

Practice and Problem Solving

Homework Help

Example Exercises

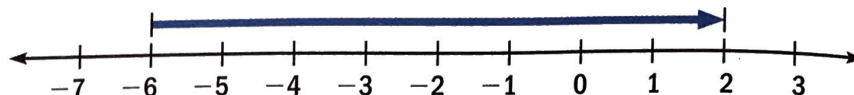
- | | |
|---|-----------|
| 1 | 14-23, 39 |
| 2 | 24-29, 40 |
| 3 | 30-32, 41 |
| 4 | 33-38 |



Online Resources
CLASSZONE.COM

- More Examples
- eTutorial Plus

14. Match the correct sum with the addition shown on the number line.



A. $-6 + 8$

B. $6 + (-8)$

C. $-6 + (-8)$

Use a number line to find the sum.

15. $1 + (-17)$

16. $-4 + 13$

17. $-7 + (-3)$

18. $13 + (-3)$

19. $-9 + (-5)$

20. $-6 + (-7)$

21. $8 + (-2)$

22. $-3 + 6$

23. $-5 + (-4)$

Find the sum.

24. $-54 + 40$

25. $-20 + (-32)$

26. $66 + (-16)$

27. $19 + (-45)$

28. $-32 + 17$

29. $-72 + (-30)$

30. $7 + (-9) + 15$

31. $-40 + 33 + 12$

32. $55 + (-28) + (-6)$

Evaluate the expression when $x = -8$, $y = 4$, and $z = -5$.

33. $x + 15$

34. $y + (-75)$

35. $-19 + z$

36. $x + y$

37. $x + z$

38. $y + z$

39. **Critical Thinking** Use a single arrow on a number line to represent the sum $-4 + (-10)$. What does the length of the arrow indicate? What does the direction of the arrow indicate?

40. **Hockey** In the National Hockey League, a player is assigned a positive point each time his team scores while he is on the ice. He is assigned a negative point each time the opposing team scores while he is on the ice. (No points are assigned if the scoring team has more players on the ice than the other team.) The sum of the positive and negative points is called the player's plus-minus rating. The table shows the points awarded to a player in two games.

- a. Find the player's plus-minus rating for game 1.

- b. Find the player's plus-minus rating for game 2.

- c. Find the total plus-minus rating for the two games.

- d. **Interpret and Apply** Did the player have a better plus-minus rating in game 1 or in game 2? Explain.

Game	Positive points	Negative points
1	3	-1
2	2	-5

41. **Overdraft** Your checking account shows an *overdraft*, or a negative balance. Your present balance is $-\$25$. You deposit $\$100$, then write a check for $\$12$. What is your new balance?



Use a calculator to find the sum. Estimate the sum by rounding to check that your answer is reasonable.

42. $-345 + (-978)$

43. $2172 + (-4087)$

44. $-1117 + 539$



Tech Help

To enter a negative number on a calculator, use $(-)$, not $-$.

Guided Practice

Vocabulary Check

- Write the phrase as a variable expression: the difference of -15 and a number x .
- Explain how you would find the difference of -45 and -60 .

Skill Check

Find the difference.

3. $3 - 8$

4. $6 - (-2)$

5. $-9 - 4$

6. $-5 - (-1)$

Evaluate the expression when $m = -6$.

7. $m - 4$

8. $m - 16$

9. $7 - m$

10. $-7 - m$

Guided Problem Solving

- The Big Dig** Boston's Central Artery Project, called "The Big Dig," is one of the most complex highway projects in American history. The project includes an underground highway and a tunnel. The lowest point of the highway is 110 feet below sea level. The lowest point of the tunnel is 90 feet below sea level. What is the difference in these two elevations?
 - Write an integer to represent the elevation of the lowest point of the highway.
 - Write an integer to represent the elevation of the lowest point of the tunnel.
 - Find the difference of the elevations in Steps 1 and 2.

Practice and Problem Solving

Homework Help

Example Exercises

1 12-23, 32

2 24-31

3 33-38



Online Resources
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- More Examples
- eTutorial Plus

Find the difference.

12. $8 - 9$

13. $1 - (-8)$

14. $-10 - 6$

15. $-5 - (-17)$

16. $0 - 15$

17. $2 - (-37)$

18. $-20 - 4$

19. $-1 - (-53)$

20. $24 - 41$

21. $-39 - 32$

22. $79 - (-98)$

23. $-86 - (-34)$

Evaluate the expression when $m = -6$.

24. $17 - m$

25. $4 - m$

26. $m - 7$

27. $-16 - m$

28. $m - 19$

29. $m - 3 - 10$

30. $20 - m - 5$

31. $14 - 30 - m$

- Error Analysis** Describe and correct the error in finding the difference of -2 and -5 .



$$\begin{aligned} -2 - (-5) &= -2 + (-5) \\ &= -7 \end{aligned}$$

- Temperatures** The most extreme temperature change in Canadian history occurred when the temperature in Pincher Creek, Alberta, rose from -19°C to 22°C in one hour. Find the change in temperature.

