

1. Find the additive inverse of -100 .

- A) -100
- B) 100
- C) $-\frac{1}{100}$
- D) $\frac{1}{100}$
- E) none of the above

2. Find the additive inverse of $\frac{3}{10}$.

- A) -3
- B) -10
- C) $\frac{3}{10}$
- D) $\frac{10}{3}$
- E) $-\frac{3}{10}$

3. Let $x \in \{-4, 0, 6\}$. For which values of x is $x < 5$ true?

- A) $-4, 0, 6$
- B) $0, 6$
- C) $-4, 0$
- D) $-4, 6$
- E) none of the above

4. Let $x \in \{-8, -2, 5\}$. For which values of x is $x < -2$ true?

- A) 5
- B) $-8, -2, 5$
- C) -8
- D) $-8, -2$
- E) $-8, 5$

5. Let $b \in \{-8, 0, 6\}$. Evaluate $-b$ for each element of the set.
- A) $-6, 8$
 - B) $-8, 0, 6$
 - C) $6, -8$
 - D) $8, 0, -6$
 - E) $8, 0, 6$
6. Let $b \in \{-2, 0, 9\}$. Evaluate $-b$ for each element of the set.
- A) $2, 0, -9$
 - B) $-2, 0, 9$
 - C) $-2, 0, -9$
 - D) $2, 0, 9$
 - E) $2, 1, 9$
7. Let $c \in \{-7, 0, 8\}$. Evaluate $|c|$ for each element of the set.
- A) $7, 8$
 - B) $-7, 0, 8$
 - C) $7, 0, 8$
 - D) $-7, 8$
 - E) $7, 0, -8$
8. Use the roster method to write the set consisting of the integers between -23 and -18 .
- A) $\{-22, -21, -20, -19\}$
 - B) $\{-23, -22, -20, -19, -18\}$
 - C) $\{-22, -21, -20, -19, -18\}$
 - D) $\{-23, -22, -21, -20, -19, -18\}$
 - E) $\{-23, -22, -21, -20, -19\}$
9. Use the roster method to write the set of integers between -3 and 4 .
- A) $-2, -1, 0, 1, 2, 3$
 - B) $-3, -2, -1, 0, 1, 2, 3$
 - C) $-2, -1, 0, 1, 2, 3, 4$
 - D) $-3, -2, -1, 0, 1, 2, 3, 4$
 - E) none of the above

10. Use set builder notation to write the set of integers greater than -6 .
- A) $\{x \mid x \geq -6, x \in \text{integers}\}$
 - B) $\{x \mid x > -6, x \in \text{integers}\}$
 - C) $\{x \mid x < 6, x \in \text{integers}\}$
 - D) $\{x \mid x \leq 6, x \in \text{integers}\}$
 - E) none of the above
11. Use set-builder notation to write the set of real numbers between -6 and 2 .
- A) $\{x \mid -6 < x < 2, x \in \text{integers}\}$
 - B) $\{x \mid x < 6, x \in \text{integers}\}$
 - C) $\{x \mid x \geq -6, x \in \text{integers}\}$
 - D) $\{x \mid -6 < x < 2\}$
 - E) $\{x \mid -2 < x < 6\}$
12. Find $A \cup B$.
- $A = \{14, 15, 16\}; \quad B = \{16, 17, 18\}$
- A) $A \cup B = \{15, 13, 19, 18\}$
 - B) $A \cup B = \{14, 15, 16, 17, 18\}$
 - C) $A \cup B = \{14, 15, 16, 16, 17\}$
 - D) $A \cup B = \{16, 17, 18\}$
 - E) $A \cup B = \{14, 15, 13, 16\}$
13. Find $A \cup B$ for $A = \{2, 4, 10\}$, $B = \{3, 4, 9\}$.
- A) $\{2, 4, 10\}$
 - B) $\{3, 4, 9\}$
 - C) $\{2, 3, 4, 9\}$
 - D) $\{2, 3, 4, 9, 10\}$
 - E) $\{3, 4, 9, 10\}$

14. Find $A \cap B$.

$$A = \{18, 19, 20\}; \quad B = \{20, 21, 22\}$$

- A) $A \cap B = \{18, 19, 20, 21, 22\}$
- B) $A \cap B = \{20\}$
- C) $A \cap B = \{\emptyset\}$
- D) $A \cap B = \{20, 21, 22\}$
- E) $A \cap B = \emptyset$

