

Chapter 2 Integers and Algebraic Expressions

Are You Prepared?

- A. $12 - 10 - 1 + 4 = 2 - 1 + 4 = 1 + 4 = 5$
 B. $22 - 3 \square 6 - 1 = 22 - 18 - 1 = 4 - 1 = 3$
 C. $24 \div 8 \square 2 = 3 \square 2 = 6$
 D. $2^2 = 4$
 E. $32 \div 4 \div 2 = 8 \div 2 = 4$
 F. $9^2 - 4(30 - 2 \square 5) = 9^2 - 4(30 - 10)$
 $\quad = 9^2 - 4(20)$
 $\quad = 81 - 4(20)$
 $\quad = 81 - 80$
 $\quad = 1$
 G. $13 - 8 \div 2 \square 3 = 13 - 4 \square 3 = 13 - 12 = 1$
 H. $\sqrt{16 - 3 \square 4} = \sqrt{16 - 12} = \sqrt{4} = 2$
 I. $\sqrt{10^2 - 8^2} = \sqrt{100 - 64} = \sqrt{36} = 6$
 J. $50 \div 2 \div 5 = 25 \div 5 = 5$
 K. $18 \div 9 \square 3 = 2 \square 3 = 6$
 L. $\frac{50 - 40}{5 - 3} = \frac{10}{2} = 5$
 M. $\sqrt{5^2 - 3^2} = \sqrt{25 - 9} = \sqrt{16} = 4$

1	A ₅	2	B ₃	6	4
C ₆	3	D ₄	2	5	1
E ₄	2	3	5	F ₁	6
5	G ₁	6	4	3	H ₂
3	4	1	I ₆	2	J ₅
2	K ₆	L ₅	1	M ₄	3

Section 2.1 Integers, Absolute Value, and Opposite

Section 2.1 Practice Exercises

1. Answers will vary.
2. (a) The distance between a number and zero on the number line is called its **absolute value**.
 (b) The numbers ... , -3, -2, -1, 0, 1, 2, 3, ... and so on are called **integers**.
 (c) **Negative numbers** lie to the left of zero on a number line.
 (d) Two numbers that are the same distance from zero on the number line, but on opposite sides of zero are called **opposites**.
 (e) **Positive numbers** lie to the right of zero on the number line.
3. -86 m
4. -\$45
5. \$3800
6. 5
7. -\$500
8. \$23
9. -14 lb
10. -2000 ft
11. 1,400,000
12. -\$20,000
- 13.



Chapter 2 Integers and Algebraic Expressions



15. -2

16. 8

17. $0 > -3$

18. $-1 < 0$

19. $-8 > -9$

20. $-5 < -2$

21. $8 < 9$

22. $5 > 2$

23. $-226 < 198$

24. $408 > -416$

25. $|-2| = 2$

26. $|-9| = 9$

27. $|2| = 2$

28. $|9| = 9$

29. $|-427| = 427$

30. $|-615| = 615$

31. $|100,000| = 100,000$

32. $|64,000| = 64,000$

33. (a) -8

(b) $|-12|$

34. (a) -14

(b) $|-20|$

35. (a) 7

(b) $|7|$

36. (a) 4

(b) $|4|$

37. $|-5|$

38. $|-9|$

39. Neither, they are equal.

40. Neither, they are equal.

41. -5

42. -31

43. 12

44. 25

45. 0

46. -1

47. 1

48. 612

49. $-(-15) = 15$

50. $-(-4) = 4$

51. $-|-15| = -(15) = -15$

52. $-|-4| = -(4) = -4$

53. $-|15| = -(15) = -15$

54. $-|4| = -(4) = -4$

55. $|-15| = 15$

56. $|-4| = 4$

57. $-(-36) = 36$

58. $-(-19) = 19$

59. $-|-107| = -(107) = -107$

Section 2.1 Integers, Absolute Value, and Opposite

60. $-|-26| = -(26) = -26$

61. (a) $|-6| = 6$

(b) $-(-6) = 6$

(c) $-|6| = -(6) = -6$

(d) $|6| = 6$

(e) $-|-6| = -(6) = -6$

62. (a) $-(-12) = 12$

(b) $|12| = 12$

(c) $|-12| = 12$

(d) $-|-12| = -(12) = -12$

(e) $-|12| = -(12) = -12$

63. (a) $-|8| = -(8) = -8$

(b) $|8| = 8$

(c) $-|-8| = -(8) = -8$

(d) $-(-8) = 8$

(e) $|-8| = 8$

64. (a) $-|-1| = -(1) = -1$

(b) $-(-1) = 1$

(c) $|1| = 1$

(d) $|-1| = 1$

(e) $-|1| = -(1) = -1$

65. -6

66. -23

67. $-(-2)$

68. $-(-9)$

69. $|7|$

70. $|11|$

71. $|-3|$

72. $|-10|$

73. $-|14|$

74. $-|42|$

75. $|-12| = 12$; $|12| = 12$; so $|-12| = |12|$

76. $-(-4) = 4$; $-|-4| = -4$;

so $-(-4) > -|-4|$

77. $|-22| = 22$; $-(22) = -22$;

so $|-22| > -(22)$

78. $-8 > -10$

79. $-44 > -54$

80. $-|0| = 0$; $-|1| = -1$; so $-|0| > -|1|$

81. $|-55| = 55$; $-(-65) = 65$;

so $|-55| < -(-65)$

82. $-(82) = -82$; $|46| = 46$;

so $-(82) < |46|$

83. $-|32| = -32$; $|0| = 0$; so $-|32| < |0|$

84. $-|22| = -22$; $0 = 0$; so $-|22| < 0$

85. Portland is between 20° and 30° ; about 25°F

86. Atlanta is between 40° and 50° ; about 42°F

87. Bismarck is between -20° and -30° ; about -22°F

88. Denver is between 0° and -10° ; about -8°F

89. Eugene is between 0° and -10° ; about -2°F

90. Orlando is about 50°F

91. Dallas is between 40° and 50° ; about 44°F

92. June is the greatest amount below average; -6 in.

Chapter 2 Integers and Algebraic Expressions

93. September is the greatest amount above average.

94. August had the average amount of rainfall.

95. $-|-46| = -46$

$$-(-24) = 24$$

$$-60$$

$$5^2 = 25$$

$$|-12| = 12$$

$$-60, -|-46|, |-12|, -(-24), 5^2$$

96. -15

$$-(-18) = 18$$

$$-|20| = -20$$

$$4^2 = 16$$

$$|-3|^2 = 3^2 = 9$$

$$-|20|, -15, |-3|^2, 4^2, -(-18)$$

97. Positive

98. Positive

99. Negative

100. Negative

Section 2.2 Addition of Integers

Section 2.2 Practice Exercises

1. Answers will vary.

2. $-6 < -5$

3. $-33 > -44$

4. $|-4| = 4$; $-|4| = -4$; so $|-4| > -|4|$

5. $|6| = 6$; $|-6| = 6$; so $|6| = |-6|$

6. $0 > -6$

7. $-|-10| = -10$; $10 = 10$; so $-|-10| < 10$

8. $-(-2) = 2$; $2 = 2$; so $-(-2) = 2$

9. $-3 + 5 = 2$

10. $-6 + 3 = -3$

11. $2 + (-4) = -2$

12. $5 + (-1) = 4$

13. $-4 + (-4) = -8$

14. $-2 + (-5) = -7$

15. $-3 + 9 = 6$

16. $-1 + 5 = 4$

17. $0 + (-7) = -7$

18. $(-5) + 0 = -5$

19. $-1 + (-3) = -4$

20. $-4 + (-3) = -7$

21. To add two numbers with the same sign, add their absolute values and apply the common sign.

22. $23 + 12 = 35$

23. $12 + 3 = 15$

24. $-8 + (-3) = -11$

25. $-10 + (-6) = -16$

26. $-7 + (-9) = -16$

27. $-100 + (-24) = -124$

28. $23 + 50 = 73$

29. $44 + 45 = 89$

30. To add two numbers with different signs, subtract the smaller absolute value from the larger absolute value. Then apply the sign of the number having the larger absolute value.