Example 4**Finding a Mean**

Antarctic Temperatures The table shows record low monthly temperatures from June to November at McMurdo Station in Antarctica. Find the mean of the temperatures.

Month	June	July	Aug.	Sept.	Oct.	Nov.
Temperature (°F)	-42	-59	-57	-47	-40	-19

Solution

To find the mean of the temperatures, first add the temperatures. Then divide by 6, the number of temperatures.

$$\begin{aligned}\text{Mean} &= \frac{-42 + (-59) + (-57) + (-47) + (-40) + (-19)}{6} \\ &= \frac{-264}{6} = -44\end{aligned}$$

Answer The mean of the temperatures is -44°F .

1.7**Exercises**

More Practice, p. 803

**Guided Practice****Vocabulary Check**

1. Explain what the mean of a data set is.
2. If a and b are integers and the expression ab is positive, what do you know about the signs of a and b ?

Skill Check

Tell whether the product or quotient is **positive or negative**.

3. $-238(-17)$

4. $\frac{920}{-23}$

5. $465(-147)$

6. $\frac{-256}{-32}$

7. $-1209 \div 31$

8. $-65(219)$

9. $-98 \div (-2)$

10. $-99(-716)$

Guided Problem Solving

11. **Electronics** An electronic device is tested to determine how it reacts to changes in temperature. The device is placed in a test chamber at 22°C . After each minute, the temperature in the chamber is lowered 3°C . What is the temperature in the chamber after 9 minutes?

- 1 Write an integer that represents the change in temperature in the chamber in one minute.
- 2 Write a product of integers that represents the total change in temperature in 9 minutes. Then evaluate the product.
- 3 Find the temperature in the chamber after 9 minutes.

Practice and Problem Solving

Homework Help

Example	Exercises
1	12-26, 29-34
2	27
3	12-25, 29-34
4	28



Online Resources
CLASSZONE.COM

- More Examples
- eTutorial Plus

Find the product or quotient.

12. $12(5)$

13. $28 \div 14$

14. $65 \div (-5)$

15. $6(-22)$

16. $-7(50)$

17. $-26 \div 13$

18. $-72 \div (-36)$

19. $12(-30)$

20. $\frac{175}{-25}$

21. $\frac{-51}{-3}$

22. $-17(-20)$

23. $\frac{-840}{7}$

24. **Error Analysis** Describe and correct the error in multiplying -5 and -12 , then dividing by -4 .

$\times \frac{-5(-12)}{-4} = \frac{-60}{-4} = 15$

25. **Compare and Contrast** Tell how the rules for multiplying and dividing integers are alike and how they are different.

26. **Critical Thinking** The table below gives expressions involving the multiplication of integers.

Expression	Number of integers	Product	Sign of product
$-1(-2)$?	?	?
$-1(-2)(-3)$?	?	?
$-1(-2)(-3)(-4)$?	?	?
$-1(-2)(-3)(-4)(-5)$?	?	?

- a. Copy and complete the table.

- b. **Writing** Write a rule for the sign of the product of more than two negative integers.

- c. **Number Sense** Suppose that in part (b) the product included positive integer factors as well. Would your rule change? Explain.

27. **MIR Submersible** A MIR submersible is a type of submarine. As a MIR dives, its elevation changes by -100 feet each minute.

- a. From the surface, a MIR takes about 200 minutes to reach the lowest point to which it can dive. What is its elevation at that point?

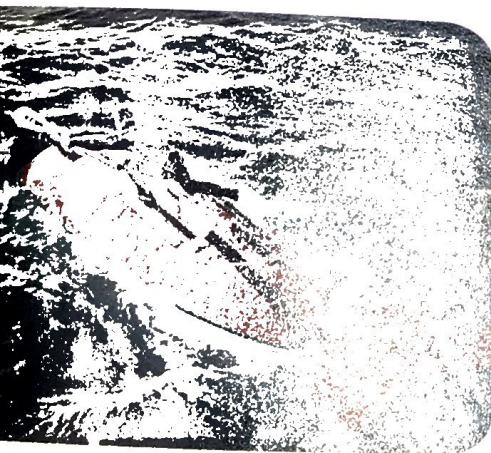
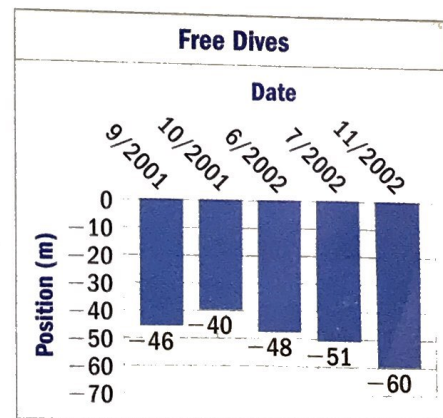
- b. How long would a MIR take to dive to 1000 feet below sea level?