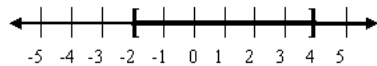
15. Find $A \cap B$.

$$A = \{-16, -15, -14\}; \quad B = \{27, 28, 29\}$$

- A) $A \cap B = \{-16, -15, -14, 27, 28, 29\}$
- B) $A \cap B = \{27\}$
- C) $A \cap B = \{\emptyset\}$
- D) $A \cap B = \{27, 28, 29\}$
- E) $A \cap B = \emptyset$

16. Graph $\{x | -2 < x < 4, x \in \text{integers}\}$.

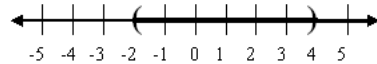
A)



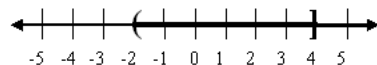
B)



C)



D)



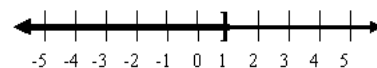
E) none of the above

17. Graph $\{x|x < 1\}$.

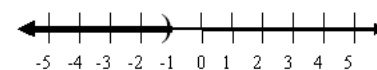
A)



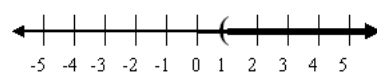
B)



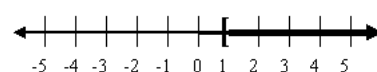
C)



D)

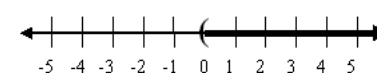


E)

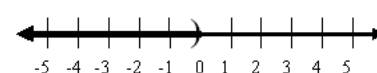


18. Graph $\{x|x > 1\} \cup \{x|x < -1\}$.

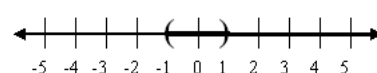
A)



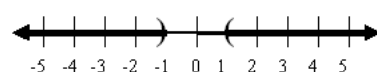
B)



C)



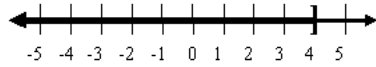
D)



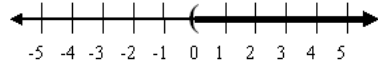
E) none of the above

19. Graph $\{x|x \leq 4\} \cap \{x|x > 0\}$.

A)



B)



C)



D)



E) none of the above

20. Use set-builder notation to write the set $(1, 3)$.

A) $\{x|1 < x \leq 3\}$

B) $\{x|x < 1, x \in \text{integers}\}$

C) $\{x|1 \leq x < 3\}$

D) $\{x|1 < x < 3\}$

E) $\{x|1 \leq x \leq 3\}$

21. Write the interval $(2, 5)$ in set-builder notation.

A) $\{x|2 < x < 5\}$

B) $\{x|2 \leq x < 5\}$

C) $\{x|2 < x \leq 5\}$

D) $\{x|2 \leq x \leq 5\}$

E) none of the above

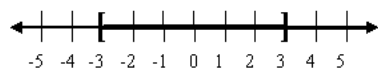
22. Use set-builder notation to write the set $[3, 5]$.
- A) $\{x \mid 3 < x \leq 5\}$
 - B) $\{x \mid x < 3, x \in \text{integers}\}$
 - C) $\{x \mid 3 \leq x < 5\}$
 - D) $\{x \mid 3 < x < 5\}$
 - E) $\{x \mid 3 \leq x \leq 5\}$
23. Use set-builder notation to write the set $(-\infty, 7]$.
- A) $\{x \mid x > 7, x \in \text{integers}\}$
 - B) $\{x \mid x < -7\}$
 - C) $\{x \mid x \geq 7\}$
 - D) $\{x \mid x < 7\}$
 - E) $\{x \mid x \leq 7\}$
24. Use set-builder notation to write the set $(-5, \infty)$.
- A) $\{x \mid x > -5\}$
 - B) $\{x \mid x < -5\}$
 - C) $\{x \mid x > 5, x \in \text{integers}\}$
 - D) $\{x \mid x \geq -5\}$
 - E) $\{x \mid x \leq -5\}$
25. Write the set of real numbers $\{x \mid -2 < x < 4\}$ in interval notation.
- A) $[-2, 4]$
 - B) $[-2, 4)$
 - C) $(-2, 4)$
 - D) $(-2, 4]$
 - E) none of the above