31. $7 + (-10) = -3$

32. $-8 + 2 = -6$

33. $12 + (-7) = 5$

34. $-3 + 9 = 6$

35. $-90 + 66 = -24$

36. $-23 + 49 = 26$

37. $78 + (-33) = 45$

38. $10 + (-23) = -13$

39. $2 + (-2) = 0$

40. $-6 + 6 = 0$

41. $-13 + 13 = 0$

42. $45 + (-45) = 0$

43. $12 + (-3) = 9$

44. $-33 + (-1) = -34$

45. $-23 + (-3) = -26$

46. $-5 + 15 = 10$

47. $4 + (-45) = -41$

48. $-13 + (-12) = -25$

49. $(-103) + (-47) = -150$

50. $119 + (-59) = 60$

51. $0 + (-17) = -17$

52. $-29 + 0 = -29$

53. $-19 + (-22) = -41$

54. $-300 + (-24) = -324$

55. $6 + (-12) + 8 = -6 + 8 = 2$

56. $20 + (-12) + (-5) = 8 + (-5) = 3$

57. $-33 + (-15) + 18 = -48 + 18 = -30$

58. $3 + 5 + (-1) = 8 + (-1) = 7$

59. $7 + (-3) + 6 = 4 + 6 = 10$

60. $12 + (-6) + (-9) = 6 + (-9) = -3$

61. $-10 + (-3) + 5 = -13 + 5 = -8$

$$\begin{aligned} 62. \quad & -23 + (-4) + (-12) + (-5) \\ & = -27 + (-12) + (-5) \\ & = -39 + (-5) \\ & = -44 \end{aligned}$$

63. $-18 + (-5) + 23 = -23 + 23 = 0$

$$\begin{aligned} 64. \quad & 14 + (-15) + 20 + (-42) = -1 + 20 + (-42) \\ & = 19 + (-42) \\ & = -23 \end{aligned}$$

$$\begin{aligned} 65. \quad & 4 + (-12) + (-30) + 16 + 10 \\ & = -8 + (-30) + 16 + 10 \\ & = -38 + 16 + 10 \\ & = -22 + 10 \\ & = -12 \end{aligned}$$

66. $24 + (-5) + (-19) = 19 + (-19) = 0$

67. $-23 + 49 = 26$

68. $89 + (-11) = 78$

Chapter 2 Integers and Algebraic Expressions

69. $3 + (-10) + 5 = -7 + 5 = -2$

70. $-2 + (-4) + 14 + 20 = -6 + 14 + 20$
 $= 8 + 20$
 $= 28$

71. $(-8 + 6) + (-5) = -2 + (-5) = -7$

72. $(-25 + 7) + (-15) = -18 + (-15) = -33$

73. $-6 + (-1) + 10 + 6 + (-2)$
 $= -7 + 10 + 6 + (-2)$
 $= 3 + 6 + (-2)$
 $= 9 + (-2)$
 $= 7 \text{ in.}$

Marquette had above average snowfall.

74. $1 + (-3) + 2 + 5 + (-4) = -2 + 2 + 5 + (-4)$
 $= 0 + 5 + (-4)$
 $= 5 + (-4)$
 $= 1 \text{ in.}$

Hilo had above average rainfall.

75. $1 + (-7) + (-1) + (-1) = -6 + (-1) + (-1)$
 $= -7 + (-1)$
 $= -8$

76. $-2 + 0 + (-1) + (-3) = -2 + (-1) + (-3)$
 $= -3 + (-3)$
 $= -6$

77. $-4 + 12 = 8^\circ\text{F}$

78. $-14 + 10 = -4^\circ\text{F}$

79. $-\$56 + \$389 = \$333$

80. $\$23 + (-\$40) = -\$17$

81. $-200 + (-400) + 1000 + (-400) + 600$
 $= -\$600 + \$1000 + (-\$400) + \600
 $= \$400 + (-\$400) + \$600$
 $= \$0 + \600
 $= \$600$

82. $3 + 2 + (-8) + 5 + (-2) + 4 + 21$
 $= 5 + (-8) + 5 + (-2) + 4 + 21$
 $= -3 + 5 + (-2) + 4 + 21$
 $= 2 + (-2) + 4 + 21$
 $= 0 + 4 + 21$
 $= 4 + 21$
 $= 25 \text{ yd}$

83. $0 + 2 + (-1) + (-1) + 0 + (-1) + 1 + 0 + 0$
 $= 2 + (-1) + (-1) + 0 + (-1) + 1 + 0 + 0$
 $= 1 + (-1) + 0 + (-1) + 1 + 0 + 0$
 $= 0 + 0 + (-1) + 1 + 0 + 0$
 $= 0 + (-1) + 1 + 0 + 0$
 $= -1 + 1 + 0 + 0$
 $= 0 + 0 + 0$
 $= 0$

84. $1 + 1 + 0 + 0 + (-1) + (-1) + 0 + 0 + 2$
 $= 2 + 0 + 0 + (-1) + (-1) + 0 + 0 + 2$
 $= 2 + (-1) + (-1) + 0 + 0 + 2$
 $= 1 + (-1) + 0 + 0 + 2$
 $= 0 + 0 + 0 + 2$
 $= 2$

85. For example: $-12 + 2$

86. For example: $-6 + (-8)$

87. For example: $-1 + (-1)$

88. For example: $5 + (-5)$

89. $302 + (-422) = -120$

90. $-900 + 334 = -566$

91. $-23,991 + (-4423) = -28,414$

92. $-1034 + (-23,291) = -24,325$

$$\begin{aligned}
 93. \quad 23 + (-125) + 912 + (-99) \\
 &= -102 + 912 + (-99) \\
 &= 810 + (-99) \\
 &= 711
 \end{aligned}$$

$$\begin{aligned}
 94. \quad 891 + 12 + (-223) + (-341) \\
 &= 903 + (-223) + (-341) \\
 &= 680 + (-341) \\
 &= 339
 \end{aligned}$$

Section 2.3 Subtraction of Integers

Section 2.3 Practice Exercises

- Answers will vary.
- $34 + (-13) = 21$
- $-34 + (-13) = -47$
- $-34 + 13 = -21$
- $-|-26| = -(26) = -26$
- $-(-32) = 32$
- $$\begin{aligned}
 -9 + (-8) + 5 + (-3) + 7 \\
 &= -17 + 5 + (-3) + 7 \\
 &= -12 + (-3) + 7 \\
 &= -15 + 7 \\
 &= -8
 \end{aligned}$$
- To subtract two integers, add the opposite of the second number to the first number.
- $2 - 9 = 2 + (-9) = -7$
- $5 - 11 = 5 + (-11) = -6$
- $4 - (-3) = 4 + 3 = 7$
- $12 - (-8) = 12 + 8 = 20$
- $-3 - 15 = -3 + (-15) = -18$
- $-7 - 21 = -7 + (-21) = -28$
- $-11 - (-13) = -11 + 13 = 2$
- $-23 - (-9) = -23 + 9 = -14$
- $35 - (-17) = 35 + 17 = 52$
- $23 - (-12) = 23 + 12 = 35$
- $-24 - 9 = -24 + (-9) = -33$
- $-5 - 15 = -5 + (-15) = -20$
- $50 - 62 = 50 + (-62) = -12$
- $38 - 46 = 38 + (-46) = -8$
- $-17 - (-25) = -17 + 25 = 8$
- $-2 - (-66) = -2 + 66 = 64$
- $-8 - (-8) = -8 + 8 = 0$
- $-14 - (-14) = -14 + 14 = 0$
- $120 - (-41) = 120 + 41 = 161$
- $91 - (-62) = 91 + 62 = 153$
- $-15 - 19 = -15 + (-19) = -34$
- $-82 - 44 = -82 + (-44) = -126$
- $3 - 25 = 3 + (-25) = -22$
- $6 - 33 = 6 + (-33) = -27$
- $-13 - 13 = -13 + (-13) = -26$
- $-43 - 43 = -43 + (-43) = -86$

Chapter 2 Integers and Algebraic Expressions

35. $24 - 25 = 24 + (-25) = -1$

36. $43 - 98 = 43 + (-98) = -55$

37. $-6 - (-38) = -6 + 38 = 32$

38. $-75 - (-21) = -75 + 21 = -54$

39. $-48 - (-33) = -48 + 33 = -15$

40. $-29 - (-32) = -29 + 32 = 3$

41. $2 + 5 - (-3) - 10 = 2 + 5 + 3 + (-10)$
 $= 7 + 3 + (-10)$
 $= 10 + (-10)$
 $= 0$

42. $4 - 8 + 12 - (-1) = 4 + (-8) + 12 + 1$
 $= -4 + 12 + 1$
 $= 8 + 1$
 $= 9$

43. $-5 + 6 + (-7) - 4 - (-9)$
 $= -5 + 6 + (-7) + (-4) + 9$
 $= 1 + (-7) + (-4) + 9$
 $= -6 + (-4) + 9$
 $= -10 + 9$
 $= -1$

44. $-2 - 1 + (-11) + 6 - (-8)$
 $= -2 + (-1) + (-11) + 6 + 8$
 $= -3 + (-11) + 6 + 8$
 $= -14 + 6 + 8$
 $= -8 + 8$
 $= 0$

45. $25 - 13 - (-40) = 25 + (-13) + 40$
 $= 12 + 40$
 $= 52$

46. $-35 + 15 - (-28) = -35 + 15 + 28$
 $= -20 + 28$
 $= 8$

47. minus, difference, decreased, less than, subtract from

48. Subtraction is not commutative.
 $3 - 7 \neq 7 - 3$

49. $14 - 23 = 14 + (-23) = -9$

50. $27 - 40 = 27 + (-40) = -13$

51. $105 - 110 = 105 + (-110) = -5$

52. $70 - 98 = 70 + (-98) = -28$

53. $320 - (-20) = 320 + 20 = 340$

54. $150 - 75 = 150 + (-75) = 75$

55. $5 - 12 = 5 + (-12) = -7$

56. $16 - 10 = 16 + (-10) = 6$

57. $-34 - 21 = -34 + (-21) = -55$

58. $-90 - 22 = -90 + (-22) = -112$

59. $-35 - 24 = -35 + (-24) = -59$

60. $175 - 189 = 175 + (-189) = -14$

61. $6000 - (-423) = 6000 + 423 = 6423^\circ \text{F}$

62. $214 - (-184) = 214 + 184 = 398^\circ \text{C}$

63. $-\$320 - \$55 = -\$320 + (-\$55) = -\$375$
 His balance is $-\$375$.