28. **Free Diving** Free diving means diving without breathing equipment. The graph shows the position with respect to sea level for five record free dives.

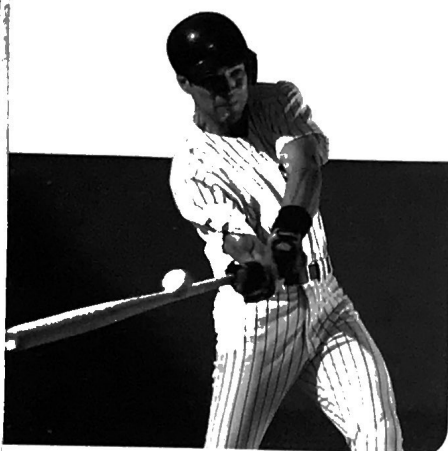
- a. Find the mean of the positions.

- b. Find the median of the positions.

- c. **Compare** Does the mean or the median represent a lower position?



MIR submersible being launched



In the Real World

Baseball A baseball hit by a player in the major leagues can leave the bat at a speed of 110 miles per hour. Suppose a batter hits a ball at that speed directly back to the pitcher's mound, about 61 feet from home plate. To the nearest tenth of a second, how long does it take the ball to reach the mound?

Simplify.

29. $-5(-10)(-25)$

31. $360 \div (-36) \div (-2)$

33. $-2(-14) \div (-7)$

30. $16(-4)(-8)$

32. $-72 \div 12 \div 3$

34. $20(-45) \div (-9)$

Number Sense Without performing the indicated divisions, copy and complete the statement using $>$, $<$, or $=$.

35. $-738 \div 82$? $-192 \div (-32)$

36. $288 \div (-36)$? $756 \div 18$

37. **Sports** A batter hits a baseball. The ball's height h (in feet) above the ground t seconds after it is hit is given by the equation $h = -16t^2 + 80t + 3$. Find the height of the ball 4 seconds after it is hit.

In Exercises 38–41, evaluate the variable expression when $x = -4$.

Example Evaluating Variable Expressions

$$\begin{aligned} -7x^2 &= -7(-4)^2 \\ &= -7(16) \\ &= -112 \end{aligned}$$

Substitute -4 for x .

Evaluate power.

Multiply.

Answer When $x = -4$, $-7x^2 = -112$.

38. $-10x^2$

39. $\frac{72}{x^2}$

40. $-6x^2$

41. $\frac{4x^2}{-10}$

42. For what value of n is $\frac{-4 + (-3) + 5 + 4 + (-3) + n}{-7} = 0$ true?

43. **Explain** You know that for any positive integer n , $1^n = 1$. Is the statement $(-1)^n = -1$ true for any positive integer n ? Explain.

44. **Challenge** Tell whether the statement is *always*, *sometimes*, or *never* true. Explain your answer.

a. If k is any integer and n is less than 0, then nk is less than n .

b. If k is any integer and n is greater than 1, then nk is greater than n .

Mixed Review

Write the integers in order from least to greatest. (Lesson 1.4)

45. $-12, -21, 31, 0, -5, 13$

46. $-45, -54, -22, -16, -70$

Find the sum or difference. (Lessons 1.5, 1.6)

47. $-27 + 51$

48. $-17 + (-12)$

49. $-18 - 33$

50. $-41 - (-9)$

Standardized Test Practice

51. **Multiple Choice** Which expression has a positive value?

A. $\frac{-16(-5)}{4(-9)}$

B. $-7^2 - 2$

C. $5 - 4(-6)$

D. $19 - 6(7)$

52. **Short Response** Find the mean of these temperatures: -12°F , 7°F , -22°F , -11°F , 20°F , -6°F . Describe the steps you used.

Chapter Review

Vocabulary Review

numerical expression, p. 5
 variable, p. 5
 variable expression, p. 5
 evaluate, p. 5
 verbal model, p. 6
 power, p. 10

base, p. 10
 exponent, p. 10
 order of operations, p. 16
 integer, p. 22
 negative integer, p. 22
 positive integer, p. 22

absolute value, p. 23
 opposite, p. 23
 additive inverse, p. 30
 coordinate plane, p. 47
 x-axis, p. 47
 y-axis, p. 47

origin, p. 47
 quadrant, p. 47
 ordered pair, p. 47
 x-coordinate, p. 47
 y-coordinate, p. 47
 scatter plot, p. 48

1. Draw a coordinate plane. Label the x-axis, the y-axis, the origin, and the quadrants.
2. Explain how these vocabulary terms are related: power, base, exponent.
3. Describe how to find the opposite of an integer.
4. What is a variable expression?

