Chapter 1

Chapter 1 Opener

Try It Yourself (p. 1)

1. $11 + b$;

$3 + (b + 8) = 3 + (8 + b)$ Commutative Prop. of Addition
$= (3 + 8) + b$ Associative Property of Addition
$= 11 + b$ Add 3 and 8.

2. $d + 10$;

$(d + 4) + 6 = d + (4 + 6)$ Associative Property of Addition
$= d + 10$ Add 4 and 6.

3. $30p$;

$6(5p) = (6 \bullet 5)p$ Associative Property of Multiplication
$= 30p$ Multiply 5 and 6.

4. 0;

$13 \bullet m \bullet 0 = 13 \bullet 0 \bullet m$ Commutative Prop. of Multiplication
$= (13 \bullet 0) \bullet m$ Associative Prop. of Multiplication
$= 0 \bullet m$ Multiplication Property of Zero
$= 0$ Multiplication Property of Zero

5. $29x$;

$1 \bullet x \bullet 29 = 1 \bullet 29 \bullet x$ Commutative Prop. of Multiplication
$= (1 \bullet 29) \bullet x$ Associative Prop. of Multiplication
$= 29x$ Multiplication Property of One

6. $n + 14$;

$(n + 14) + 0 = n + (14 + 0)$ Associative Property of Addition
$= n + 14$ Addition Property of Zero

Section 1.1

1.1 Activity (pp. 2–3)

1. a. You start at 90 feet above the ground. After each second, your height decreases by 15 feet. To determine when you land on the ground, continue the table until the height equals 0.

Time (seconds)	4	5	6
Height (feet)	30	15	0

You will land on the ground after 6 seconds.

b. You are moving at a speed of 15 feet per second.

c. Because the parachute is moving down, the velocity is negative.

d. Your velocity is -15 feet per second.

2. a. The balloons start at 8 feet above the ground. After each second, the height increases by 4 feet.

To determine when the balloons will be at a height of 40 feet, continue the table until the height equals 40.

Time (seconds)	4	5	6	7	8
Height (feet)	24	28	32	36	40

The balloons will be at a height of 40 feet after 8 seconds.

b. The balloons are moving at a speed of 4 feet per second.

c. Because the balloons are moving up, the velocity is positive.

d. The velocity of the balloons is 4 feet per second.

3. a. The parachute starts at 480 feet above the ground. After each second, the height decreases by 120 feet.

b. The parachute is moving at a speed of 120 feet per second.

The velocity of the parachute is -120 feet per second.

These integers are both the same distance from 0 on a number line.

4.

Velocity (feet per second)	-14	20	-2	20	20	-15
Speed (feet per second)	14	20	2	0	25	15

5. Because an object can move up or down at a speed of 16 feet per second, the velocities would be 16 feet per second and -16 feet per second.

6. Because 3 is to the right of -4 on a number line, 3 is greater than -4.

7. An object that has a velocity of -4 feet per second has a speed of 4 feet per second. An object that has a velocity of 3 feet per second has a speed of 3 feet per second. Because 4 is greater than 3, the object with a velocity of -4 feet per second has a greater speed.

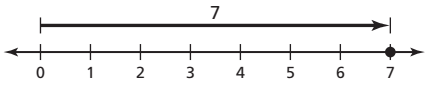
8. *Sample answer*: Speed cannot be negative. So, use positive integers to represent a speed. Velocity, because it also indicates direction, can be positive or negative. So, you can use positive or negative integers to represent a velocity.

9. $|\text{velocity}| = \text{speed}$ because speed is always positive and the absolute value of velocity is positive. For the statement $|\text{speed}| = \text{velocity}$, velocity can be negative and the absolute value of a number is always positive. So, $|\text{speed}| = \text{velocity}$ is not necessarily true.

Chapter 1

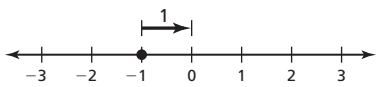
1.1 On Your Own (pp. 4–5)

1.



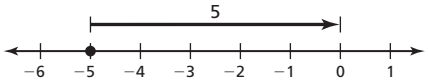
Because the distance between 7 and 0 is 7, $|7| = 7$.

2.



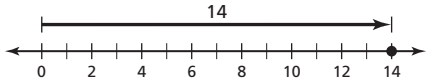
Because the distance between -1 and 0 is 1, $|-1| = 1$.

3.



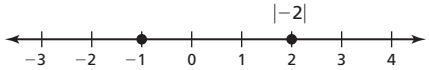
Because the distance between -5 and 0 is 5, $|-5| = 5$.

4.



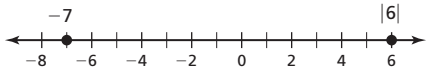
Because the distance between 14 and 0 is 14, $|14| = 14$.

5.



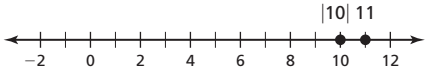
Because $|-2|$ is to the right of -1, $|-2| > -1$.

6.



Because -7 is to the left of $|6|$, $-7 < |6|$.

7.



Because $|10|$ is to the left of 11, $|10| < 11$.

8.

Because 9 and $|-9|$ are equal to 9, $9 = |-9|$.

9. The freezing point of water is 0°C, so you can use absolute values.

Airplane fuel: $|-53| = 53$

Candle wax: $|55| = 55$

Because 53 is less than 55, the freezing point of airplane fuel is closer to the freezing point of water.

1.1 Exercises (pp. 6–7)

Vocabulary and Concept Check

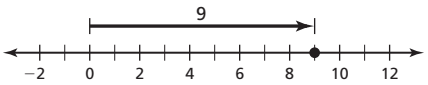
1. Because 9, -1, and 15 are included in the set $\ldots, -2, -1, 0, 1, 2, \ldots$, they are integers.

2. The absolute value of an integer is the distance between the integer and zero on a number line.

3. -6; -6 is the only expression that does not simplify to 6.

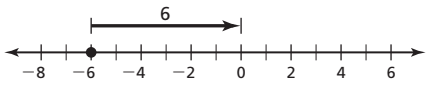
Practice and Problem Solving

4.



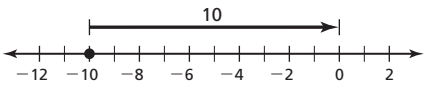
Because the distance between 9 and 0 is 9, $|9| = 9$.

5.



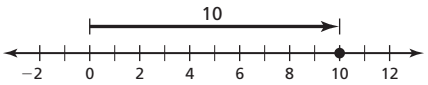
Because the distance between -6 and 0 is 6, $|-6| = 6$.

6.



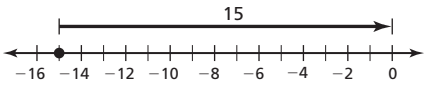
Because the distance between -10 and 0 is 10, $|-10| = 10$.

7.



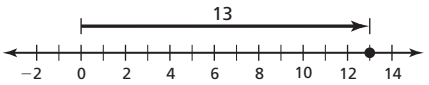
Because the distance between 10 and 0 is 10, $|10| = 10$.

8.



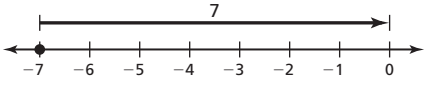
Because the distance between -15 and 0 is 15, $|-15| = 15$.

9.



Because the distance between 13 and 0 is 13, $|13| = 13$.

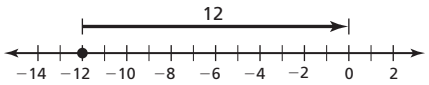
10.



Because the distance between -7 and 0 is 7, $|-7| = 7$.

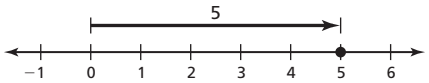
Chapter 1

11.



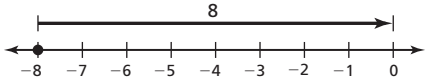
Because the distance between -12 and 0 is 12, $|-12| = 12$.

12.



Because the distance between 5 and 0 is 5, $|5| = 5$.

13.

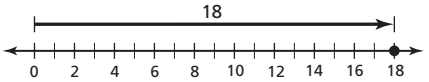


Because the distance between -8 and 0 is 8, $|-8| = 8$.

14.

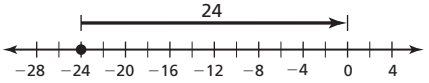
Because the distance between 0 and 0 is 0, $|0| = 0$.

15.



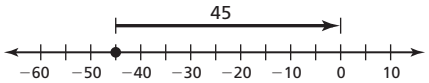
Because the distance between 0 and 18 is 18, $|18| = 18$.

16.