64. $-\$210 + \$25 = -\$185$
 His balance is $-\$185$.

$$\begin{aligned}
 65. \quad & 17,476 + 1786 - 2342 - 754 + 321 + 1597 \\
 & = 19,262 - 2342 - 754 + 321 + 1597 \\
 & = 16,920 - 754 + 321 + 1597 \\
 & = 16,166 + 321 + 1597 \\
 & = 16,487 + 1597 \\
 & = 18,084
 \end{aligned}$$

The balance is \$18,084.

$$\begin{aligned}
 66. \quad & 2036 - 150 - 25 + 480 - 200 + 80 \\
 & = 1886 - 25 + 480 - 200 + 80 \\
 & = 1861 + 480 - 200 + 80 \\
 & = 2341 - 200 + 80 \\
 & = 2141 + 80 \\
 & = 2221
 \end{aligned}$$

The balance is \$2221.

$$67. \quad 66 - (-98) = 66 + 98 = 164$$

$$68. \quad 16 - (-40) = 16 + 40 = 56$$

$$\begin{aligned}
 69. \quad & -56 + 66 + (-98) + 16 + (-40) \\
 & = 10 + (-98) + 16 + (-40) \\
 & = -88 + 16 + (-40) \\
 & = -72 + (-40) \\
 & = -112
 \end{aligned}$$

70. Because the total change is negative, the Dow was down for the week.

$$71. \quad \text{The range is } 3^\circ - (-8^\circ) = 3^\circ + 8^\circ = 11^\circ.$$

$$72. \quad \text{The range is } -1^\circ - (-12^\circ) = -1^\circ + 12^\circ = 11^\circ.$$

$$73. \quad \text{For example: } 4 - 10$$

$$74. \quad \text{For example: } 10 - 30$$

$$75. \quad 5, 1, -3, -7, -11, -15, -19$$

$$76. \quad -13, -18, -23, -28, -33, -38, -43$$

77. Positive

78. Negative

79. Positive

80. Positive or zero

81. Negative

82. Negative

83. Negative

84. Positive

$$85. \quad -190 - 223 = -413$$

$$86. \quad -288 - 145 = -433$$

$$87. \quad -23,624 - (-9001) = -14,623$$

$$88. \quad -14,593 - (-34,499) = 19,906$$

$$89. \quad 892,904 - (-23,546) = 916,450$$

$$90. \quad 104,839 - (-24,938) = 129,777$$

$$91. \quad 29,029 - (-35,798) = 64,827 \text{ ft}$$

$$92. \quad 4392 - (-86) = 4478 \text{ m}$$

Section 2.4 Multiplication and Division of Integers

Section 2.4 Practice Exercises

$$1. \quad -2 + (-4) = -6$$

$$-(-5) = 5$$

$$-|-10| = -(10) = -10$$

$$(-3)(-6) = 18$$

When multiplying two numbers with the same sign, the product is positive.

$$2. \quad \text{(a) } |-5| = 5$$

$$\text{(b) } |5| = 5$$

$$\text{(c) } -|5| = -5$$

$$\text{(d) } -|-5| = -(5) = -5$$

$$\text{(e) } -(-5) = 5$$

Chapter 2 Integers and Algebraic Expressions

3. $14 - (-5) = 14 + 5 = 19$
4. $-24 - 50 = -24 + (-50) = -74$
5. $-33 + (-11) = -44$
6. $-7 - (-23) = -7 + 23 = 16$
7. $23 - 12 + (-4) - (-10)$
 $= 23 + (-12) + (-4) + 10$
 $= 11 + (-4) + 10$
 $= 7 + 10$
 $= 17$
8. $9 + (-12) - 17 - 4 - (-15)$
 $= 9 + (-12) + (-17) + (-4) + 15$
 $= -3 + (-17) + (-4) + 15$
 $= -20 + (-4) + 15$
 $= -24 + 15$
 $= -9$
9. $-3(5) = -15$
10. $-2(13) = -26$
11. $-5(-8) = 40$
12. $-12(-2) = 24$
13. $7(-3) = -21$
14. $5(-12) = -60$
15. $-12(-4) = 48$
16. $-6(-11) = 66$
17. $-15(3) = -45$
18. $-3(25) = -75$
19. $9(-8) = -72$
20. $8(-3) = -24$
21. $-14(0) = 0$
22. $-8(0) = 0$
23. $-95(-1) = 95$
24. $-144(-1) = 144$
25. $-3(-1) = 3$
26. $-12(-4) = 48$
27. $-5(3) = -15$
28. $9(-2) = -18$
29. $3(-5) = -15$
30. $-3(6) = -18$
31. $(-5)(-2)(-4)(-10) = 10(-4)(-10)$
 $= -40(-10)$
 $= 400$
32. $(-3)(-5)(-2)(-4) = 15(-2)(-4)$
 $= -30(-4)$
 $= 120$
33. $(-11)(-4)(-2) = 44(-2) = -88$
34. $(-20)(-3)(-1) = 60(-1) = -60$
35. $(24)(-2)(0)(-3) = -48(0)(-3)$
 $= 0(-3)$
 $= 0$
36. $(3)(0)(-13)(22) = 0(-13)(22)$
 $= 0(22)$
 $= 0$

$$\begin{aligned}
 37. \quad & (-1)(-1)(-1)(-1)(-1)(-1) \\
 & = 1(-1)(-1)(-1)(-1) \\
 & = -1(-1)(-1)(-1) \\
 & = 1(-1)(-1) \\
 & = -1(-1) \\
 & = 1
 \end{aligned}$$

$$\begin{aligned}
 38. \quad & (-1)(-1)(-1)(-1)(-1)(-1)(-1) \\
 & = 1(-1)(-1)(-1)(-1)(-1) \\
 & = -1(-1)(-1)(-1)(-1) \\
 & = 1(-1)(-1)(-1) \\
 & = -1(-1)(-1) \\
 & = 1(-1) \\
 & = -1
 \end{aligned}$$

$$\begin{aligned}
 39. \quad & (-2)(2)(2)(-2)(2) = -4(2)(-2)(2) \\
 & = -8(-2)(2) \\
 & = 16(2) \\
 & = 32
 \end{aligned}$$

$$\begin{aligned}
 40. \quad & (2)(-2)(2)(2) = -4(2)(2) \\
 & = -8(2) \\
 & = -16
 \end{aligned}$$

$$41. \quad -10^2 = -(10)(10) = -10(10) = -100$$

$$42. \quad -8^2 = -(8)(8) = -8(8) = -64$$

$$43. \quad (-10)^2 = (-10)(-10) = 100$$

$$44. \quad (-8)^2 = (-8)(-8) = 64$$

$$\begin{aligned}
 45. \quad & -10^3 = -(10)(10)(10) \\
 & = -10(10)(10) \\
 & = -100(10) \\
 & = -1000
 \end{aligned}$$

$$\begin{aligned}
 46. \quad & -8^3 = -(8)(8)(8) \\
 & = -8(8)(8) \\
 & = -64(8) \\
 & = -512
 \end{aligned}$$

$$\begin{aligned}
 47. \quad & (-10)^3 = (-10)(-10)(-10) \\
 & = 100(-10) \\
 & = -1000
 \end{aligned}$$

$$48. \quad (-8)^3 = (-8)(-8)(-8) = 64(-8) = -512$$

$$\begin{aligned}
 49. \quad & -5^4 = -(5)(5)(5)(5) \\
 & = -5(5)(5)(5) \\
 & = -25(5)(5) \\
 & = -125(5) \\
 & = -625
 \end{aligned}$$

$$\begin{aligned}
 50. \quad & -4^4 = -(4)(4)(4)(4) \\
 & = -4(4)(4)(4) \\
 & = -16(4)(4) \\
 & = -64(4) \\
 & = -256
 \end{aligned}$$

$$\begin{aligned}
 51. \quad & (-5)^4 = (-5)(-5)(-5)(-5) \\
 & = 25(-5)(-5) \\
 & = -125(-5) \\
 & = 625
 \end{aligned}$$

$$\begin{aligned}
 52. \quad & (-4)^4 = (-4)(-4)(-4)(-4) \\
 & = 16(-4)(-4) \\
 & = -64(-4) \\
 & = 256
 \end{aligned}$$

$$53. \quad (-1)^2 = (-1)(-1) = 1$$

$$54. \quad (-1)^3 = (-1)(-1)(-1) = 1(-1) = -1$$

$$\begin{aligned}
 55. \quad & -1^4 = -(1)(1)(1)(1) \\
 & = -1(1)(1)(1) \\
 & = -1(1)(1) \\
 & = -1(1) \\
 & = -1
 \end{aligned}$$