26. Write the set of real numbers $\{x \mid -3 \leq x \leq 4\}$ in interval notation.

- A) $(-3, 4)$
- B) $[-3, 4]$
- C) $[-3, 4)$
- D) $(-3, 4]$
- E) $\{-3, 4\}$

27. Graph $(-3, 2] \cup [-1, 3)$.

A)



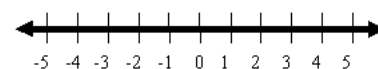
B)



C)



D)



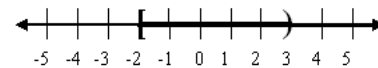
E) none of the above

28. Graph $[-5, 3) \cap (-2, \infty)$.

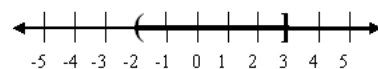
A)



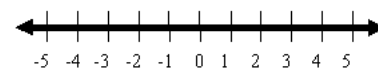
B)



C)



D)



E) none of the above

29. Simplify $-12 + (-8)$.

- A) 4
- B) 20
- C) -4
- D) -20
- E) none of the above

30. Simplify:
 $-9 + (-15)$

- A) -6
- B) -24
- C) 6
- D) 24
- E) -15

31. Simplify:
 $11(10)(-5)$

- A) 16
- B) -542
- C) 550
- D) -550
- E) -551

32. Simplify:
 $-209 \div 11$

- A) -2299
- B) 19
- C) -16
- D) -20
- E) -19

33. Simplify $\frac{3}{12} + \frac{1}{16}$.

- A) $\frac{1}{7}$
- B) $\frac{3}{16}$
- C) $\frac{1}{14}$
- D) $\frac{1}{4}$
- E) $\frac{5}{16}$

34. Simplify:

$$\left(-\frac{3}{8}\right) \cdot \left(-\frac{2}{5}\right)$$

- A) $-\frac{3}{20}$
- B) $\frac{9}{23}$
- C) $\frac{23}{9}$
- D) $\frac{3}{20}$
- E) 0

35. Simplify:

$$\frac{5}{4} \div \left(-\frac{13}{2}\right)$$

- A) $-\frac{26}{5}$
- B) $\frac{7}{17}$
- C) $-\frac{5}{26}$
- D) $-\frac{7}{17}$
- E) 0

36. Simplify:

$$-6.14 + (-3.26)$$

- A) -9.4
- B) -2.88
- C) -8.45
- D) -9.43
- E) 2.88

37. Simplify:

$$-0.67(0.27)$$

- A) -0.4
- B) -0.1609
- C) 0.2691
- D) 0.1609
- E) -0.1809

38. Simplify and round to three decimal places:

$$(-0.078) \div (-0.02)$$

- A) -3.900
- B) 3.900
- C) 0.256
- D) 3.876
- E) -0.256

39. Simplify the following, giving your answer to the nearest hundredth.

$$-26.22 \div 9.87$$

- A) -0.38
- B) 2.66
- C) 0.38
- D) -2.68
- E) -2.66

40. Simplify 4^3 .

- A) 12
- B) 64
- C) 7
- D) 8
- E) none of the above

41. Evaluate 3^4 .

- A) 64
- B) 81
- C) 3
- D) 4
- E) 12

42. Evaluate -2^3 .

- A) 8
- B) -8
- C) 9
- D) -9
- E) 6

43. Evaluate $(-3)^4$.

- A) 81
- B) -81
- C) -64
- D) 64
- E) 12

44. Evaluate $(-2)^4(-5)^2$.

- A) 80
- B) 400
- C) -400
- D) 800
- E) -80

45. Simplify $2 - 5(8 \div 4)^2$.

- A) -12
- B) -98
- C) -18
- D) 102
- E) 22

46. Evaluate the following expression using the Order of Operations Agreement.

$$7 - 3(7 - 2)^4 \div 5$$

- A) 382
- B) -368
- C) -363
- D) -382
- E) Undefined

47. Evaluate the following expression using the Order of Operations Agreement.

$$12 \div \frac{4^2}{10 - 6} - (-10)$$

- A) -7
- B) 13
- C) 58
- D) 38
- E) 0

48. Simplify $\frac{1}{3} - \left[\frac{3}{8} + \frac{1}{6} \right] \div \frac{3}{5}$.

- A) $\frac{4}{21}$
- B) $-\frac{41}{72}$
- C) $\frac{73}{120}$
- D) $\frac{1}{3}$
- E) none of the above