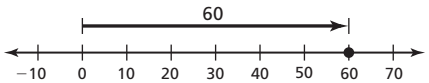
Because the distance between -24 and 0 is 24, $|-24| = 24$.

17.



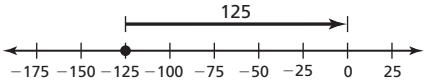
Because the distance between -45 and 0 is 45, $|-45| = 45$.

18.



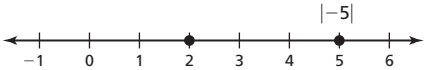
Because the distance between 60 and 0 is 60, $|60| = 60$.

19.



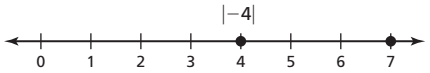
Because the distance between -125 and 0 is 125, $|-125| = 125$.

20.



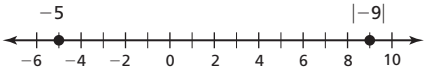
Because 2 is to the left of $|-5|$, $2 < |-5|$.

21.



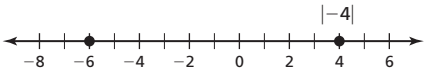
Because $|-4|$ is to the left of 7, $|-4| < 7$.

22.



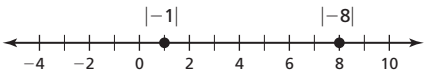
Because -5 is to the left of $|-9|$, $-5 < |-9|$.

23.



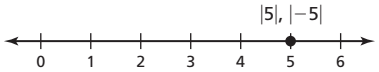
Because $|-4|$ is to the right of -6, $|-4| > -6$.

24.



Because $|-1|$ is to the left of $|-8|$, $|-1| < |-8|$.

25.



Because $|5|$ and $|-5|$ both equal 5, $|5| = |-5|$.

26. The absolute value of a number cannot be negative. $|10| = 10$

27. The student forgot to take the absolute value of -5. Because $|-5| = 5$, $|-5| > 4$.

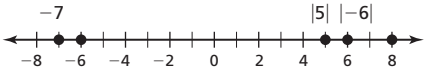
28. A deposit of \$50 is 50 as an integer. A withdrawal of \$20 is -20 as an integer.

29. To go down 8 floors is -8 as an integer. To go up 5 floors is 5 as an integer.

30.

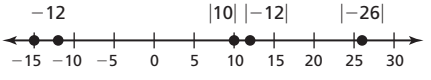
From least to greatest, the values are -5, -2, $|-2|$, $|3|$, and 8.

31.



From least to greatest, the values are -7, -6, $|5|$, $|-6|$, and 8.

32.



From least to greatest, the values are -15, -12, $|10|$, $|-12|$, and $|-26|$.

Chapter 1

33.

From least to greatest, the values are $-17, |-11|, |20|, 21,$ and $|-34|$.

34. $|-30| = 30$

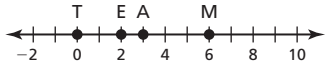
35. $-|4| = -4$

36. $-|-15| = -15$

37. a.

From least to greatest, the points on the number line spell the word MATE.

b.



From least to greatest, the points on the number line spell the word TEAM.

38. *Sample answer:* -4; $|-4| = 4$ and $4 > 3$

39. $n \geq 0$; Because $n + |-n| = 2n$, the value of n is equal to $|-n|$. Because $2n$ is positive, n must also be positive.

40. $n \leq 0$; Because $n + |-n| = 0$, the value of n is opposite $|-n|$. Because $|-n|$ is positive, n must be negative.

41. a. The divers are at a depth of -14 feet and -18 feet, respectively.

b. Because -14 is to the right of -18 on a number line, -14 is greater.

c. Because $|-18| = 18$ is to the right of $|-14| = 14$ on a number line, -18 has the greater absolute value. The diver is 18 feet below sea level, so the absolute value and the depth are the same.

42. Because $|-969| = 969$ is to the left of $|1277| = 1277$ on a number line, -969 has the smaller absolute value. Therefore, the summit of Loihi is closer to sea level.

43. a. Because -4 is the score to the left of all the scores on the number line, Player 3 wins with the lowest score.

b. Because a score of 0 is at par, Player 2 is at par.

c. Because $|+5|$ has the greatest absolute value, Player 1 is the farthest from par.

44. true; Because $x < 0$, the value of $-x$ must be positive.

45. false; $|0| = 0$ and 0 is neither positive nor negative.

Fair Game Review

46. $19 + 32 = 51$

47. $50 + 94 = 144$

48. $181 + 217 = 398$

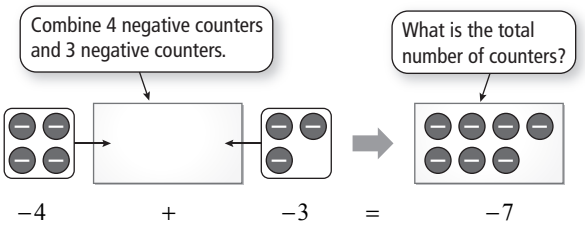
49. $1149 + 2021 = 3170$

50. A; Whole numbers include positive integers and zero and -5 is a negative integer.

Section 1.2

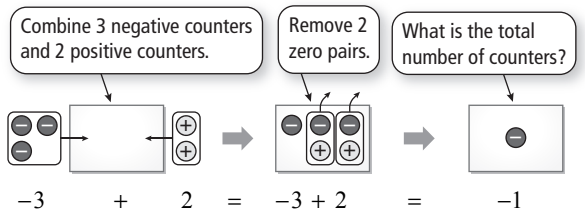
1.2 Activity (pp. 8–9)

1.



So, $-4 + (-3) = -7$.

2.



So, $-3 + 2 = -1$.

3. 2; So, $5 + (-3) = 2$.

4. $7 + (-7) = 0$; 7 and -7 are the same distance from zero on the number line.

Chapter 1

	Exercise	Type of Sum	Sum	Sum: Positive, Negative, or Zero
5.	$-4 + (-3)$	Integers with the same sign	-7	negative
6.	$-3 + 2$	Integers with different signs	-1	negative
7.	$5 + (-3)$	Integers with different signs	2	positive
8.	$7 + (-7)$	Integers with different signs	0	zero
9.	$2 + 4$	Integers with the same sign	6	positive
10.	$-6 + (-2)$	Integers with the same sign	-8	negative
11.	$-5 + 9$	Integers with different signs	4	positive
12.	$15 + (-9)$	Integers with different signs	6	positive
13.	$-10 + 10$	Integers with different signs	0	zero
14.	$-6 + (-6)$	Integers with the same sign	-12	negative
15.	$13 + (-13)$	Integers with different signs	0	zero

16. The sum of two integers is positive when both integers are positive. When the integers have different signs, the sum is positive when the absolute value of the positive number is greater than the absolute value of the negative number, and the sum is negative when the absolute value of the negative number is greater than the absolute value of the positive number. The sum of two integers is negative when both integers are negative. The sum of two integers is zero when the integers are opposites.

17. a. Add the absolute values of the integers. Then use the common sign.

b. Subtract the lesser absolute value from the greater absolute value. Use the sign of the integer with the greater absolute value.

c. The sum is zero.

1.2 On Your Own (pp. 10–11)

1. $7 + 13 = 20$

The sum is 20.

2. $-8 + (-5) = -13$

The sum is -13.

3. $-20 + (-15) = -35$

The sum is -35.

4. $-2 + 11 = 9$

The sum is 9.

5. $9 + (-10) = -1$

The sum is -1.

6. $-31 + 31 = 0$

The sum is 0.

7. $C = -40 + 30 + 40 + (-50)$

$= -40 + 40 + 30 + (-50)$

$= (-40 + 40) + [30 + (-50)]$

$= 0 + (-20)$

$= -20$

Because $C = -20$, the account balance decreased by \$20 in July.

1.2 Exercises (pp. 12–13)

Vocabulary and Concept Check

1. Change the sign of the integer.

2. Because $3 + (-4) = -1$ and $-4 + 3 = -1$, the expressions are the same by the Commutative Property of Addition.

3. The absolute value of -8 is less than the absolute value of 20, and 20 is positive. So, the sum is positive.

4. The integers are additive inverses. So, the sum is zero.

5. The integers have the same sign, which is negative. So, the sum is negative.

6. true; To add integers with the same sign, add the absolute values and use the common sign.

7. false; A positive integer and its absolute value are equal, not opposites.

Practice and Problem Solving

8. $6 + 4 = 10$

The sum is 10.

9. $-4 + (-6) = -10$

The sum is -10.

Chapter 1

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

The sum is -5.

11. $-5 + 12 = 7$

The sum is 7.

12. $5 + (-7) = -2$

The sum is -2.