Chapter 2 Integers and Algebraic Expressions

$$\begin{aligned} 56. \quad -1^5 &= -(1)(1)(1)(1)(1) \\ &= -(1)(1)(1)(1) \\ &= -1(1)(1)(1) \\ &= -1(1)(1) \\ &= -1(1) \\ &= -1 \end{aligned}$$

$$57. \quad 60 \div (-3) = -20$$

$$58. \quad 46 \div (-2) = -23$$

$$59. \quad \frac{-56}{-8} = 7$$

$$60. \quad \frac{-48}{-3} = 16$$

$$61. \quad \frac{-15}{5} = -3$$

$$62. \quad \frac{30}{-6} = -5$$

$$63. \quad -84 \div (-4) = 21$$

$$64. \quad -48 \div (-6) = 8$$

$$65. \quad \frac{-13}{0} = \text{Undefined}$$

$$66. \quad \frac{-41}{0} = \text{Undefined}$$

$$67. \quad \frac{0}{-18} = 0$$

$$68. \quad \frac{0}{-6} = 0$$

$$69. \quad (-20) \div (-5) = 4$$

$$70. \quad (-10) \div (-2) = 5$$

$$71. \quad \frac{204}{-6} = -34$$

$$72. \quad \frac{300}{-2} = -150$$

$$73. \quad (-100) \div (20) = -5$$

$$74. \quad (46) \div (-23) = -2$$

$$75. \quad (-64) \div (-32) = 2$$

$$76. \quad (-108) \div (-4) = 27$$

$$77. \quad (-52) \div (13) = -4$$

$$78. \quad (-45) \div (-15) = 3$$

$$79. \quad (-60) \div (10) = -6 \text{ ft/min}$$

$$80. \quad (-27) \div (3) = -9^\circ \text{F}$$

$$81. \quad -25 - 40 = -65$$

$$(-65) \div (5) = -13^\circ \text{F}$$

$$82. \quad -1804 - (-528) = -1804 + 528 = -1276$$

$$(-1276) \div (2) = -638 \text{ m}$$

$$83. \quad 5(225) = 1125$$

$$890 - 1125 = -\$235$$

$$84. \quad 2(150) + 82 = 300 + 82 = 382$$

$$320 - 382 = -\$62$$

$$85. \quad -3(6) = -18 \text{ ft}$$

$$86. \quad -9(5) = -45 \text{ in}$$

$$87. \quad 18(-6) = -108$$

$$88. \quad 24(-2) = -48$$

$$89. \quad 18 \div (-6) = -3$$

$$90. \quad 24 \div (-2) = -12$$

$$91. \quad (-9)(-12) = 108$$

Problem Recognition Exercises: Operations on Integers

92. $-36 \div (-12) = 3$
93. $-90 \div (-6) = 15$
94. $(-5)(-4) = 20$
95. $\frac{0}{-2} = 0$
96. $-24 \div 0 = \text{Undefined}$
97. $-90 \div 0 = \text{Undefined}$
98. $\frac{0}{-5} = 0$
99. $(-2)(-5)(4) = 10(4) = 40$
100. $(10)(-2)(-3)(-5) = -20(-3)(-5)$
 $= 60(-5)$
 $= -300$
101. $(-7)^2 = (-7)(-7) = 49$
102. $-7^2 = -(7)(7) = -7(7) = -49$
103. (a) $-35 \div (-5) = 7$
 (b) $35 \div (-5) = -7$
104. (a) $-36 \div (-4) = 9$
- (b) $36 \div (-4) = -9$
105. $1(+1) + 0(-1) = 1 + 0 = +1$
106. $17(+1) + 18(-1) = 17 + (-18) = -1$
107. $8(+1) + 10(-1) = 8 + (-10) = -2$
108. $20(+1) + 18(-1) = 20 + (-18) = +2$
109. $a \bar{b} = (\text{positive})(\text{negative}) = \text{negative}$
110. $b \div a = (\text{negative}) \div (\text{positive}) = \text{negative}$
111. $|a| \div b = (\text{positive}) \div (\text{negative}) = \text{negative}$
112. $a \square b = (\text{positive})(\text{positive}) = \text{positive}$
113. $-a \div b = (\text{negative}) \div (\text{negative}) = \text{positive}$
114. $a(-b) = (\text{positive})(\text{positive}) = \text{positive}$
115. $(-413)(871) = -359,723$
116. $(-6125)(-97) = 594,125$
117. $\frac{-576,828}{-10,682} = 54$
118. $5,945,308 \div (-9452) = -629$

Problem Recognition Exercises: Operations on Integers

1. (a) $(-24)(-2) = 48$
 (b) $(-24) - (-2) = -24 + 2 = -22$
 (c) $(-24) + (-2) = -26$
 (d) $(-24) \div (-2) = 12$
2. (a) $12(-3) = -36$
 (b) $12 - (-3) = 12 + 3 = 15$
 (c) $12 + (-3) = 9$
 (d) $12 \div (-3) = -4$
3. $-5 + (-3) = -8$
4. $9(-5) = -45$
5. $-3 - (-7) = -3 + 7 = 4$
6. $\frac{28}{-4} = -7$
7. $-23(-2) = 46$
8. $-4 - 18 = -4 + (-18) = -22$

Chapter 2 Integers and Algebraic Expressions

9. $\frac{42}{-2} = -21$
10. $-18 + (-13) = -31$
11. $10 - (-12) = 10 + 12 = 22$
12. $\frac{-21}{-7} = 3$
13. $-6(-9) = 54$
14. $-7 + 4 + 8 + (-16) + (-5)$
 $= -3 + 8 + (-16) + (-5)$
 $= 5 + (-16) + (-5)$
 $= -11 + (-5)$
 $= -16$
15. (a) $15 - (-5) = 15 + 5 = 20$
 (b) $15(-5) = -75$
 (c) $15 + (-5) = 10$
 (d) $15 \div (-5) = -3$
16. (a) $-36(-2) = 72$
 (b) $-36 - (-2) = -36 + 2 = -34$
 (c) $\frac{-36}{-2} = 18$
 (d) $-36 + (-2) = -38$
17. (a) $20(-4) = -80$
 (b) $-20(-4) = 80$
 (c) $-20(4) = -80$
 (d) $20(4) = 80$
18. (a) $-5 - 9 - 2 = -5 + (-9) + (-2)$
 $= -14 + (-2)$
 $= -16$
 (b) $-5(-9)(-2) = 45(-2) = -90$
19. (a) $10 + (-3) + (-12) = 7 + (-12) = -5$
- (b) $10 - (-3) - (-12) = 10 + 3 + 12$
 $= 13 + 12$
 $= 25$
20. (a) $(-1)(-2)(-3)(-4) = 2(-3)(-4)$
 $= -6(-4)$
 $= 24$
 (b) $(-1)(-2)(3)(4) = 2(3)(4)$
 $= 6(4)$
 $= 24$
 (c) $(-1)(-2)(-3)(4) = 2(-3)(4)$
 $= -6(4)$
 $= -24$
 (d) $(-1)(2)(3)(4) = -2(3)(4)$
 $= -6(4)$
 $= -24$
21. (a) $|-50| = 50$
 (b) $-(-50) = 50$
 (c) $|50| = 50$
 (d) $-|-50| = -(50) = -50$
22. $\frac{0}{-8} = 0$
23. $-55 \div 0 = \text{Undefined}$
24. $-615 - (-705) = -615 + 705 = 90$
25. $-184 - 409 = -184 + (-409) = -593$
26. $420 \div (-14) = -30$
27. $-3600 \div (-90) = 40$
28. $-44 - (-44) = -44 + 44 = 0$
29. $-37 - (-37) = -37 + 37 = 0$
30. $(-9)^2 = (-9)(-9) = 81$

$$\begin{aligned}
 31. \quad (-2)^5 &= (-2)(-2)(-2)(-2)(-2) \\
 &= 4(-2)(-2)(-2) \\
 &= -8(-2)(-2) \\
 &= 16(-2) \\
 &= -32
 \end{aligned}$$

$$32. \quad -9^2 = -(9)(9) = -9(9) = -81$$

$$\begin{aligned}
 33. \quad -2^5 &= -(2)(2)(2)(2)(2) \\
 &= -2(2)(2)(2)(2) \\
 &= -4(2)(2)(2) \\
 &= -8(2)(2) \\
 &= -16(2) \\
 &= -32
 \end{aligned}$$

$$34. \quad \frac{-46}{0} = \text{Undefined}$$

$$35. \quad 0 \div (-16) = 0$$

$$36. \quad -15,042 + 4893 = -10,149$$

$$37. \quad -84,506 + (-542) = -85,048$$

Section 2.5 Order of Operations and Algebraic Expressions

Section 2.5 Practice Exercises

1. Answers will vary.

2. **Variables** are used to represent quantities that are subject to change.