49. Evaluate:

$$4.44 - 0.18(8.1 - 6.4)^2$$

- A) 3.9198
- B) -33.405
- C) 4.9602
- D) 2.9198
- E) 4.4998

50. Use the Commutative Property of Multiplication to complete the statement:
 $11 \cdot 10 = 10 \cdot ?$

- A) -11
- B) 10
- C) 11
- D) -10
- E) 1

51. Use the Commutative Property of Addition to complete the statement:
 $7 + 8 = 8 + ?$

- A) 1
- B) 8
- C) -7
- D) -8
- E) 7

52. Use the Associative Property of Addition to complete the statement:
 $(3 + 5) + 8 = ? + (5 + 8)$

- A) -3
- B) 5
- C) 3
- D) -5
- E) 8

53. Use the Associative Property of Multiplication to complete the statement:
 $(11 \cdot 5) \cdot 4 = 11 \cdot (? \cdot 4)$

- A) 11
- B) 5
- C) -11
- D) -5
- E) 4

54. Use the Division Property of Zero to complete the statement:

$$\frac{5}{?} \text{ is undefined.}$$

- A) 5
- B) 1
- C) -5
- D) -1
- E) 0

55. Use the Distributive Property to complete the statement:

$$3(x+6) = 3x + ?$$

- A) 18
- B) 6
- C) 3
- D) 0
- E) 1

56. Use the Division Property of Zero to complete the statement:

$$\frac{?}{-11} = 0$$

- A) -11
- B) 1
- C) 11
- D) -1
- E) 0

57. Use the Inverse Property of Addition to complete the statement:

$$(7x+2y) + ? = 0$$

- A) $-(7x+2y)$
- B) $7x+2y$
- C) $7x-2y$
- D) $-(7x-2y)$
- E) -1

58. Use the Inverse Property of Multiplication to complete the statement:

$$\frac{1}{2mn}(2mn) = ?$$

- A) 2
- B) 0
- C) 1
- D) m
- E) n

59. Use the Multiplication Property of One to complete the statement:

$$? \cdot 1 = 11x$$

- A) 1
- B) 0
- C) 11
- D) x
- E) $11x$

60. Use the Associative Property of Multiplication to complete the statement.

$$7(8x) = ? \cdot x$$

- A) $(7 + 8)$
- B) $(7 - 8)$
- C) $(7 \cdot 8)$
- D) $(7 \div 8)$
- E) none of the above

61. Use the Commutative Property of Addition to complete the statement.

$$cd + dh = dh + ?$$

- A) hc
- B) hd
- C) cd
- D) ch
- E) none of the above

62. Identify the property that justifies the statement.

$$\frac{0}{8} = 0$$

- A) The Inverse Property of Multiplication
- B) The Addition Property of Zero
- C) The Distributive Property
- D) The Inverse Property of Division
- E) A Division Property of Zero

63. Identify the property that justifies the statement:

$$-9 + 9 = 0$$

- A) The Division Property of Zero
- B) The Multiplication Property of Zero
- C) The Inverse Property of Multiplication
- D) The Inverse Property of Addition
- E) The Distributive Property

64. Identify the property that justifies the statement.

$$9x + (10y + 7) = (9x + 10y) + 7$$

- A) The Associative Property of Addition
- B) The Distributive Property
- C) The Commutative Property of Addition
- D) The Inverse Property of Addition
- E) The Commutative Property of Multiplication

65. Identify the property that justifies the statement.

$$(x + y)8 = 8x + 8y$$

- A) The Associative Property of Addition
- B) The Associative Property of Multiplication
- C) The Distributive Property
- D) The Commutative Property of Addition
- E) The Commutative Property of Multiplication