13. $8 + (-8) = 0$

The sum is 0.

14. $9 + (-11) = -2$

The sum is -2.

15. $-3 + 13 = 10$

The sum is 10.

16. $-4 + (-16) = -20$

The sum is -20.

17. $-3 + (-1) = -4$

The sum is -4.

18. $14 + (-5) = 9$

The sum is 9.

19. $0 + (-11) = -11$

The sum is -11.

20. $-10 + (-15) = -25$

The sum is -25.

21. $-13 + 9 = -4$

The sum is -4.

22. $18 + (-18) = 0$

The sum is 0.

23. $-25 + (-9) = -34$

The sum is -34.

24. The absolute value of 9 is greater than the absolute value of -6, so the sum is positive.

$9 + (-6) = 3$

25. The integers are both negative, not additive inverses. So, the sum is negative.

$-10 + (-10) = -20$

26. $T = -3 + 21 = 18$

Because $T = 18$, the temperature is 18°F.

27. $B = -12 + 60 = 48$

Because $B = 48$, the account balance is \$48.

28. Because 6 and -6 are additive inverses, use the Associative Property of Addition to rewrite the sum as $9 + [6 + (-6)]$.

The sum is 9.

29. Because 13 and -13 are additive inverses, use the Associative Property of Addition to rewrite the sum as $-8 + [13 + (-13)]$.

The sum is -8.

30. *Sample answer:* Because 9 and -9 are additive inverses, use the Commutative Property of Addition to rewrite the sum as $9 + (-9) + (-17)$.

The sum is -17.

31. *Sample answer:* Because 7 and -7 are additive inverses, use the Commutative Property of Addition to rewrite the sum as $7 + (-7) + (-12)$.

The sum is -12.

32. *Sample answer:* Because -12 and -15 are both negative, use the Commutative Property of Addition to rewrite the sum as $-12 + (-15) + 25$.

The sum is -2.

33. *Sample answer:* Because 6 and 14 are both positive, use the Commutative Property of Addition to rewrite the sum as $6 + 14 + (-9)$.

The sum is 11.

34. $13 + (-21) + 16 = -8 + 16 = 8$

The sum is 8.

35. $22 + (-14) + (-35) = 8 + (-35) = -27$

The sum is -27.

36. $-13 + 27 + (-18) = 14 + (-18) = -4$

The sum is -4.

37. $-19 + 26 + 14 = 7 + 14 = 21$

The sum is 21.

38. $-32 + (-17) + 42 = -49 + 42 = -7$

The sum is -7.

Chapter 1

39. $-41 + (-15) + (-29) = -56 + (-29) = -85$

The sum is -85.

40. Charge of atom

$= \text{Charge of protons} + \text{Charge of electrons}$

$= (+1) + (+1) + (+1) + (-1) + (-1) + (-1)$

$= (+3) + (-3)$

$= 0$

The protons and the electrons are oppositely charged. So, the lithium atom has a charge of 0.

41. *Sample answer:* The integers -30 and 5 have different signs and their sum is -25. The integers -10 and -15 have the same sign and their sum is -25.

42. $a + b = 4 + (-5) = -1$

The sum is -1.

43. $-b + c = -(-5) + (-8) = 5 + (-8) = -3$

The sum is -3.

44. $|a + b + c| = |4 + (-5) + (-8)|$

$= |-1 + (-8)|$

$= |-9|$

$= 9$

The sum is 9.

45. Because $-10 + 12 = 2$, $d = -10$.

46. Because $2 + (-2) = 0$, $b = 2$.

47. Because $-8 + (-7) = -15$, $m = -7$.

48. a. After point C, the dolphin's height changes by $+15$ and -13. Because $15 + (-13) = 2$, point E is 2 feet higher than point C. So, point C is deeper than point E.

b. After point B, the dolphin's height changes by -18 and $+15$. Because $-18 + 15 = -3$, point D is 3 feet lower than point B. So, point B is higher than point D.

49.

-1	4	-3
-2	0	2
3	-4	1

Fair Game Review

50. $69 - 38 = 31$

51. $82 - 74 = 8$

52. $177 - 63 = 114$

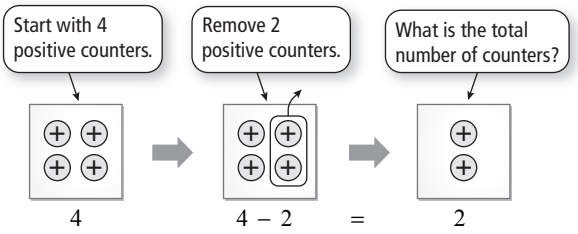
53. $451 - 268 = 183$

54. D; The difference of the maximum and minimum is $30 - 8 = 22$.

Section 1.3

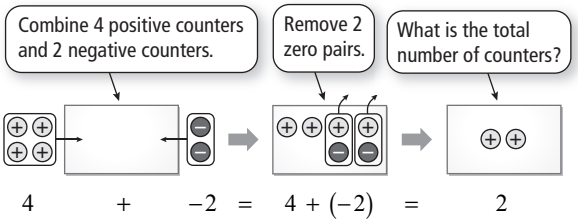
1.3 Activity (pp. 14–15)

1.



So, $4 - 2 = 2$.

2.



So, $4 + (-2) = 2$.

3. -4; So, $-3 - 1 = -4$.

4. The expression is $-3 + (-1)$. You end at -4.

So, $-3 + (-1) = -4$.

	Exercise	Operation: Add or Subtract	Answer
5.	$4 - 2$	Subtract 2	2
6.	$4 + (-2)$	Add -2	2
7.	$-3 - 1$	Subtract 1	-4
8.	$-3 + (-1)$	Add -1	-4
9.	$3 - 8$	Subtract 8	-5
10.	$3 + (-8)$	Add -8	-5
11.	$9 - 13$	Subtract 13	-4
12.	$9 + (-13)$	Add -13	-4
13.	$-6 - (-3)$	Subtract -3	-3
14.	$-6 + 3$	Add 3	-3
15.	$-5 - (-12)$	Subtract -12	7
16.	$-5 + 12$	Add 12	7

Chapter 1

17. When two integers are subtracted, the difference is the same as adding the first integer and the opposite of the second integer.

18. To subtract an integer, add its opposite.

19. -9; Additive Inverse Property; *Sample answer*: $-4 + 4 = 0$, so you know your answer is the remaining number, -9.

1.3 On Your Own (pp. 16–17)

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

The difference is 5.

2. $9 - 17 = 9 + (-17) = -8$

The difference is -8.

3. $-3 - 3 = -3 + (-3) = -6$

The difference is -6.

4. $-14 - 9 = -14 + (-9) = -23$

The difference is -23.

5. $9 - (-8) = 9 + 8 = 17$

The difference is 17.

6. $-12 - (-12) = -12 + 12 = 0$

The difference is 0.

7. $\begin{aligned} -9 - 16 - 8 &= -9 + (-16) - 8 \\ &= -25 - 8 \\ &= -25 + (-8) \\ &= -33 \end{aligned}$

So, $-9 - 16 - 8 = -33$.

8. $\begin{aligned} -4 - 20 - 9 &= -4 + (-20) - 9 \\ &= -24 - 9 \\ &= -24 + (-9) \\ &= -33 \end{aligned}$

So, $-4 - 20 - 9 = -33$.

9. $\begin{aligned} 0 - 9 - (-5) &= 0 + (-9) - (-5) \\ &= -9 - (-5) \\ &= -9 + 5 \\ &= -4 \end{aligned}$

So, $0 - 9 - (-5) = -4$.

10. $\begin{aligned} -8 - (-6) - 0 &= -8 + 6 - 0 \\ &= -2 - 0 \\ &= -2 \end{aligned}$

So, $-8 - (-6) - 0 = -2$.

11. $\begin{aligned} 15 - (-20) - 20 &= 15 + 20 - 20 \\ &= 35 - 20 \\ &= 35 + (-20) \\ &= 15 \end{aligned}$

So, $15 - (-20) - 20 = 15$.

12. $\begin{aligned} -14 - 9 - 36 &= -14 + (-9) - 36 \\ &= -23 - 36 \\ &= -23 + (-36) \\ &= -59 \end{aligned}$

So, $-14 - 9 - 36 = -59$.

13. $\text{range} = 5700 - (-10) = 5700 + 10 = 5710$

The range of elevations is 5710 meters.

1.3 Exercises (pp. 18–19)

Vocabulary and Concept Check

1. To subtract integers, find the sum of the first integer and the opposite of the second integer.

2. *Sample answer:* The integers -12 and 12 are opposites.

3. Find the difference of 3 and -2.

$3 - (-2) = 3 + 2 = 5$

What is 3 less than -2?