$$3. \quad -100 \div (-4) = 25$$

$$4. \quad -100 - (-4) = -100 + 4 = -96$$

$$5. \quad -100(-4) = 400$$

$$6. \quad -100 + (-4) = -104$$

$$7. \quad (-12)^2 = (-12)(-12) = 144$$

$$8. \quad -12^2 = -(12)(12) = -12(12) = -144$$

$$\begin{aligned}
 9. \quad -1 - 5 - 8 - 3 &= -1 + (-5) + (-8) + (-3) \\
 &= -6 + (-8) + (-3) \\
 &= -14 + (-3) \\
 &= -17
 \end{aligned}$$

$$\begin{aligned}
 10. \quad -2 - 6 - 3 - 10 &= -2 + (-6) + (-3) + (-10) \\
 &= -8 + (-3) + (-10) \\
 &= -11 + (-10) \\
 &= -21
 \end{aligned}$$

$$\begin{aligned}
 11. \quad (-1)(-5)(-8)(-3) &= 5(-8)(-3) \\
 &= -40(-3) \\
 &= 120
 \end{aligned}$$

$$\begin{aligned}
 12. \quad (-2)(-6)(-3)(-10) &= 12(-3)(-10) \\
 &= -36(-10) \\
 &= 360
 \end{aligned}$$

$$\begin{aligned}
 13. \quad 5 + 2(3 - 5) &= 5 + 2(3 + (-5)) \\
 &= 5 + 2(-2) \\
 &= 5 + (-4) \\
 &= 1
 \end{aligned}$$

Chapter 2 Integers and Algebraic Expressions

$$\begin{aligned}
 14. \quad 6 - 4(8 - 10) &= 6 + (-4)(8 + (-10)) \\
 &= 6 + (-4)(-2) \\
 &= 6 + 8 \\
 &= 14
 \end{aligned}$$

$$\begin{aligned}
 15. \quad -2(3 - 6) + 10 &= -2(3 + (-6)) + 10 \\
 &= -2(-3) + 10 \\
 &= 6 + 10 \\
 &= 16
 \end{aligned}$$

$$\begin{aligned}
 16. \quad -4(1 - 3) - 8 &= -4(1 + (-3)) + (-8) \\
 &= -4(-2) + (-8) \\
 &= 8 + (-8) \\
 &= 0
 \end{aligned}$$

$$17. \quad -8 - 6^2 = -8 - 36 = -8 + (-36) = -44$$

$$18. \quad -10 - 5^2 = -10 - 25 = -10 + (-25) = -35$$

$$19. \quad 120 \div (-4)(5) = -30(5) = -150$$

$$20. \quad 36 \div (-2)(3) = -18(3) = -54$$

$$\begin{aligned}
 21. \quad 40 - 32 \div (-4)(2) &= 40 - (-8)(2) \\
 &= 40 - (-16) \\
 &= 40 + 16 \\
 &= 56
 \end{aligned}$$

$$\begin{aligned}
 22. \quad 48 - 36 \div (6)(-2) &= 48 - 6(-2) \\
 &= 48 - (-12) \\
 &= 48 + 12 \\
 &= 60
 \end{aligned}$$

$$\begin{aligned}
 23. \quad 100 - 2(3 - 8) &= 100 - 2(3 + (-8)) \\
 &= 100 - 2(-5) \\
 &= 100 - (-10) \\
 &= 100 + 10 \\
 &= 110
 \end{aligned}$$

$$\begin{aligned}
 24. \quad 55 - 3(2 - 6) &= 55 - 3(2 + (-6)) \\
 &= 55 - 3(-4) \\
 &= 55 - (-12) \\
 &= 55 + 12 \\
 &= 67
 \end{aligned}$$

$$\begin{aligned}
 25. \quad |-10 + 13| - |-6| &= |3| - |-6| \\
 &= 3 - 6 \\
 &= 3 + (-6) \\
 &= -3
 \end{aligned}$$

$$\begin{aligned}
 26. \quad |4 - 9| - |-10| &= |-5| - |-10| \\
 &= 5 - 10 \\
 &= -5
 \end{aligned}$$

$$\begin{aligned}
 27. \quad \sqrt{100 - 36} - 3\sqrt{16} &= \sqrt{64} - 3\sqrt{16} \\
 &= 8 - 3(4) \\
 &= 8 - 12 \\
 &= -4
 \end{aligned}$$

$$\begin{aligned}
 28. \quad \sqrt{36 - 11} + 2\sqrt{9} &= \sqrt{25} + 2\sqrt{9} \\
 &= 5 + 2(3) \\
 &= 5 + 6 \\
 &= 11
 \end{aligned}$$

$$29. \quad 5^2 - (-3)^2 = 5 \cdot 5 - (-3)(-3) = 25 - 9 = 16$$

$$\begin{aligned}
 30. \quad (6)^2 - (-4)^2 &= 36 - (-4)(-4) \\
 &= 36 - 16 \\
 &= 20
 \end{aligned}$$

$$\begin{aligned}
 31. \quad -3 + (5 - 9)^2 &= -3 + (-4)^2 \\
 &= -3 + (-4)(-4) \\
 &= -3 + 16 \\
 &= 13
 \end{aligned}$$

$$\begin{aligned}
 32. \quad -5 + (3 - 10)^2 &= -5 + (-7)^2 \\
 &= -5 + (-7)(-7) \\
 &= -5 + 49 \\
 &= 44
 \end{aligned}$$

$$\begin{aligned}
 33. \quad 12 + (14 - 16)^2 \div (-4) &= 12 + (-2)^2 \div (-4) \\
 &= 12 + (-2)(-2) \div (-4) \\
 &= 12 + 4 \div (-4) \\
 &= 12 + (-1) \\
 &= 11
 \end{aligned}$$

$$\begin{aligned}
 34. \quad -7 + (1 - 5)^2 \div 4 &= -7 + (-4)^2 \div 4 \\
 &= -7 + (-4)(-4) \div 4 \\
 &= -7 + 16 \div 4 \\
 &= -7 + 4 \\
 &= -3
 \end{aligned}$$

$$35. \quad -48 \div 12 \div (-2) = -4 \div (-2) = 2$$

$$36. \quad -100 \div (-5) \div (-5) = 20 \div (-5) = -4$$

$$\begin{aligned}
 37. \quad 90 \div (-3) \square (-1) \div (-6) &= -30 \square (-1) \div (-6) \\
 &= 30 \div (-6) \\
 &= -5
 \end{aligned}$$

$$\begin{aligned}
 38. \quad 64 \div (-4) \square 2 \div (-16) &= -16 \square 2 \div (-16) \\
 &= -32 \div (-16) \\
 &= 2
 \end{aligned}$$

$$\begin{aligned}
 39. \quad [7^2 - 9^2] \div (-5 + 1) & \\
 &= [49 - 81] \div (-5 + 1) \\
 &= -32 \div (-4) \\
 &= 8
 \end{aligned}$$

$$\begin{aligned}
 40. \quad [(-8)^2 - 5^2] \div (-4 + 1) & \\
 &= [64 - 25] \div (-4 + 1) \\
 &= 39 \div (-3) \\
 &= -13
 \end{aligned}$$

$$\begin{aligned}
 41. \quad 2 + 2^2 - 10 - 12 &= 2 + 4 - 10 - 12 \\
 &= 2 + 4 + (-10) + (-12) \\
 &= 6 + (-10) + (-12) \\
 &= -4 + (-12) \\
 &= -16
 \end{aligned}$$

$$\begin{aligned}
 42. \quad 14 - 4^2 + 2 - 10 &= 14 - 16 + 2 - 10 \\
 &= 14 + (-16) + 2 + (-10) \\
 &= -2 + 2 + (-10) \\
 &= 0 + (-10) \\
 &= -10
 \end{aligned}$$

