: Moderate

Section: 1.3

46. Evaluate. $5 \cdot 4 \div 2 - 4^2$

- A) 100 B) 36 C) 5 D) -6

Ans: D

Difficulty Level: Difficult

Section: 1.3

47. Evaluate. $2^3 + 2 \cdot 5 - 24 \div 6 \cdot 2$

- A) 16 B) 10 C) 48 D) 42

Ans: B

Difficulty Level: Difficult

Section: 1.3

48. Write the following phrase using symbols.

d decreased by 7

Ans: $d - 7$

Difficulty Level: Routine

Section: 1.4

49. Write the following phrase using symbols.

2 more than r

Ans: $r + 2$

Difficulty Level: Routine

Section: 1.4

50. Write the following phrase using symbols.

The product of 5 and d

Ans: $5d$

Difficulty Level: Moderate

Section: 1.4

51. Write the following phrase using symbols.

7 times the sum of b and y

- A) $7b + y$ B) $7(b + y)$ C) $7 + (by)$ D) $7 + (b + y)$

Ans: B

Difficulty Level: Difficult

Section: 1.4

52. Write the following phrase using symbols.

The quotient of p minus q and 5

A) $\frac{p-q}{5}$ B) $\frac{p}{q}-5$ C) $\frac{p}{5}-q$ D) $p-\frac{q}{5}$

Ans: A

Difficulty Level: Difficult

Section: 1.4

53. Which of the following is not an expression?

A) $4(y+1)$ B) $x+2y$ C) $ab=6$ D) $a+b+c$

Ans: C

Difficulty Level: Routine

Section: 1.4

54. Which of the following is not an expression?

A) $r(t+8)$ B) $r+\div t$ C) $t\cdot r-8$ D) $t+r+8$

Ans: B

Difficulty Level: Moderate

Section: 1.4

55. Determine whether the following is an expression.

$$2 + c = m$$

A) Yes B) No

Ans: B

Difficulty Level: Routine

Section: 1.4

56. Determine whether the following is an expression.

$$n + \cdot p$$

A) Yes B) No

Ans: B

Difficulty Level: Moderate

Section: 1.4

57. Sarai puts 25 cents in her piggy bank every night before she goes to bed. If M represents the money (in dollars) in her piggy bank this morning, how much money (in dollars) is in her piggy bank when she goes to bed tonight?

A) $0.25M$ B) $\frac{M}{0.25}$ C) $M+0.25$ D) $M-0.25$

Ans: C

Difficulty Level: Moderate

Section: 1.4

58. Match the phrase with the proper expression.

p less than 9

A) $9 - (-p)$ B) $9 - p$ C) $p - (-9)$ D) $p - 9$

Ans: B

Difficulty Level: Routine

Section: 1.4

59. Write the following phrase using symbols. Use the variable x to represent the number.

2 less than a number

Ans: $x - 2$

Difficulty Level: Moderate

Section: 1.4

60. Write the following phrase using symbols. Use the variable x to represent the number.

A number increased by 5

Ans: $x + 5$

Difficulty Level: Moderate

Section: 1.4

61. Write the following phrase using symbols. Use the variable x to represent the number.

Eight less than three times a number

A) $3(8 - x)$ B) $3(x - 8)$ C) $3x - 8$ D) $8 - 3x$

Ans: C

Difficulty Level: Difficult

Section: 1.4

62. Write the following phrase using symbols. Use the variable x to represent the number.

The quotient of a number and 6

Ans: $\frac{x}{6}$

Difficulty Level: Moderate

Section: 1.4

63. Write the following geometric expression using the given symbols.

$\frac{1}{3}$ times the Area of the base (A) times the height(h)

Ans: $\frac{1}{3}Ah$

Difficulty Level: Routine

Section: 1.4

64. Write the following geometric expression using the given symbols.

Four times the radius (r) squared times p .