$-2 - 3 = -2 + (-3) = -5$

How much less is -2 than 3?

$3 - (-2) = 3 + 2 = 5$

Subtract -2 from 3.

$3 - (-2) = 3 + 2 = 5$

The statement "What is 3 less than -2?" is different because the expression is equal to -5 and the other expressions are equal to 5.

4. D; $9 - (-5) = 9 + 5$

5. C; $-9 - 5 = -9 + (-5)$

6. A; $-9 - (-5) = -9 + 5$

7. B; $9 - 5 = 9 + (-5)$

Chapter 1

Practice and Problem Solving

8. $4 - 7 = 4 + (-7) = -3$

The difference is -3.

9. $8 - (-5) = 8 + 5 = 13$

The difference is 13.

10. $-6 - (-7) = -6 + 7 = 1$

The difference is 1.

11. $-2 - 3 = -2 + (-3) = -5$

The difference is -5.

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

The difference is -3.

13. $-4 - 6 = -4 + (-6) = -10$

The difference is -10.

14. $-8 - (-3) = -8 + 3 = -5$

The difference is -5.

15. $10 - 7 = 10 + (-7) = 3$

The difference is 3.

16. $-8 - 13 = -8 + (-13) = -21$

The difference is -21.

17. $15 - (-2) = 15 + 2 = 17$

The difference is 17.

18. $-9 - (-13) = -9 + 13 = 4$

The difference is 4.

19. $-7 - (-8) = -7 + 8 = 1$

The difference is 1.

20. $-6 - (-6) = -6 + 6 = 0$

The difference is 0.

21. $-10 - 12 = -10 + (-12) = -22$

The difference is -22.

22. $32 - (-6) = 32 + 6 = 38$

The difference is 38.

23. $0 - 20 = 0 + (-20) = -20$

The difference is -20.

24. To subtract 7 and -12, add the opposite of -12 to 7.

$7 - (-12) = 7 + 12 = 19$

25. A depth of 9 feet deeper than -3 feet can be represented by the expression $-3 - 9$.

26. The vertical distance can be represented by the difference of the highest height and the lowest height of the shark, which is $15 - (-80)$.

27. $-2 - 7 + 15 = -2 + (-7) + 15 = -9 + 15 = 6$

So, $-2 - 7 + 15 = 6$.

28. $-9 + 6 - (-2) = -3 - (-2) = -3 + 2 = -1$

So, $-9 + 6 - (-2) = -1$.

29. $12 - (-5) - 8 = 12 + 5 - 8$
$= 17 - 8$
$= 17 + (-8)$
$= 9$

So, $12 - (-5) - 8 = 9$.

30. $-87 - 5 - 13 = -87 + (-5) - 13$
$= -92 - 13$
$= -92 + (-13)$
$= -105$

So, $-87 - 5 - 13 = -105$.

31. $-6 - (-8) + 6 = -6 + 8 + 6 = 2 + 6 = 8$

So, $-6 - (-8) + 6 = 8$.

32. $-15 - 7 - (-11) = -15 + (-7) - (-11)$
$= -22 - (-11)$
$= -22 + 11$
$= -11$

So, $-15 - 7 - (-11) = -11$.

33. Because $14 - 5 = 9$, $m = 14$.

34. Because $4 - (-3) = 4 + 3 = 7$, $w = 4$.

35. Because $6 - 15 = 6 + (-15) = -9$, $c = 15$.

36. $4 - n = 4 - 9 = 4 + (-9) = -5$

37. $m - (-8) = -6 - (-8) = -6 + 8 = 2$

Chapter 1

38. $-5 + k - n = -5 + (-3) - 9$
$= -8 - 9$
$= -8 + (-9)$
$= -17$

39. $|m - k| = |-6 - (-3)| = |-6 + 3| = |-3| = 3$

40. The difference in the elevations is $-4 - 11 = -15$ meters.

41. *Sample answer:*
If $x = -2$ and $y = -1$, then $x - y = -1$.
If $x = -3$ and $y = -2$, then $x - y = -1$.

42. a. January: $56 - (-35) = 56 + 35 = 91°F$

February: $57 - (-38) = 57 + 38 = 95°F$

March: $56 - (-24) = 56 + 24 = 80°F$

April: $72 - (-15) = 72 + 15 = 87°F$

May: $82 - 1 = 82 + (-1) = 81°F$

June: $92 - 29 = 92 + (-29) = 63°F$

July: $84 - 34 = 84 + (-34) = 50°F$

August: $85 - 31 = 85 + (-31) = 54°F$

September: $73 - 19 = 73 + (-19) = 54°F$

October: $64 - (-6) = 64 + 6 = 70°F$

November: $62 - (-21) = 62 + 21 = 83°F$

December: $53 - (-36) = 53 + 36 = 89°F$

b. The all-time high temperature was $92°F$ in June and the all-time low temperature was $-38°F$ in February.

c. The range of the temperatures is $92 - (-38) = 92 + 38 = 130°F$.

43. sometimes; If a and b are positive integers, where a is greater than b, then the difference of a and b is positive. However, the difference between b and a is negative. So, the difference of two positive integers is sometimes positive.

44. sometimes; If a and b are negative integers, where a is greater than b, then the difference of a and b is positive. However the difference of b and a is negative. So, the difference of two negative integers is sometimes positive.

45. always; If a is a positive integer and b is a negative integer, then the difference of a and b is the sum of a and $-b$. Because $-b$ is a positive integer, the difference of a and b is the sum of two positive integers, which is always positive. So, the difference of a positive integer and a negative integer is always positive.

46. never; If a is a negative integer and b is a positive integer, then the difference of a and b is the same as the sum of a and $-b$. Because $-b$ is a negative integer, the difference of a and b is the sum of two negative integers, which is always negative. So, the difference of a negative integer and a positive integer is never positive.

47. The expressions $a - b$ and $b - a$ are opposites and the absolute values of opposites are equal. So, the statement is true for all values of a and b.

48. The statement is true when $a = 0$, when $b = 0$, or when a and b have the same sign.

49. The statement is true when $b = 0$, or when a and b have the same sign and $|a| \geq |b|$.

Fair Game Review

50. $-5 + (-5) + (-5) + (-5) = -10 + (-5) + (-5)$
$= -15 + (-5)$
$= -20$

The sum is -20.

51. $-9 + (-9) + (-9) + (-9) + (-9)$
$= -18 + (-9) + (-9) + (-9)$
$= -27 + (-9) + (-9)$
$= -36 + (-9)$
$= -45$

The sum is -45.

52. $8 \times 5 = 40$

53.
$$\begin{array}{r} 78 \\ \times\ 6 \\ \hline 468 \end{array}$$
$6 \times 78 = 468$

54.
$$\begin{array}{r} 36 \\ \times\ 41 \\ \hline 36 \\ +\ 1440 \\ \hline 1476 \end{array}$$
$36 \times 41 = 1476$

55.
$$\begin{array}{r} 82 \\ \times\ 29 \\ \hline 738 \\ +\ 1640 \\ \hline 2378 \end{array}$$
$82 \times 29 = 2378$

56. C; When $n = 3$, $4(3) + 3 = 12 + 3 = 15$. Because 15 is a composite number, the value of n is 3.

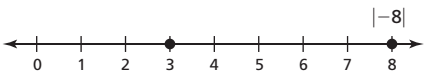
Chapter 1

Study Help

Available at *BigIdeasMath.com*.

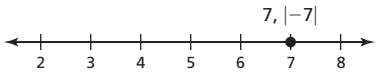
Quiz 1.1–1.3

1.



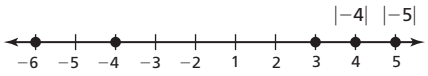
Because $|-8|$ is to the right of 3, $|-8| > 3$.

2.



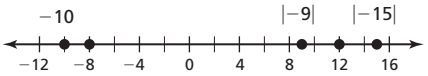
Because 7 and $|-7|$ both equal 7, $7 = |-7|$.

3.



From least to greatest, the values are $-6, -4, 3, |-4|$, and $|-5|$.

4.



From least to greatest, the values are $-10, -8, |-9|, 12$, and $|-15|$.

5. $-3 + (-8) = -11$

6. $-4 + 16 = 12$

7. $3 - 9 = 3 + (-9) = -6$

8. $-5 - (-5) = -5 + 5 = 0$

9.
$$\begin{aligned} 4 - a - c &= 4 - (-2) - 5 \\ &= 4 + 2 - 5 \\ &= 6 - 5 \\ &= 6 + (-5) \\ &= 1 \end{aligned}$$

10. $|b - c| = |(-8) - 5| = |-8 + (-5)| = |-13| = 13$

11. a. The depths of the climbers are -10 feet and -7 feet, respectively.

b. Because -10 is to the left of -7 on a number line, -7 is the greater integer.

c. Because $|-10|$ is to the right of $|-7|$ on a number line, -10 has the greater absolute value.