$$43. \quad \frac{3^2 - 27}{-9 + 6} = \frac{9 - 27}{-9 + 6} = \frac{-18}{-3} = 6$$

$$44. \quad \frac{8 + (-2)^2}{-5 + (-1)} = \frac{8 + 4}{-5 + (-1)} = \frac{12}{-6} = -2$$

$$\begin{aligned}
 45. \quad \frac{13 - (2)(4)}{-1 - 2^2} &= \frac{13 - (2)(4)}{-1 - 4} \\
 &= \frac{13 - 8}{-1 - 4} \\
 &= \frac{5}{-5} \\
 &= -1
 \end{aligned}$$

$$\begin{aligned}
 46. \quad \frac{10 - (-3)(5)}{-9 - 4^2} &= \frac{10 - (-3)(5)}{-9 - 16} \\
 &= \frac{10 - (-15)}{-9 - 16} \\
 &= \frac{10 + 15}{-9 - 16} \\
 &= \frac{25}{-25} \\
 &= -1
 \end{aligned}$$

$$47. \quad \frac{|-23 + 7|}{5^2 - (-3)^2} = \frac{|-23 + 7|}{25 - 9} = \frac{|-16|}{16} = \frac{16}{16} = 1$$

$$48. \quad \frac{|10 - 50|}{6^2 - (-4)^2} = \frac{|10 - 50|}{36 - 16} = \frac{|-40|}{20} = \frac{40}{20} = 2$$

$$\begin{aligned}
 49. \quad 21 - [4 - (5 - 8)] &= 21 - [4 - (-3)] \\
 &= 21 - [4 + 3] \\
 &= 21 - 7 \\
 &= 14
 \end{aligned}$$

Chapter 2 Integers and Algebraic Expressions

$$\begin{aligned} 50. \quad 15 - [10 - (20 - 25)] &= 15 - [10 - (-5)] \\ &= 15 - [10 + 5] \\ &= 15 - 15 \\ &= 0 \end{aligned}$$

$$\begin{aligned} 51. \quad -17 - 2[18 \div (-3)] &= -17 - 2[-6] \\ &= -17 - (-12) \\ &= -17 + 12 \\ &= -5 \end{aligned}$$

$$\begin{aligned} 52. \quad -8 - 5(-45 \div 15) &= -8 - 5(-3) \\ &= -8 - (-15) \\ &= -8 + 15 \\ &= 7 \end{aligned}$$

$$\begin{aligned} 53. \quad 4 + 2[9 + (-4 + 12)] &= 4 + 2[9 + 8] \\ &= 4 + 2[17] \\ &= 4 + 34 \\ &= 38 \end{aligned}$$

$$\begin{aligned} 54. \quad -13 + 3[11 + (-15 + 10)] \\ &= -13 + 3[11 + (-5)] \\ &= -13 + 3[6] \\ &= -13 + 18 \\ &= 5 \end{aligned}$$

55. $\$15x$

56. $\$12p$

57. $(t + 4)$ in.

58. $(h + 1)$ hr

59. $(v - 6)$ mph

60. $(A - 30)$ yr

61. $2g$

62. $2t$

63. $-12n$

64. $-3z$

65. $-9 - x$

66. $-18 - p$

67. $\frac{t}{-2}$

68. $\frac{-10}{w}$

69. $y + (-14)$

70. $c + (-150)$

71. $2(c + d)$

72. $2(a + b)$

73. $x - (-8)$

74. $m - (-5)$

75. $x + 9z = -10 + 9(-3) = -10 + (-27) = -37$

76. $a + 7b = -3 + 7(-6) = -3 + (-42) = -45$

$$\begin{aligned} 77. \quad x + 5y + z &= -10 + 5(5) + 2 \\ &= -10 + 25 + 2 \\ &= 15 + 2 \\ &= 17 \end{aligned}$$

$$\begin{aligned} 78. \quad 9p + 4t + w &= 9(2) + 4(6) + (-50) \\ &= 18 + 24 + (-50) \\ &= 42 + (-50) \\ &= -8 \end{aligned}$$

$$\begin{aligned} 79. \quad a - b + 3c &= -7 - (-2) + 3(4) \\ &= -7 + 2 + 12 \\ &= -5 + 12 \\ &= 7 \end{aligned}$$

Section 2.5 Order of Operations and Algebraic Expressions

$$\begin{aligned}
 80. \quad w + 2y - z &= -9 + 2(10) - (-3) \\
 &= -9 + 20 + 3 \\
 &= 11 + 3 \\
 &= 14
 \end{aligned}$$

$$81. \quad -3mn = -3(-8)(-2) = 24(-2) = -48$$

$$82. \quad -5pq = -5(-4)(-2) = 20(-2) = -40$$

$$83. \quad |-y| = | -(-9) | = |9| = 9$$

$$84. \quad |-z| = | -(-18) | = |18| = 18$$

$$85. \quad -|-w| = -| -(-4) | = -|4| = -4$$

$$86. \quad -|-m| = -| -(-15) | = -|15| = -15$$

$$87. \quad x^2 = (-3)^2 = (-3)(-3) = 9$$

$$88. \quad n^2 = (-9)^2 = (-9)(-9) = 81$$

$$89. \quad -x^2 = -(-3)^2 = -(-3)(-3) = 3(-3) = -9$$

$$90. \quad -n^2 = -(-9)^2 = -(-9)(-9) = 9(-9) = -81$$

$$\begin{aligned}
 91. \quad -4|x + 3y| &= -4|5 + 3(-6)| \\
 &= -4|5 + (-18)| \\
 &= -4|-13| \\
 &= -4(13) \\
 &= -52
 \end{aligned}$$

$$\begin{aligned}
 92. \quad -2|4a - b| &= -2|4(-8) - (-2)| \\
 &= -2|-32 + 2| \\
 &= -2|-30| \\
 &= -2(30) \\
 &= -60
 \end{aligned}$$

$$\begin{aligned}
 93. \quad 6 - |m - n^2| &= 6 - |-2 - 3^2| \\
 &= 6 - |-2 - 9| \\
 &= 6 - |-11| \\
 &= 6 - 11 \\
 &= -5
 \end{aligned}$$

$$\begin{aligned}
 94. \quad 4 - |c^2 - d^2| &= 4 - |3^2 - (-5)^2| \\
 &= 4 - |9 - 25| \\
 &= 4 - |9 + (-25)| \\
 &= 4 - |-16| \\
 &= 4 - 16 \\
 &= -12
 \end{aligned}$$

$$\begin{aligned}
 95. \quad &\frac{-8 + (-11) + (-4) + 1 + 9 + 4 + (-5)}{7} \\
 &= \frac{-19 + (-4) + 1 + 9 + 4 + (-5)}{7} \\
 &= \frac{-23 + 1 + 9 + 4 + (-5)}{7} \\
 &= \frac{-22 + 9 + 4 + (-5)}{7} \\
 &= \frac{-13 + 4 + (-5)}{7} \\
 &= \frac{-9 + (-5)}{7} \\
 &= \frac{-14}{7} \\
 &= -2^\circ
 \end{aligned}$$

$$\begin{aligned}
 96. \quad & \frac{15+12+10+3+0+(-2)+(-3)}{7} \\
 &= \frac{27+10+3+0+(-2)+(-3)}{7} \\
 &= \frac{37+3+0+(-2)+(-3)}{7} \\
 &= \frac{40+0+(-2)+(-3)}{7} \\
 &= \frac{38+(-3)}{7} \\
 &= \frac{35}{7} \\
 &= 5^\circ
 \end{aligned}$$

$$\begin{aligned}
 97. \quad & \frac{-8+(-8)+(-6)+(-5)+(-2)+(-3)+3+3+0+(-4)}{10} \\
 &= \frac{-16+(-6)+(-5)+(-2)+(-3)+3+3+0+(-4)}{10} \\
 &= \frac{-22+(-5)+(-2)+(-3)+3+3+0+(-4)}{10} \\
 &= \frac{-27+(-2)+(-3)+3+3+0+(-4)}{10} \\
 &= \frac{-29+(-3)+3+3+0+(-4)}{10} \\
 &= \frac{-32+3+3+0+(-4)}{10} \\
 &= \frac{-29+3+0+(-4)}{10} \\
 &= \frac{-26+0+(-4)}{10} \\
 &= \frac{-30}{10} \\
 &= -3
 \end{aligned}$$

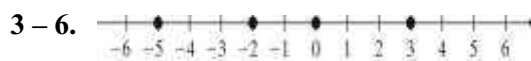
$$\begin{aligned}
 98. \quad & \frac{-6+(-2)+5+1+0+(-3)+4+2+(-7)+(-4)}{10} \\
 &= \frac{-8+5+1+0+(-3)+4+2+(-7)+(-4)}{10} \\
 &= \frac{-3+1+0+(-3)+4+2+(-7)+(-4)}{10} \\
 &= \frac{-2+0+(-3)+4+2+(-7)+(-4)}{10} \\
 &= \frac{-5+4+2+(-7)+(-4)}{10} \\
 &= \frac{-1+2+(-7)+(-4)}{10} \\
 &= \frac{1+(-7)+(-4)}{10} \\
 &= \frac{-6+(-4)}{10} \\
 &= \frac{-10}{10} \\
 &= -1
 \end{aligned}$$