66. Identify the property that justifies the statement.

$$3(a + b) = 3a + 3b$$

- A) The Associative Property of Multiplication
- B) The Inverse Property of Addition
- C) The Commutative Property of Addition
- D) The Associative Property of Addition
- E) The Distributive Property

67. Identify the property that justifies the statement.

$$(3b)c = 3(bc)$$

- A) The Associative Property of Multiplication
- B) The Commutative Property of Multiplication
- C) The Distributive Property
- D) The Inverse Property of Multiplication
- E) none of the above

68. Identify the property that justifies the statement.

$$(a + e) + i = (e + a) + i$$

- A) The Associative Property of Addition
- B) The Distributive Property
- C) The Commutative Property of Addition
- D) The Inverse Property of Addition
- E) none of the above

69. Evaluate the variable expression when $a = 4$, $b = 10$, $c = -9$, and $d = -4$.

$$ab + dc$$

- A) 4
- B) -106
- C) 74
- D) 76
- E) 1

70. Evaluate the variable expression when $a = 4$, $b = 4$, $c = 4$, and $d = 1$.

$$2ab - 3dc$$

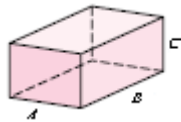
- A) 44
- B) 20
- C) 28
- D) 40
- E) 4

71. Evaluate the variable expression when $a = 5$, $b = -2$, $c = -5$, and $d = 5$.

$$-d^2 - c^3a$$

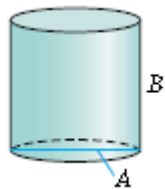
- A) 600
- B) 650
- C) -650
- D) 621
- E) 629

72. Find the surface area of the closed-top box. $A = 3$ meters, $B = 4$ meters, and $C = 2$ meters.



- A) 26 square meters
- B) 40 square meters
- C) 36 square meters
- D) 52 square meters
- E) 28 square meters

73. Find the volume the figure. $A = 8$ centimeters and $B = 8$ centimeters. Give both the exact value and an approximation to the nearest hundredth.



- A) $512\pi \text{ cm}^3$; 1608.50 cm^3
- B) $64\pi \text{ cm}^3$; 201.06 cm^3
- C) $128\pi \text{ cm}^3$; 402.12 cm^3
- D) $\frac{128}{3}\pi \text{ cm}^3$; 134.04 cm^3
- E) $\frac{512}{3}\pi \text{ cm}^3$; 536.17 cm^3

74. Simplify $7x + 3x$.

- A) $-10x$
- B) $-4x$
- C) $4x$
- D) $10x$
- E) none of the above

75. Simplify:

$$3mn + 7mn$$

- A) $4mn$
- B) $10mn$
- C) $7mn$
- D) $12mn$
- E) $16mn$

76. Simplify:

$$7a - 9(8a - 2)$$

- A) $-68a + 18$
- B) $-65a - 18$
- C) $-65a + 18$
- D) $-65a$
- E) $18a + 21$

77. Simplify:

$$8[y - 7(y - 4x)]$$

- A) $-48y + 224x$
- B) $48y + 224x$
- C) $-48y - 224x$
- D) $48y - 224x$
- E) $-48y$

78. Simplify:

$$-7(7z - 4y) + 4(5z - 3y)$$

- A) $-29z + 16y$
- B) $-29z + 40y$
- C) $-69z - 40y$
- D) $13z - 16y$
- E) $-45z - 40y$

79. Simplify:

$$5x - 3[y - 5(x - 4[x + 2y])]$$

- A) $80x + 123y$
- B) $-40x - 63y$
- C) $80x - 33y$
- D) $80x - 123y$
- E) $-40x - 123y$

80. Translate into a variable expression and then simplify. Give your answers in that order.

"a number minus the sum of the number and 13"

- A) $n - (n + 13); -13$
- B) $n - (n + 13); 13$
- C) $n - (n - 13); 13$
- D) $n + (n - 13); 2n - 13$
- E) $n + (n + 13); 2n + 13$

81. Translate the following into a variable expression. Then simplify.

a number decreased by the difference between twenty and the number

- A) $p - (20 - p); 2p - 20$
- B) $p - (p - 20); 20$
- C) $p - (20 + p); -20$
- D) $(20 - p) - p; 20 - 2p$
- E) 0