12. Find the sum of the integers.
$$\begin{aligned} &650 + 530 + 52 + (-28) + (-75) \\ &= 1180 + 52 + (-28) + (-75) \\ &= 1232 + (-28) + (-75) \\ &= 1204 + (-75) \\ &= 1129 \end{aligned}$$
Because the sum of the income and expenses is \$1129, which is greater than \$1100, the school reached its goal.

13. The range of the temperatures is
$90 - (-40) = 90 + 40 = 130°\text{F}$.

Section 1.4

1.4 Activity (pp. 22–23)

1.
$$\begin{aligned} 3 \bullet 2 &= 2 + 2 + 2 \\ &= 6. \end{aligned}$$
So, $3 \bullet 2 = 6$.

2.
$$\begin{aligned} 3 \bullet (-2) &= (-2) + (-2) + (-2) \\ &= -6. \end{aligned}$$
So, $3 \bullet (-2) = -6$.

3. *Sample answer*: Subtract 2 from the previous answer to get the next.

$-1 \bullet 2 = -2$
$-2 \bullet 2 = -4$
$-3 \bullet 2 = -6$

So, $-3 \bullet 2 = -6$.

4. *Sample answer*: Add 3 to the previous answer to get the next.

$-3 \bullet 0 = 0$
$-3 \bullet -1 = 3$
$-3 \bullet -2 = 6$

So, $-3 \bullet (-2) = 6$.

Chapter 1

	Exercise	Type of Product	Product	Product: Positive or Negative
5.	$3 \bullet 2$	Integers with the same sign	6	positive
6.	$3 \bullet (-2)$	Integers with different signs	-6	negative
7.	$-3 \bullet 2$	Integers with different signs	-6	negative
8.	$-3 \bullet (-2)$	Integers with the same sign	6	positive
9.	$6 \bullet 3$	Integers with the same sign	18	positive
10.	$2 \bullet (-5)$	Integers with different signs	-10	negative
11.	$-6 \bullet 5$	Integers with different signs	-30	negative
12.	$-5 \bullet (-3)$	Integers with the same sign	15	positive

13. *Sample answer:* The product of -3 and 0 is 0.

14. The product is positive when the integers are both positive or both negative. The product is negative when one integer is positive and one integer is negative. The product is zero when one or both integers are zero.

15. a. To multiply two integers with the same sign, multiply the absolute values of the integers. The sign is positive.

b. To multiply two integers with different signs, multiply the absolute values of the integers. The sign is negative.

1.4 On Your Own (pp. 24–25)

1. $5 \bullet 5 = 25$

The product is 25.

2. $4(11) = 44$

The product is 44.

3. $-1(-9) = 9$

The product is 9.

4. $-7 \bullet (-8) = 56$

The product is 56.

5. $12 \bullet (-2) = -24$

The product is -24.

6. $4(-6) = -24$

The product is -24.

7. $-10(-6)(0) = 60(0) = 0$

The product is 0.

8. $-7 \bullet (-5) \bullet (-4) = 35 \bullet (-4) = -140$

The product is -140.

9. $(-3)^2 = (-3)(-3) = 9$

10. $(-2)^3 = (-2)(-2)(-2) = 4(-2) = -8$

11. $-7^2 = -(7 \bullet 7) = -49$

12. $-6^3 = -(6 \bullet 6 \bullet 6) = -(36 \bullet 6) = -216$

13. Total change = Change per year $\bullet$ Number of years

$= -15 \bullet 3$

$= -45$

The total change in the number of manatees is -45.

1.4 Exercises (pp. 26–27)

Vocabulary and Concept Check

1. a. When the product is positive, the signs are the same.

b. When the product is negative, the signs are different.

2. *Sample answer:* 4 and -2; $4(-2) = -8$

3. Because the signs are different, the product is negative.

4. Because the signs are the same, the product is positive.

5. Because the signs are different, the product is negative.

6. true; The product of the first two positive integers is positive. Therefore, the product of the first two integers and the third integer is the product of two positive integers, which is positive.

7. false; The product of the first two negative integers is positive. Therefore, the product of the first two integers and the third integer is the product of a positive and a negative integer, which is negative.

Practice and Problem Solving

8. $6 \bullet 4 = 24$

The product is 24.

9. $7(-3) = -21$

The product is -21.

Chapter 1

10. $-2(8) = -16$

The product is -16.

11. $-3(-4) = 12$

The product is 12.

12. $-6 \bullet 7 = -42$

The product is -42.

13. $3 \bullet 9 = 27$

The product is 27.

14. $8 \bullet (-5) = -40$

The product is -40.

15. $-1 \bullet (-12) = 12$

The product is 12.

16. $-5(10) = -50$

The product is -50.

17. $-13(0) = 0$

The product is 0.

18. $-9 \bullet 9 = -81$

The product is -81.

19. $15(-2) = -30$

The product is -30.

20. $-10 \bullet 11 = -110$

The product is -110.

21. $-6 \bullet (-13) = 78$

The product is 78.

22. $7(-14) = -98$

The product is -98.

23. $-11 \bullet (-11) = 121$

The product is 121.

24. Change = Calories per minute • Number of minutes

$= -10 \bullet 20$

$= -200$

The change in the number of calories is -200.

25. Change = Change per year • Number of years

$= -60{,}000 \bullet 4$

$= -240{,}000$

The change in the number of acres of wetlands is $-240{,}000$.

26. $3 \bullet (-8) \bullet (-2) = -24 \bullet (-2) = 48$

27. $6(-9)(-1) = -54(-1) = 54$

28. $-3(-5)(-4) = 15(-4) = -60$

29. $(-5)(-7)(-20) = 35(-20) = -700$

30. $-6 \bullet 3 \bullet (-2) = -18 \bullet (-2) = 36$

31. $3 \bullet (-12) \bullet 0 = -36 \bullet 0 = 0$

32. $(-4)^2 = (-4)(-4) = 16$

33. $(-1)^3 = (-1)(-1)(-1) = 1(-1) = -1$

34. $-8^2 = -(8 \bullet 8) = -64$

35. $-6^2 = -(6 \bullet 6) = -36$

36. $-5^2 \bullet 4 = -(5 \bullet 5) \bullet 4 = -25 \bullet 4 = -100$

37. $-2 \bullet (-3)^3 = -2\left[(-3) \bullet (-3) \bullet (-3)\right]$

$= -2\left[9(-3)\right]$

$= -2(-27)$

$= 54$

38. The product of two negative integers is positive.

$-2(-7) = 14$

39. The integer 10 is squared, not -10.

$-10^2 = -(10 \bullet 10) = -100$

40. $ab = (-2)(3) = -6$

41. $\left|a^2c\right| = \left|(-2)^2(-8)\right| = \left|(-2)(-2)(-8)\right|$

$= \left|4(-8)\right|$

$= \left|-32\right|$

$= 32$

Chapter 1

42. $-ab^3 - ac = -(-2)(3)^3 - (-2)(-8)$
$= 2(3 \bullet 3 \bullet 3) - 16$
$= 2(9 \bullet 3) - 16$
$= 2(27) - 16$
$= 54 - 16$
$= 38$

43. $-12, \quad 60, \quad -300, \quad 1500, \ldots$
$\times(-5) \quad \times(-5) \quad \times(-5)$

To find the next two numbers in the pattern, multiply by -5. So, the next two numbers are $1500(-5) = -7500$ and $-7500(-5) = 37{,}500$.

44. $7, \quad -28, \quad 112, \quad -448, \ldots$
$\times(-4) \quad \times(-4) \quad \times(-4)$

To find the next two numbers in the pattern, multiply by -4. So, the next two numbers are $-448(-4) = 1792$ and $1792(-4) = -7168$.

45. Change = Change in points per day • Number of days
$= -4 \bullet 3$
$= -12$

The change in points is -12.

46. a.

Time (minutes)	5	10	15	20
Height (feet)	19,600	17,200	14,800	12,400

When $t = 5$: $h = 22{,}000 + (-480t)$
$= 22{,}000 + (-480 \bullet 5)$
$= 22{,}000 + (-2400)$
$= 19{,}600$

When $t = 10$: $h = 22{,}000 + (-480t)$
$= 22{,}000 + (-480 \bullet 10)$
$= 22{,}000 + (-4800)$
$= 17{,}200$

When $t = 15$: $h = 22{,}000 + (-480t)$
$= 22{,}000 + (-480 \bullet 15)$
$= 22{,}000 + (-7200)$
$= 14{,}800$

When $t = 20$: $h = 22{,}000 + (-480t)$
$= 22{,}000 + (-480 \bullet 20)$
$= 22{,}000 + (-9600)$
$= 12{,}400$

b. Use guess, check, and revise to solve.