Chapter 2 Review Exercises

Section 2.1

1. -4250 ft

2. -\$3,000,000



7. Opposite: 4; Absolute value: 4

8. Opposite: -6; Absolute value: 6

9. $|-3|=3$
10. $|-1000|=1000$
11. $|74|=74$
12. $|0|=0$
13. $-(-9)=9$
14. $-(-28)=28$
15. $-|-20|=- (20)=-20$
16. $-|-45|=- (45)=-45$
17. $-7=-7$;
 $|-7|=7$;
 $-7 < |-7|$
18. $-12 < -5$
19. $-(-4)=4$;
 $-|-4|=- (4)=-4$;
 $-(-4) > -|-4|$
20. $-20=-20$;
 $-|-20|=- (20)=-20$;
 $-20=-|-20|$
27. $35+(-22)=13$
28. $-105+90=-15$
29. $-29+(-41)=-70$
30. $-98+(-42)=-140$
31. $-3+(-10)+12+14+(-10)$
 $=-13+12+14+(-10)$
 $=-1+14+(-10)$
 $=13+(-10)$
 $=3$
32. $9+(-15)+2+(-7)+(-4)$
 $=-6+2+(-7)+(-4)$
 $=-4+(-7)+(-4)$
 $=-11+(-4)$
 $=-15$
33. $23+(-35)=-12$
34. $57+(-10)=47$
35. $-5+(-13)+20=-18+20=2$
36. $-42+12=-30$
37. $-12+3=-9$
38. $-89+(-22)=-111$
39. $-4+9+(-3)+1+(-5)$
 $=5+(-3)+1+(-5)$
 $=2+1+(-5)$
 $=3+(-5)$
 $=-2$ in.
 Caribou had below average snowfall.
40. $2+(-2)+(-1)+(-4)=0+(-1)+(-4)$
 $=-1+(-4)$
 $=-5$

Section 2.2

21. $6+(-2)=4$
22. $-3+6=3$
23. $-3+(-2)=-5$
24. $-3+0=-3$
25. To add two numbers with the same sign, add their absolute values and apply the common sign.
26. To add two numbers with different signs, subtract the smaller absolute value from the larger absolute value. Then apply the

Section 2.3

41. To subtract two integers, add the opposite of the second number to the first number.

42. $4 - (-23) = 4 + 23 = 27$

43. $19 - 44 = 19 + (-44) = -25$

44. $-2 - (-24) = -2 + 24 = 22$

45. $-289 - 130 = -289 + (-130) = -419$

46. $2 - 7 - 3 = 2 + (-7) + (-3)$
 $= -5 + (-3)$
 $= -8$

47. $-45 - (-77) + 8 = -45 + 77 + 8$
 $= 32 + 8$
 $= 40$

48. $-16 - 4 - (-3) = -16 + (-4) + 3$
 $= -20 + 3$
 $= -17$

49. $99 - (-7) - 6 = 99 + 7 + (-6)$
 $= 106 + (-6)$
 $= 100$

50. (a) $8 - 10 = 8 + (-10) = -2$
 (b) $10 - 8 = 10 + (-8) = 2$

51. For example: 14 subtracted from -2

52. For example: Subtract -7 from -25

53. $-1 - (-6) = -1 + 6 = 5$
 The temperature rose 5°F .

54. $-40 + 132 = 92$
 Sam's new balance is \$92.

55.
$$\frac{-3 + 4 + 0 + 9 + (-2) + (-1) + 0 + 5 + (-3)}{9}$$

$$= \frac{1 + 0 + 9 + (-2) + (-1) + 0 + 5 + (-3)}{9}$$

$$= \frac{10 + (-2) + (-1) + 0 + 5 + (-3)}{9}$$

$$= \frac{8 + (-1) + 0 + 5 + (-3)}{9}$$

$$= \frac{7 + 0 + 5 + (-3)}{9}$$

$$= \frac{12 + (-3)}{9}$$

$$= \frac{9}{9}$$

$$= 1$$

The average is 1 above par.

56. $2400 - (-1050) = 2400 + 1050 = 3450$ ft

Section 2.4

57. $6(-3) = -18$

58. $\frac{-12}{4} = -3$

59. $\frac{-900}{-60} = 15$

60. $(-7)(-8) = 56$

61. $-36 \div 9 = -4$

62. $60 \div (-5) = -12$

63. $(-12)(-4)(-1)(-2) = 48(-1)(-2)$
 $= -48(-2)$
 $= 96$

64. $(-1)(-8)(2)(1)(-2) = 8(2)(1)(-2)$
 $= 16(1)(-2)$
 $= 16(-2)$
 $= -32$

65. $-15 \div 0 = \text{Undefined}$

$$66. \frac{0}{-5} = 0$$

$$67. -5^3 = -(5)(5)(5) = -5(5)(5) \\ = -25(5) = -125$$

$$68. (-5)^3 = (-5)(-5)(-5) = 25(-5) = -125$$

$$69. (-6)^2 = (-6)(-6) = 36$$

$$70. -6^2 = -(6)(6) = -6(6) = -36$$

$$71. (-1)^{10} \\ = -1(-1)(-1)(-1)(-1)(-1)(-1)(-1)(-1)(-1) \\ = 1(-1)(-1)(-1)(-1)(-1)(-1)(-1)(-1)(-1) \\ = -1(-1)(-1)(-1)(-1)(-1)(-1)(-1) \\ = 1(-1)(-1)(-1)(-1)(-1)(-1) \\ = -1(-1)(-1)(-1)(-1)(-1) \\ = 1(-1)(-1)(-1)(-1) \\ = -1(-1)(-1)(-1) \\ = 1(-1)(-1) \\ = -1(-1) \\ = 1$$

$$72. (-1)^{21} = -1$$

73. Negative

74. Positive

$$75. -45 \div (-15) = 3$$

$$76. \square 49 = -76$$

$$77. \frac{-12}{4} = -3^\circ \text{F}$$

$$78. 550 - 4(160) = 550 - 640 \\ = 550 + (-640) \\ = -\$90$$

Section 2.5

$$79. 50 - 3(6 - 2) = 50 - 3(4) \\ = 50 - 12 \\ = 50 + (-12) \\ = 38$$

$$80. 48 - 8 \div (-2) + 5 = 48 - (-4) + 5 \\ = 48 + 4 + 5 \\ = 52 + 5 \\ = 57$$

$$81. 28 \div (-7) \square - (-1) = -4 \square - (-1) \\ = -12 + 1 \\ = -11$$

$$82. (-4)^2 \div 8 - (-6) = 16 \div 8 - (-6) \\ = 2 + 6 \\ = 8$$

$$83. [10 - (-3)^2] \square (-11) + 4 = [10 - 9] \square (-11) + 4 \\ = 1 \square (-11) + 4 \\ = -11 + 4 \\ = -7$$

$$84. [-9 - (-7)]^2 \square \div (-6) = (-2)^2 \square \div (-6) \\ = 4 \square \div (-6) \\ = 12 \div (-6) \\ = -2$$

$$85. \frac{100 - 4^2}{(-7)(6)} = \frac{100 - 16}{(-7)(6)} = \frac{84}{-42} = -2$$

$$86. \frac{18 - 3(-2)}{4^2 - 8} = \frac{18 - 3(-2)}{16 - 8} = \frac{18 - (-6)}{16 - 8} \\ = \frac{18 + 6}{16 - 8} = \frac{24}{8} = 3$$