A) $(4p)^2r$ B) $(4r)^2p$ C) $4rp^2$ D) $4pr^2$

Ans: D

Difficulty Level: Moderate

Section: 1.4

65. Distance d is the product of the rate r and time t . Express this relationship algebraically.

A) $d = rt$ B) $d = r + t$ C) $dr = t$ D) $d + r = t$

Ans: A

Difficulty Level: Routine

Section: 1.4

66. Translate the algebraic expression into words. [Hint: Each expression is not a complete sentence, so your English does not have to be a complete sentence, either.]

$5(6 + p)$

Ans: Five times the sum of six and p [Answers may vary.]

Difficulty Level: Moderate

Section: 1.4

67. Translate the algebraic expression into words. [Hint: Each expression is not a complete sentence, so your English does not have to be a complete sentence, either.]

$$\frac{v^2 - 3}{(v + 4)^2}$$

Ans: The quotient of the difference of the square of v and three and the square of the sum of v and four. [Answers may vary.]

Difficulty Level: Difficult

Section: 1.4

68. Evaluate $3a - 5b$ if $a = 3$ and $b = -5$.

Ans: 34

Difficulty Level: Moderate

Section: 1.5

69. Evaluate $2p^2 + 3q$ if $p = 3$ and $q = -3$.

Ans: 9

Difficulty Level: Routine

Section: 1.5

70. Evaluate $\frac{2m-5n}{n+3p}$ if $m = -2$, $n = 4$, and $p = -1$.

- A) -24 B) 24 C) -16 D) 16

Ans: A

Difficulty Level: Difficult

Section: 1.5

71. Evaluate $b^2 - 2bc + c^2$ if $b = 3$ and $c = -2$.

- A) -7 B) 1 C) 17 D) 25

Ans: D

Difficulty Level: Difficult

Section: 1.5

72. Evaluate $\frac{xy}{yz}$ if $x = 12$, $y = -\frac{5}{4}$, and $z = -\frac{4}{5}$.

Ans: -15

Difficulty Level: Difficult

Section: 1.5

73. A formula that relates Fahrenheit and Celsius temperature is $C = \frac{5}{9}(F - 32)$. If the current temperature is 23°F , what is the Celsius temperature?

- A) -19°C B) -5°C C) 45°C D) 31°C

Ans: B

Difficulty Level: Moderate

Section: 1.5

74. If the circumference of a circle whose radius is r is given by $C = 2pr$, in which $p \approx 3.14$, find the circumference when $r = 8$ feet (ft).

- A) 50.24 ft B) 25.12 ft C) 12.56 ft D) 200.96 ft

Ans: A

Difficulty Level: Moderate

Section: 1.5

75. Use your calculator to evaluate the following expression if $x = -1.91$, $y = -5.63$, and $z = 8.17$. Round your results to the nearest tenth.

$$x - yz$$

- A) 45.2 B) 42.7 C) 44.1 D) 45.7

Ans: C

Difficulty Level: Routine

Section: 1.5

76. Use your calculator to evaluate the following expression if $x = -9.64$, and $y = -3.17$. Round your results to the nearest tenth.

$$x + 5y$$

Ans: -25.5

Difficulty Level: Routine

Section: 1.5

77. Use your calculator to evaluate the following expression if $x = 1.07$, $y = -4.12$, and $z = -3.76$. Round your answer to the nearest tenth.

$$\frac{z^2}{xy}$$

A) 3.2 B) -3.2 C) 54.4 D) -54.4

Ans: B

Difficulty Level: Moderate

Section: 1.5

78. Use your calculator to evaluate the following expression if $x = -2.57$, $y = 1.55$, and $z = -1.98$. Round your answer to the nearest tenth.