When $t = 45$: $h = 22{,}000 + (-480t)$
$= 22{,}000 + (-480 \bullet 45)$
$= 22{,}000 + (-21{,}600)$
$= 400$

When $t = 46$: $h = 22{,}000 + (-480t)$
$= 22{,}000 + (-480 \bullet 46)$
$= 22{,}000 + (-22{,}080)$
$= -80$

Because -80 has a smaller absolute value than 400, it will take the plane about 46 minutes to land.

47. a.

Month	Price of Skates
June	$165 = \$165$
July	$165 + (-12) = \$153$
August	$165 + 2(-12) = \$141$
September	$165 + 3(-12) = \$129$

b. Because each month is adding multiples of -12, the price decreases by \$12 each month.

c. Amount saved by August:

$35 + 55 + 45 = 90 + 45 = 135$

In August, you have saved \$135 and the skates cost \$141, so you do not have enough money.

Amount saved by September:

$35 + 55 + 45 + 18 = 90 + 45 + 18$
$= 135 + 18$
$= 153$

In September, you have saved \$153 and the skates cost \$129, so you do have enough money to buy the skates.

48. To yield the least sum and have a positive product, a and b are both negative. The negative factors of 24 are -1 and -24, -2 and -12, -3 and -8, and -4 and -6. The sums of the factors are -25, -14, -11, and -10, respectively. The least sum is -25.

Fair Game Review

49. $27 \div 9 = 3$

50. $48 \div 6 = 8$

51.
$$\begin{array}{r} 14 \\ 4\overline{)56} \\ -\,4 \\ \hline 16 \\ -\,16 \\ \hline 0 \end{array}$$

$56 \div 4 = 14$

52.
$$\begin{array}{r} 17 \\ 9\overline{)153} \\ -\,9 \\ \hline 63 \\ -\,63 \\ \hline 0 \end{array}$$

$153 \div 9 = 17$

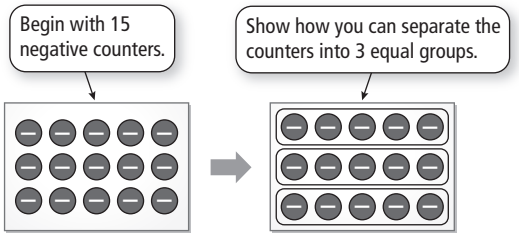
Chapter 1

53. D; Because 84 can be factored into $2 \bullet 2 \bullet 3 \bullet 7$, the prime factorization is $2^2 \times 3 \times 7$.

Section 1.5

1.5 Activity (pp. 28–29)

1.



Because there are 5 negative counters in each group, $-15 \div 3 = -5$.

2. ***First Way***

12 is equal to 3 groups of 4.

So, $12 \div 3 = 4$.

Second Way

12 is equal to 4 groups of 3.

So, $12 \div 4 = 3$.

3. ***First Way***

$12 \div (-3) = -4$.

Second Way

So, $12 \div (-4) = -3$.

In each case, when you divide a positive integer by a negative integer, you get a negative integer.

4. ***First Way***

$-12 \div (3) = -4$.

Second Way

So, $-12 \div (-4) = 3$.

When you divide a negative integer by a positive integer, you get a negative integer. When you divide a negative integer by a negative integer, you get a positive integer.

	Exercise	Type of Quotient	Quotient	Quotient: Positive, Negative, or Zero
5.	$-15 \div 3$	Integers with different signs	-5	negative
6.	$12 \div 4$	Integers with the same sign	3	positive
7.	$12 \div (-3)$	Integers with different signs	-4	negative
8.	$-12 \div (-4)$	Integers with the same sign	3	positive
9.	$-6 \div 2$	Integers with different signs	-3	negative
10.	$-21 \div (-7)$	Integers with the same sign	3	positive
11.	$10 \div (-2)$	Integers with different signs	-5	negative
12.	$12 \div (-6)$	Integers with different signs	-2	negative
13.	$0 \div (-15)$	First integer is zero	0	zero
14.	$0 \div 4$	First integer is zero	0	zero

15. The quotient is positive when the integers have the same sign. The quotient is negative when one integer is positive and one integer is negative. The quotient is zero when the first integer is zero.

16. a. To divide two integers with the same sign, divide the absolute values of the integers. The sign is positive.

b. To divide two integers with different signs, divide the absolute values of the integers. The sign is negative.

1.5 On Your Own (pp. 30–31)

1. $14 \div 2 = 7$

The quotient is 7.

2. $-32 \div (-4) = 8$

The quotient is 8.

3. $-40 \div (-8) = 5$

The quotient is 5.

4. $0 \div (-6) = 0$

The quotient is 0.

Chapter 1

5. $\frac{-49}{7} = -7$

The quotient is -7.

6. $\frac{21}{-3} = -7$

The quotient is -7.

7. $a \div b = -18 \div (-6) = 3$

8. $\frac{a + 6}{3} = \frac{-18 + 6}{3} = \frac{-12}{3} = -4$

9. $\frac{b^2}{a} + 4 = \frac{(-6)^2}{-18} + 4$

$= \frac{(-6)(-6)}{-18} + 4$

$= \frac{36}{-18} + 4$

$= -2 + 4$

$= 2$

10. Mean hourly change $= \frac{\text{Change in height}}{\text{Time}} = \frac{-36}{6} = -6$

The mean change in the height of the tide is -6 feet per hour.

1.5 Exercises (pp. 32–33)

Vocabulary and Concept Check

1. When the quotient is positive, the integers have the same sign. When the quotient is negative, the integers have different signs. When the quotient is zero, the first integer is zero.

2. The divisor is zero.

3. *Sample answer:* The quotient of -4 and 2 is negative.

4. $\frac{10}{-5} = -2$

$\frac{-10}{5} = -2$

$\frac{-10}{-5} = 2$

$-\left(\frac{10}{5}\right) = -2$

Because the expression $\frac{-10}{-5}$ is equal to 2 and the other expressions are equal to -2, the expression $\frac{-10}{-5}$ does not belong.

5. Because the integers have different signs, the quotient is negative.

6. Because the integers have the same sign, the quotient is positive.

7. Because the integers have different signs, the quotient is negative.

Practice and Problem Solving

8. $4 \div (-2) = -2$

The quotient is -2.

9. $21 \div (-7) = -3$

The quotient is -3.

10. $-20 \div 4 = -5$

The quotient is -5.

11. $-18 \div (-3) = 6$

The quotient is 6.

12. $\frac{-14}{7} = -2$

The quotient is -2.

13. $\frac{0}{6} = 0$

The quotient is 0.

14. $\frac{-15}{-5} = 3$

The quotient is 3.

15. $\frac{54}{-9} = -6$

The quotient is -6.

16. $-33 \div 11 = -3$

The quotient is -3.

17. $-49 \div (-7) = 7$

The quotient is 7.

18. $0 \div (-2) = 0$

The quotient is 0.

19. $60 \div (-6) = -10$

The quotient is -10.

20. $\frac{-56}{14} = -4$

The quotient is -4.

Chapter 1

21. $\frac{18}{0}$ = undefined

The quotient is undefined.

22. $\frac{65}{-5} = -13$

The quotient is -13.

23. $\frac{-84}{-7} = 12$

The quotient is 12.

24. The quotient of two negative integers is positive.

$\frac{-63}{-9} = 7$

25. The quotient of zero and an integer is zero.

$0 \div (-5) = 0$

26. Mean yearly change $= \frac{\text{Change in alligators}}{\text{Time}}$

$= \frac{-60}{5}$

$= -12$

The mean yearly change in the population is -12 alligators.

27. Mean number of pages $= \frac{\text{Total number of pages}}{\text{Number of days}}$

$= \frac{105}{7}$

$= 15$

The mean number of pages you read each day is 15.

28. $x \div y = 10 \div (-2) = -5$

29. $\frac{10y^2}{z} = \frac{10(-2)^2}{(-5)}$

$= \frac{10 \bullet (-2)(-2)}{-5}$

$= \frac{10(4)}{-5}$

$= \frac{40}{-5}$

$= -8$

30. $\left|\frac{xz}{-y}\right| = \left|\frac{10(-5)}{-(-2)}\right| = \left|\frac{-50}{2}\right| = |-25| = 25$

31. $\frac{-x^2 + 6z}{y} = \frac{-(10)^2 + 6(-5)}{-2}$

$= \frac{-(10 \bullet 10) + 6(-5)}{-2}$

$= \frac{-100 + (-30)}{-2}$

$= \frac{-130}{-2}$

$= 65$

32. Find the sum of the integers.

$3 + (-10) + (-2) + 13 + 11 = -7 + (-2) + 13 + 11$

$= -9 + 13 + 11$

$= 4 + 11$

$= 15$

The mean of the integers is $15 \div 5 = 3$.