Chapter 2 Integers and Algebraic Expressions

$$\begin{aligned}
 87. \quad 5 - 2[-3 + (2 - 5)] &= 5 - 2[-3 + (-3)] \\
 &= 5 - 2[-6] \\
 &= 5 - (-12) \\
 &= 5 + 12 \\
 &= 17
 \end{aligned}$$

$$\begin{aligned}
 88. \quad -10 + 3[4 - (-2 + 7)] &= -10 + 3[4 - 5] \\
 &= -10 + 3[-1] \\
 &= -10 + (-3) \\
 &= -13
 \end{aligned}$$

$$89. (a + 8) \text{ yr}$$

$$90. \$3n$$

$$91. -5x$$

$$92. p - 12$$

$$93. (a + b) + 2$$

$$94. \frac{w}{4}$$

$$95. y - (-8)$$

$$96. 2(5 + z)$$

$$\begin{aligned}
 97. \quad 3x - 2y &= 3(-5) - 2(4) \\
 &= -15 - 8 \\
 &= -15 + (-8) \\
 &= -23
 \end{aligned}$$

$$\begin{aligned}
 98. \quad 5(a - 4b) &= 5(-3 - 4(2)) \\
 &= 5(-3 - 8) \\
 &= 5(-3 + (-8)) \\
 &= 5(-11) \\
 &= -55
 \end{aligned}$$

$$\begin{aligned}
 99. \quad -2(x + y)^2 &= -2(6 + (-9))^2 \\
 &= -2(-3)^2 \\
 &= -2(9) \\
 &= -18
 \end{aligned}$$

$$\begin{aligned}
 100. \quad -3w^2 - 2z &= -3(-4)^2 - 2(-9) \\
 &= -3(16) - 2(-9) \\
 &= -48 - (-18) \\
 &= -48 + 18 \\
 &= -30
 \end{aligned}$$

$$101. -|x| = -|-2| = -(2) = -2$$

$$102. -|-x| = -|-(-5)| = -|5| = -(5) = -5$$

$$103. -(-x) = -(-(-10)) = -(10) = -10$$

$$104. -(-x) = -(-5) = 5$$

Chapter 2 Test

$$1. -\$220$$

$$2. 26$$

$$3. -5 < -2$$

$$\begin{aligned}
 4. \quad &|-5| = 5; \\
 &|-2| = 2; \\
 &|-5| > |-2|
 \end{aligned}$$

$$\begin{aligned}
 5. \quad &0 = 0; \\
 &-(-2) = 2; \\
 &0 < -(-2)
 \end{aligned}$$

$$\begin{aligned}
 6. \quad &-|-12| = -(12) = -12; \\
 &-12 = -12; \\
 &-|-12| = -12
 \end{aligned}$$

7. $-|-9| = -(9) = -9$;
 $9 = 9$;
 $-|-9| < 9$
8. $-5^2 = -(5)(5) = -5(5) = -25$;
 $(-5)^2 = (-5)(-5) = 25$;
 $-5^2 < (-5)^2$
9. $|-10| = 10$
10. $-(-10) = 10$
11. $9 + (-14) = -5$
12. $-23 + (-5) = -28$
13. $-4 - (-13) = -4 + 13 = 9$
14. $-30 - 11 = -30 + (-11) = -41$
15. $-15 + 21 = 6$
16. $5 - 28 = 5 + (-28) = -23$
17. $6(-12) = -72$
18. $(-11)(-8) = 88$
19. $\frac{-24}{-12} = 2$
20. $\frac{54}{-3} = -18$
21. $\frac{-44}{0} = \text{Undefined}$
22. $(-91)(0) = 0$
23. $-3(-7) = 21$
24. $-13 + 8 = -5$
25. $18 - (-4) = 18 + 4 = 22$
26. $6 \div (-2) = -3$
27. $-8 + 5 = -3$
28. $-3 + 15 + (-6) + (-1) = 12 + (-6) + (-1)$
 $= 6 + (-1)$
 $= 5$
29. $-1 + 2 + (-4) + (-2) + (-2)$
 $= 1 + (-4) + (-2) + (-2)$
 $= -3 + (-2) + (-2)$
 $= -5 + (-2)$
 $= -7$ in
Atlanta had below average rainfall.
30. $\frac{-35}{5} = -7^\circ \text{F}$
31. (a) $(-8)^2 = (-8)(-8) = 64$
(b) $-8^2 = -(8)(8) = -8(8) = -64$
(c) $(-4)^3 = (-4)(-4)(-4)$
 $= 16(-4) = -64$
(d) $-4^3 = -(4)(4)(4) = -4(4)(4)$
 $= -16(4) = -64$
32. $-14 + 22 - (-5) + (-10)$
 $= -14 + 22 + 5 + (-10)$
 $= 8 + 5 + (-10)$
 $= 13 + (-10)$
 $= 3$
33. $(-3)(-1)(-4)(-1)(-5)$
 $= 3(-4)(-1)(-5)$
 $= -12(-1)(-5)$
 $= 12(-5)$
 $= -60$
34. $16 - 2[5 - (1 - 4)] = 16 - 2[5 - (-3)]$
 $= 16 - 2[5 + 3]$
 $= 16 - 2[8]$
 $= 16 - 16$
 $= 0$

Chapter 2 Integers and Algebraic Expressions

$$\begin{aligned} 35. \quad -20 \div (-2)^2 + (-14) &= -20 \div 4 + (-14) \\ &= -5 + (-14) \\ &= -19 \end{aligned}$$

$$\begin{aligned} 36. \quad 12 \cdot (-6) + [20 - (-12)] - 15 \\ &= 12 \cdot (-6) + 32 - 15 \\ &= -72 + 32 - 15 \\ &= -40 - 15 = -55 \end{aligned}$$

$$\begin{aligned} 37. \quad \frac{24 - 2|3 - 9|}{8 - 2^2} &= \frac{24 - 2|-6|}{8 - 2^2} \\ &= \frac{24 - 2(6)}{8 - 4} \\ &= \frac{24 - 12}{8 - 4} \\ &= \frac{12}{4} \\ &= 3 \end{aligned}$$

$$38. \quad \$18m$$

$$39. \quad -x^2 + y^2 = -(4)^2 + (-1)^2 = -16 + 1 = -15$$

$$40. \quad -4m - 3n = -4(-6) - 3(4) = 24 - 12 = 12$$

Chapters 1–2 Cumulative Review Exercises

1. Ten-thousands place

2. One hundred thirty is less than two hundred forty-four.

$$\begin{array}{r} 3. \quad \begin{array}{r} 132 \quad 100 \\ 589 \quad 600 \\ \hline 490 \quad 500 \\ \hline \end{array} \\ \quad \quad \quad 1200 \text{ ft} \end{array}$$

$$4. \quad 73 + 41 = 114$$

$$\begin{aligned} 5. \quad 71 + (-4) + 81 + (-106) &= 67 + 81 + (-106) \\ &= 148 + (-106) \\ &= 42 \end{aligned}$$

$$\begin{aligned} 6. \quad 284 - 171 - (-84) - 393 \\ &= 284 + (-171) + 84 + (-393) \\ &= 113 + 84 + (-393) \\ &= 197 + (-393) \\ &= -196 \end{aligned}$$

$$\begin{array}{r} 7. \quad \begin{array}{r} \overset{9}{\cancel{10}} \overset{9}{\cancel{10}} 11 \\ 10 \ 0 \ 1 \\ -2 \ 3 \ 5 \\ \hline 7 \ 6 \ 6 \end{array} \end{array}$$

$$8. \quad -386 \div (-2) = 193$$

$$9. \quad -386 \div (-2) = 193$$

$$10. \quad \begin{array}{r} 7 \overline{) 737} \text{ R } 2 \\ \underline{-7} \\ 03 \\ \underline{-0} \\ 37 \\ \underline{-35} \\ 2 \end{array}$$

$$11. \quad \begin{array}{r} 409 \\ \times 228 \\ \hline 11 \\ 13272 \\ 8180 \\ \hline + 81800 \\ \hline 93,252 \end{array}$$

$$12. \quad \frac{0}{-61} = 0$$

$$13. \quad 0 \overline{) 341} \text{ Undefined}$$

$$14. \quad 5(28) = 140 \text{ m}^2$$

$$\begin{aligned} 15. \quad \text{(a)} \quad -|-4| &= -(4) = -4 \\ \text{(b)} \quad -(-4) &= 4 \end{aligned}$$

(c) $-4^2 = -(4)(4) = -4(4) = -16$

(d) $(-4)^2 = (-4)(-4) = 16$

16. $-14 - 2(9 - 5^2) = -14 - 2(9 - 25)$
 $= -14 - 2(9 + (-25))$
 $= -14 - 2(-16)$
 $= -14 - (-32)$
 $= -14 + 32$
 $= 18$

17. $x^2 - x + y = (-4)^2 - (-4) + 1$
 $= 16 + 4 + 1 = 20 + 1 = 21$

18. $|x - y| = |-4 - 1| = |-5| = 5$

19. (a) $30 \div 3 = 120$

$120 \div 3 = 40$ days

Torie can take the herb for 40 days if she takes 3 a day

(b) $120 \div 2 = 60$ days

Torie can take the herb for 60 days if she takes 2 a day.

20. $\frac{-8 + (-11) + 3 + 6 + 0 + (-8) + (-10)}{7}$
 $= \frac{-19 + 3 + 6 + 0 + (-8) + (-10)}{7}$
 $= \frac{-16 + 6 + 0 + (-8) + (-10)}{7}$
 $= \frac{-10 + 0 + (-8) + (-10)}{7}$
 $= \frac{-18 + (-10)}{7} = \frac{-28}{7} = -4^\circ\text{F}$