$$\frac{3x + y}{z + 2y}$$

Ans: -5.5

Difficulty Level: Difficult

Section: 1.5

79. List the terms of the following expression.

$$8w + 3$$

Ans: $8w, 3$

Difficulty Level: Routine

Section: 1.6

80. List the terms of the following expression.

$$10d^2 - 10d + 9$$

Ans: $10d^2, -10d, 9$

Difficulty Level: Routine

Section: 1.6

81. List the like terms in the following group of terms.

$$3bc, 10c, 7b, 9bc$$

Ans: $3bc, 9bc$

Difficulty Level: Routine

Section: 1.6

82. List the like terms in the following group of terms.

$$-4t, 2st^2, -5s^2t, 9st^2, -8st^2, -3s^2$$

Ans: $2st^2, 9st^2, -8st^2$

Difficulty Level: Moderate

Section: 1.6

83. Combine like terms.

$$-7d + 2d$$

Ans: $-5d$

Difficulty Level: Routine

Section: 1.6

84. Combine like terms.

$$7a - 2b + 10a$$

A) $17a - 2b$ B) $15ab$ C) $5a + 10b$ D) $15a + b$

Ans: A

Difficulty Level: Moderate

Section: 1.6

85. Combine like terms.

$$6a^2 + 4a + 5 + 3a^2 + 7a - 2$$

A) $20a^2 + 3$ B) $20a^3 + 3$ C) $18a^2 + 28a - 10$ D) $9a^2 + 11a + 3$

Ans: D

Difficulty Level: Difficult

Section: 1.6

86. A rectangle has sides of $3x - 4$ and $7x + 10$. Provide a simplified expression for its perimeter.

Ans: $20x + 12$

Difficulty Level: Difficult

Section: 1.6

87. Simplify the expression by combining like terms.

$$\frac{18a}{5} - 4 - \frac{3a}{5} + 10$$

A) $3a + 6$ B) $\frac{21a}{5} + 6$ C) $\frac{27a}{5}$ D) $\frac{9a}{5}$

Ans: A

Difficulty Level: Difficult

Section: 1.6

88. Subtract $4ab^3$ from the sum of $10ab^3$ and $2ab^3$.

Ans: $8ab^3$

Difficulty Level: Difficult

Section: 1.6

89. Use the distributive property to remove the parentheses, then simplify by combining like terms.

$$6(2s - 9) + 3$$

- A) $12s - 6$ B) $-42s + 3$ C) $12s + 57$ D) $12s - 51$

Ans: D

Difficulty Level: Moderate

Section: 1.6

90. A primary beam can support a load of $48p$. A secondary beam is added that can support a load of $39p$. What is the total load that the two beams can support?

- A) $48p$ B) $9p$ C) $87p$ D) $39p$

Ans: C

Difficulty Level: Moderate

Section: 1.6

91. Multiply.

$$y^7 \cdot y^5$$

Ans: y^{12}

Difficulty Level: Routine

Section: 1.7

92. Multiply.

$$a^4b^2 \cdot ab^3$$

- A) ab^6 B) a^5b^5 C) ab^5 D) a^4b^5

Ans: B

Difficulty Level: Moderate

Section: 1.7

93. Multiply.

$$3x^5 \cdot 10x^{10}$$

- A) $13x^{15}$ B) $13x^{50}$ C) $30x^{50}$ D) $30x^{15}$

Ans: D

Difficulty Level: Moderate

Section: 1.7

94. Multiply.

$$4xy^3 \cdot 2x^2y \cdot 5xy^2$$

Ans: $40x^4y^6$

Difficulty Level: Difficult

Section: 1.7

95. Divide.

$$\frac{n^{16}}{n^6}$$

Ans: n^{10}

Difficulty Level: Routine

Section: 1.7

96. Divide.

$$\frac{m^8 n^6}{m^4 n^2}$$

A) $m^2 n^3$ B) $m^4 n^4$ C) $m^2 n^4$ D) $m^4 n^3$

Ans: B

Difficulty Level: Moderate

Section: 1.7

97. Divide.

$$\frac{50 p^9 q^5}{10 p q^2}$$

A) $5 p^8 q^3$ B) $5 p^9 q^3$ C) $40 p^8 q^3$ D) $40 p^9 q^3$

Ans: A

Difficulty Level: Difficult

Section: 1.7

98. Simplify the expression, if possible.

$$\frac{5a^3 b^5 \cdot 8a^3 b^5}{2a^3 b^3}$$

Ans: $20a^3 b^7$

Difficulty Level: Difficult

Section: 1.7