33. Find the sum of the integers.

$-26 + 39 + (-10) + (-16) + 12 + 31$

$= 13 + (-10) + (-16) + 12 + 31$

$= 3 + (-16) + 12 + 31$

$= -13 + 12 + 31$

$= -1 + 31$

$= 30$

The mean of the integers is $30 \div 6 = 5$.

34. $-8 - 14 \div 2 + 5 = -8 - 7 + 5$

$= -8 + (-7) + 5$

$= -15 + 5$

$= -10$

35. $24 \div (-4) + (-2) \bullet (-5) = -6 + (-2) \bullet (-5)$

$= -6 + 10$

$= 4$

36. $-128, \underset{\div(-2)}{\frown}\ 64, \underset{\div(-2)}{\frown}\ -32, \underset{\div(-2)}{\frown}\ 16, \ldots$

To find the next two numbers in the pattern, divide by -2. So, the next two numbers are $16 \div (-2) = -8$ and $-8 \div (-2) = 4$.

37. Mean change in elevation $= \frac{\text{Change in elevation}}{\text{Time}}$

$= \frac{-1200}{3}$

$= -400$

The mean change in elevation is -400 feet per minute.

Chapter 1

38. a. Find the sum of the scores.

$$\begin{aligned} -2 + (-6) + (-7) + (-3) &= -8 + (-7) + (-3) \\ &= -15 + (-3) \\ &= -18 \end{aligned}$$

The total score is -18.

b. The mean score per round is $-18 \div 4 = -4.5$.

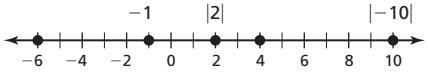
39. The roadway is $-75 \div (-15) = 5$ times deeper than the bottom of the ship.

40. To save \$500, $500 \div 25 = 20$ people need to be in the group.

41. *Sample answer:* The integers -20, -15, -10, -5, and 0 have a mean of -10. Start with -10, then pair -15 with -5 and -20 with 0. The sum of the integers must be $5(-10) = -50$.

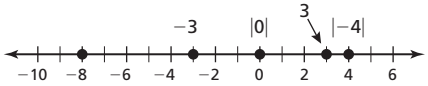
Fair Game Review

42.



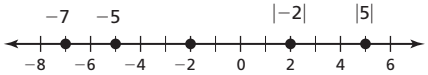
From least to greatest, the numbers are -6, -1, $|2|$, 4, and $|-10|$.

43.



From least to greatest, the numbers are -8, -3, $|0|$, 3, and $|-4|$.

44.



From least to greatest, the numbers are -7, -5, -2, $|-2|$, and $|5|$.

45. B; $4 \bullet 3 + (12 \div 2)^2 = 4 \bullet 3 + (6)^2$

$$\begin{aligned} &= 4 \bullet 3 + (6 \bullet 6) \\ &= 4 \bullet 3 + 36 \\ &= 12 + 36 \\ &= 48 \end{aligned}$$

Quiz 1.4–1.5

1. $-7(6) = -42$

The product is -42.

2. $-1(-10) = 10$

The product is 10.

3. $\dfrac{-72}{-9} = 8$

The quotient is 8.

4. $-24 \div 3 = -8$

The quotient is -8.

5. $-3 \bullet 4 \bullet (-6) = -12 \bullet (-6) = 72$

6. $(-3)^3 = -3 \bullet (-3) \bullet (-3) = 9 \bullet (-3) = -27$

7. $c^2 = (-12)^2 = (-12)(-12) = 144$

8. $bc = -6 \bullet (-12) = 72$

9. $\dfrac{ab}{c} = \dfrac{4 \bullet (-6)}{-12} = \dfrac{-24}{-12} = 2$

10. $\dfrac{|c - b|}{a} = \dfrac{|12 - (-6)|}{4} = \dfrac{|-12 + 6|}{4} = \dfrac{|-6|}{4} = \dfrac{6}{4} = \dfrac{3}{2}$

11. Total change = Change in points $\bullet$ Each 30 seconds

$$\begin{aligned} &= -3 \bullet 3 \\ &= -9 \end{aligned}$$

The change in points is -9 points.

12. Total change = Change in temperature $\bullet$ Each 5000 feet

$$\begin{aligned} &= -18 \bullet 4 \\ &= -72 \end{aligned}$$

The change in temperature is $-72°$F.

13. Mean change $= \dfrac{\text{Total points}}{\text{Total time}} = \dfrac{-165}{15} = -11$

The mean change is -11 points per minute.

14. a. Mean change $= \dfrac{\text{Dive distance}}{\text{Time}} = \dfrac{-21}{7} = -3$

The mean change in your position is -3 feet per second.

b. Position = Original position + Change per second $\bullet$ Number of seconds

$$\begin{aligned} &= -21 + (-3) \bullet 5 \\ &= -21 + (-15) \\ &= -36 \end{aligned}$$

Your position relative to the surface is -36 feet.

Chapter 1

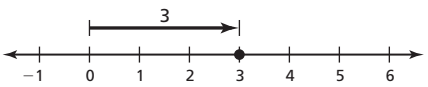
15. Mean change $= \dfrac{\text{Final weight} - \text{Original weight}}{\text{Time}}$

$$= \frac{200 - 500}{6}$$
$$= \frac{200 + (-500)}{6}$$
$$= \frac{-300}{6}$$
$$= -50$$

The mean change in weight is -50 pounds per month.

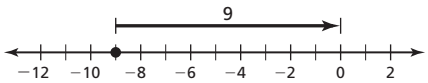
Chapter 1 Review

1.



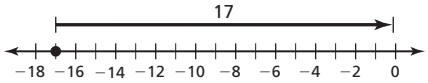
Because the distance between 3 and 0 is 3, $|3| = 3$.

2.



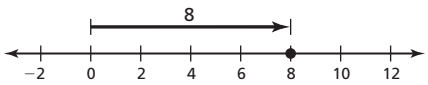
Because the distance between -9 and 0 is 9, $|-9| = 9$.

3.



Because the distance between -17 and 0 is 17, $|-17| = 17$.

4.



Because the distance between 8 and 0 is 8, $|8| = 8$.

5. Because sea level is 0 feet, you can use the absolute values.

Death Valley, CA: $|-282| = 282$

Mississippi River in Illinois: $|279| = 279$

Because 279 is less than 282, the Mississippi River in Illinois is closer to sea level.

6. $-16 + (-11) = -27$

The sum is -27.

7. $-15 + 5 = -10$

The sum is -10.

8. $100 + (-75) = 25$

The sum is 25.

9. $-32 + (-2) = -34$

The sum is -34.

10. $8 - 18 = 8 + (-18) = -10$

The difference is -10.

11. $-16 - (-5) = -16 + 5 = -11$

The difference is -11.

12. $-18 - 7 = -18 + (-7) = -25$

The difference is -25.

13. $-12 - (-27) = -12 + 27 = 15$

The difference is 15.

14. Your final score is
$-300 - 400 = -300 + (-400) = -700$ points.

15. $-8 \bullet 6 = -48$

The product is -48.

16. $10(-7) = -70$

The product is -70.

17. $-3 \bullet (-6) = 18$

The product is 18.

18. $-12(5) = -60$

The product is -60.

19. $-18 \div 9 = -2$

The quotient is -2.

20. $\dfrac{-42}{-6} = 7$

The quotient is 7.

21. $\dfrac{-30}{6} = -5$

The quotient is -5.

22. $84 \div (-7) = -12$

The quotient is -12.

23. $z \div x = -6 \div 3 = -2$

24. $\dfrac{xy}{z} = \dfrac{3(-4)}{-6} = \dfrac{-12}{-6} = 2$

25. $\dfrac{z - 2x}{y} = \dfrac{-6 - 2 \bullet 3}{-4} = \dfrac{-6 - 6}{-4} = \dfrac{-12}{-4} = 3$

Chapter 1

26. Find the sum of the integers.

$$\begin{aligned}-3 + (-8) + 12 + (-15) + 9 &= -11 + 12 + (-15) + 9\\ &= 1 + (-15) + 9\\ &= -14 + 9\\ &= -5\end{aligned}$$

The mean of the integers is $-5 \div 5 = -1$.

27. Find the sum of the integers.

$$\begin{aligned}-54 + (-32) + (-70) + (-25) + (-65) + (-42)\\ = -86 + (-70) + (-25) + (-65) + (-42)\\ = -156 + (-25) + (-65) + (-42)\\ = -181 + (-65) + (-42)\\ = -246 + (-42)\\ = -288\end{aligned}$$

The mean of the integers is $-288 \div 6 = -48$.