82. Translate into a variable expression and then simplify. Give your answers in that order.

"a number increased by $\frac{4}{5}$ of the number"

- A) $n + \left(n + \frac{4}{5}\right); 2n + \frac{4}{5}$
 B) $n + \frac{4}{5}n; \frac{9}{4}n$
 C) $n + \frac{4}{5}n; \frac{9}{5}n$
 D) $n + \frac{4}{5}; \frac{3}{5}n$
 E) $n\left(\frac{4}{5}\right); \frac{4n}{5}$

83. Translate into a variable expression and then simplify. Give your answers in that order.

"7 more than the square of a number added to the difference between the number and 6"

- A) $(n - 7) + (n^2 + 6); n^2 + n - 1$
 B) $(n - 6) - (n^2 + 7); -n^2 + n - 13$
 C) $(n^2 - 6) + (n + 7); n^2 - n + 1$
 D) $(n - 6) + (n^2 + 7); n^2 + n + 1$
 E) $(n^2 - 6) + (n - 7); n^2 - n - 13$

84. The sum of two numbers is 15. Using x to represent the smaller of the two numbers, translate "the sum of twice the smaller number and two more than the larger number" into a variable expression. Then simplify. Give your translation first and your simplification second.

- A) $2x + (15 - x + 2); x + 17$
 B) $2x + (15 + x + 2); 3x + 17$
 C) $2x + (x + 15); 3x + 15$
 D) $2x + (15 + 2); 2x + 17$
 E) $2x + (15 - (x + 2)); x + 13$

85. The sum of two numbers is fifty. Using x to represent the smaller of the two numbers, translate "the difference between five more than the larger number and twice the smaller number" into a variable expression in x . Then simplify.
- A) $(50 - x + 5) + 2x$; $55 + x$
 - B) $(50 - x + 5) - 2x$; $55 - 3x$
 - C) $(50 - x - 5) - 2x$; $45 - 3x$
 - D) $(50 - x - 5) + 2x$; $45 + x$
 - E) $(5 - x - 50) + 2x$; $-45 + x$
86. Suppose the population of New York City is ten times the population of another city in Texas. Express the population of New York City in terms of the population P of the Texas city.
- A) $\frac{1}{10}P$
 - B) $10P$
 - C) $11P$
 - D) $\frac{1}{11}P$
 - E) none of the above
87. A financial advisor has invested \$10,000 in two accounts. If one account contains x dollars, express the amount in the second account in terms of x .
- A) $x - \$10,000$
 - B) $2x - \$10,000$
 - C) $\$10,000 + 2x$
 - D) $\$10,000 - x$
 - E) none of the above
88. A 20-foot board is cut into two pieces of different lengths. Express the length of the longer piece in terms of the length L of the shorter piece.
- A) $20 - L$
 - B) $20 + L$
 - C) $L - 40$
 - D) $L + 40$
 - E) none of the above

89. The length of a rectangle is two more than four times the width. Express the length of the rectangle in terms of the width w .
- A) $w + 6$
 - B) $2(w + 4)$
 - C) $4(w + 2)$
 - D) $2w + 4$
 - E) $4w + 2$

Answer Key

1. B
2. E
3. C
4. C
5. D
6. A
7. C
8. A
9. A
10. B
11. D
12. B
13. D
14. B
15. E
16. C
17. A
18. D
19. C
20. D
21. A
22. E
23. E
24. A
25. C
26. B
27. C
28. A
29. D
30. B
31. D
32. E
33. E
34. D
35. C
36. A
37. E
38. B
39. E
40. B
41. B
42. B
43. A
44. B

- 45. C
- 46. B
- 47. B
- 48. B
- 49. A
- 50. C
- 51. E
- 52. C
- 53. B
- 54. E
- 55. A
- 56. E
- 57. A
- 58. C
- 59. E
- 60. C
- 61. C
- 62. E
- 63. D
- 64. A
- 65. C
- 66. E
- 67. A
- 68. C
- 69. D
- 70. B
- 71. A
- 72. D
- 73. C
- 74. D
- 75. B
- 76. C
- 77. A
- 78. A
- 79. E
- 80. A
- 81. A
- 82. C
- 83. D
- 84. A
- 85. B
- 86. B
- 87. D
- 88. A
- 89. E