28. Find the sum of the integers.

$$\begin{aligned}-125 + (-86) + 54 + (-35) &= -211 + 54 + (-35)\\ &= -157 + (-35)\\ &= -192\end{aligned}$$

The mean of the integers is $-192 \div 4 = -48$, which is a mean profit of $-\$48$.

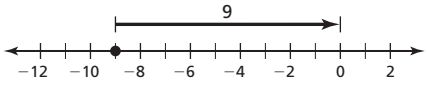
29.
$$\begin{array}{r} 6.12\overline{)30.60} \rightarrow 612\overline{)\ 3060} \\ \underline{-\ 3060} \\ 0\end{array}$$

$-30.60 \div (-6.12) = 5$

You returned 5 shirts.

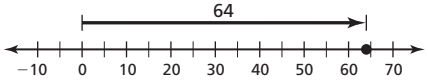
Chapter 1 Test

1.



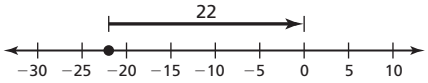
Because the distance between -9 and 0 is 9, $|-9| = 9$.

2.



Because the distance between 64 and 0 is 64, $|64| = 64$.

3.

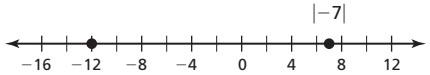


Because the distance between -22 and 0 is 22, $|-22| = 22$.

4.

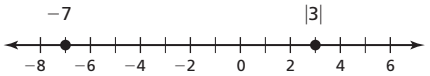
Because 4 is to the left of $|-8|$, $4 < |-8|$.

5.



Because $|-7|$ is to the right of -12, $|-7| > -12$.

6.



Because -7 is to the left of $|3|$, $-7 < |3|$.

7. $-6 + (-11) = -17$

The sum is -17.

8. $2 - (-9) = 2 + 9 = 11$

The difference is 11.

9. $-9 \bullet 2 = -18$

The product is -18.

10. $-72 \div (-3) = 24$

The quotient is 24.

11. $\dfrac{y + z}{x} = \dfrac{-3 + (-2)}{5} = \dfrac{-5}{5} = -1$

12. $\dfrac{x - 5z}{y} = \dfrac{5 - 5(-2)}{-3} = \dfrac{5 + 10}{-3} = \dfrac{15}{-3} = -5$

13. Find the sum of the integers.

$$\begin{aligned}11 + (-7) + (-14) + 10 + (-5)\\ = 4 + (-14) + 10 + (-5)\\ = -10 + 10 + (-5)\\ = 0 + (-5)\\ = -5\end{aligned}$$

The mean of the integers is $-5 \div 5 = -1$.

14. Find the sum of the integers.

$$\begin{aligned}-32 + (-41) + (-39) + (-27) + (-33) + (-44)\\ = -73 + (-39) + (-27) + (-33) + (-44)\\ = -112 + (-27) + (-33) + (-44)\\ = -139 + (-33) + (-44)\\ = -172 + (-44)\\ = -216\end{aligned}$$

The mean of the integers is $-216 \div 6 = -36$.

15. $\text{Change} = \begin{matrix}\text{Points for}\\ \text{each violation}\end{matrix} \bullet \begin{matrix}\text{Number of}\\ \text{violations}\end{matrix}$

$$\begin{aligned}&= -25 \bullet 4\\ &= -100\end{aligned}$$

The change in points is -100.

Chapter 1

16. Find the sum of the integers.

$1 + (-2) + (-1) + 0 + (-1) + 3 + (-1) + (-3) + 1 = -3$

Your total score is -3.

17. a. $\text{Mean yearly change} = \dfrac{\text{Total visitors}}{\text{Time}}$

$= \dfrac{-11{,}150{,}000}{10}$

$= -1{,}115{,}000$

The mean yearly change is $-1{,}115{,}000$ visitors.

b. Because the yearly number of visitors at the end of the 10-year period was less than the yearly number at the start of the 10-year period, the change was negative. During other years, there were more significant changes in the number of visitors in the negative direction.

Chapter 1 Standards Assessment

1. C; Overall loss or gain $= 2 - 5 - 3 + 4$

$= 2 + (-5) + (-3) + 4$

$= -3 + (-3) + 4$

$= -6 + 4$

$= -2$

The team lost 2 yards after completing 4 plays.

2. H; $6 - (-6) = 6 + 6 = 12 \neq 0$

3. C; $\left|a^2 - 2ac + 5b\right| = \left|(-2)^2 - 2(-2)(-5) + 5(3)\right|$

$= \left|(-2)(-2) + 4(-5) + 15\right|$

$= \left|4 + (-20) + 15\right|$

$= \left|-16 + 15\right|$

$= \left|-1\right|$

$= 1$

4. 25; $17 - (-8) = 17 + 8 = 25$

5. G; $(-2)^3 = (-2)(-2)(-2) = (4)(-2) = -8$

6. D; $\dfrac{x - 2y}{-z} = \dfrac{6 - 2(-4)}{-(-2)} = \dfrac{6 + 8}{2} = \dfrac{14}{2} = 7$

7. -6; $39, \underset{-15}{\overset{\frown}{\quad}}\ 24, \underset{-15}{\overset{\frown}{\quad}}\ 9, \underset{-15}{\overset{\frown}{\quad}}\ , \underset{-15}{\overset{\frown}{\quad}}\ -21$

$9 - 15 = 9 + (-15) = -6$

8. G;

$0 - red + green + green - red$

$= 0 - 6 + 7 + 7 - 6$

$= 0 + (-6) + 7 + 7 - 6$

$= -6 + 7 + 7 - 6$

$= 1 + 7 - 6$

$= 8 - 6$

$= 2$

$0 - orange - orange + green + blue$

$= 0 - (-4) - (-4) + 7 + (-5)$

$= 0 + 4 + 4 + 7 + (-5)$

$= 4 + 4 + 7 + (-5)$

$= 8 + 7 + (-5)$

$= 15 + (-5)$

$= 10$

$0 - red + blue - orange + green$

$= 0 - 6 + (-5) - (-4) + 7$

$= 0 + (-6) + (-5) + 4 + 7$

$= -6 + (-5) + 4 + 7$

$= -11 + 4 + 7$

$= -7 + 7$

$= 0$

$0 + blue - red + blue - red$

$= 0 + (-5) - 6 + (-5) - 6$

$= -5 + (-6) + (-5) + (-6)$

$= -11 + (-5) + (-6)$

$= -16 + (-6)$

$= -22$

So, the sequence of colors with the greatest score is orange, orange, green, blue.

9. B; $(-3)^3 = -3 \bullet (-3) \bullet (-3) = 9 \bullet (-3) = -27$

10. G;

$-xy = -(-2)(-3) = 2(-3) = -6$

$xy = (-2)(-3) = 6$

$x - y = -2 - (-3) = -2 + 3 = 1$

$-x - y = -(-2) - (-3) = 2 + 3 = 5$

So, xy has the greatest value when $x = -2$ and $y = -3$.

Chapter 1

11. B; $-5 \bullet (-4)^2 - (-3) = -5 \bullet (-4) \bullet (-4) + 3$

$= 20 \bullet (-4) + 3$

$= -80 + 3$

$= -77$

12. G; Associative Property of Addition

13. D; Find the sum of the integers.

$-8 + (-6) + (-2) + 0 + (-6) + (-8) + 4$

$+ (-7) + (-8) + 1$

$= -14 + (-2) + 0 + (-6) + (-8) + 4$

$+ (-7) + (-8) + 1$

$= -16 + 0 + (-6) + (-8) + 4 + (-7)$

$+ (-8) + 1$

$= -16 + (-6) + (-8) + 4 + (-7) + (-8) + 1$

$= -22 + (-8) + 4 + (-7) + (-8) + 1$

$= -30 + 4 + (-7) + (-8) + 1$

$= -26 + (-7) + (-8) + 1$

$= -33 + (-8) + 1$

$= -41 + 1$

$= -40$

So, the mean is $-40 \div 10 = -4$.

14. *Part A*: Start at 0. Then move 2 units to the left and then 3 units more to the left, which results in a position of -5.

Part B: Start at 0. Then move 2 units to the right and then 5 units to the left, which is results in a position of -3.

15. H; $\dfrac{-3 - 2^2}{-1} = \dfrac{-3 - 2 \bullet 2}{-1}$

$= \dfrac{-3 - 4}{-1}$

$= \dfrac{-3 + (-4)}{-1}$

$= \dfrac{-7}{-1}$

$= 7$