1.1 Expressions and Variables

► Goal

Evaluate variable expressions.

Example

Evaluate the expression xy when $x = 12$ and $y = 3$.

$$xy = 12(3)$$

$$= 36$$

Substitute 12 for x and 3 for y .

Multiply.

Examples on
pp. 5–6



Evaluate the expression when $p = 12$ and $q = 1.5$.

5. $35 - p$

6. $q + 2$

7. $\frac{60}{p}$

8. $16q$

9. $p + q$

10. $p - q$

11. $\frac{p}{q}$

12. pq

1.2 Powers and Exponents

► Goal

Evaluate powers.

Example

Evaluate the power $(0.4)^3$.

$$(0.4)^3 = (0.4)(0.4)(0.4)$$

$$= 0.064$$

Use 0.4 as a factor 3 times.

Multiply.

Examples on
pp. 10–11

✓ Evaluate the power.

13. 10^4

14. $(0.3)^3$

15. $(12.5)^2$

16. 3^5

17. 5^5

18. 15^2

19. $(1.2)^3$

20. $(0.8)^4$

1.3 Order of Operations

Examples on
pp. 16-18

Goal

Use the order of operations to evaluate expressions.

Example Evaluate the expression $800 - 7(2 + 3)^2$.

$$800 - 7(2 + 3)^2 = 800 - 7(5)^2$$

Add within parentheses.

$$= 800 - 7(25)$$

Evaluate power.

$$= 800 - 175$$

Multiply.

$$= 625$$

Subtract.

✓ Evaluate the expression.

21. $20 \cdot 5 + 7 \cdot 3$

22. $\frac{5 + 4}{3} - 2$

23. $28 \div (5 - 1) \cdot 3$

1.4 Comparing and Ordering Integers

Examples on
pp. 22-24

Goal

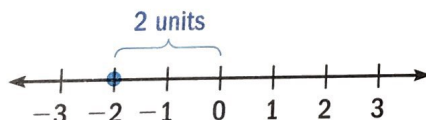
Compare and order integers.

Example Graph the integers $-2, 3, 0, 2, -3$ on a number line. Then write the integers in order from least to greatest.

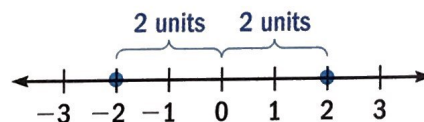


Write the integers from left to right: $-3, -2, 0, 2, 3$.

Example State the absolute value and the opposite of -2 .



The absolute value of -2 is 2.



The opposite of -2 is 2.

✓ Graph the integers on a number line. Then write the integers in order from least to greatest.

24. $4, 0, -3, 7, -6$

25. $2, -4, -3, 6, 5, -6$

26. $-8, -12, 4, -7, 1$

✓ State the absolute value and the opposite of the number.

27. 18

28. -9

29. 4

30. -100

1.5 Adding Integers

Examples on
pp. 29-31

Goal

Add Integers.

Example Find the sum.

a. $-42 + (-17)$

These integers have the same sign.

$$-42 + (-17) = -59$$

Add $|-42|$ and $|-17|$.
Both integers are negative, so the sum is negative.

b. $-51 + 63$

These integers have different signs.

$$-51 + 63 = 12$$

Subtract $|-51|$ from $|63|$.
 $|63| > |-51|$, so the sum is positive.

✓ Find the sum.

31. $12 + (-18)$

32. $-8 + (-7)$

33. $-27 + 38$

34. $-11 + (-18)$

35. $61 + (-44)$

36. $-13 + (-21)$

37. $-21 + 9$

38. $-22 + (-7)$

39. At 6:00 A.M., the temperature was -5°F . By 2:00 P.M., the temperature had risen 22°F . What was the temperature at 2:00 P.M.?

1.6 Subtracting Integers

Examples on
pp. 34-35

Goal

Subtract Integers.

Example Find the difference.

a. $7 - 15 = 7 + (-15)$
 $= -8$

To subtract 15, add its opposite, -15 .
Add 7 and -15 .

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

To subtract -11 , add its opposite, 11.
Add -9 and 11.

✓ Find the difference.

40. $0 - 8$

41. $-2 - (-2)$

42. $-46 - 29$

43. $6 - (-13)$

44. $-15 - (-17)$

45. $31 - 40$

46. $-16 - 9$

47. $20 - (-11)$

48. Find the difference of an elevation of 30 feet below sea level and an elevation of 118 feet above sea level.

1.7 Multiplying and Dividing Integers

Examples on
pp. 42-44

Goal

Multiply and divide integers.

Example

Find the product or quotient.

- a. $-4(-15) = 60$ Same sign: Product is positive.
- b. $-6(14) = -84$ Different signs: Product is negative.
- c. $-42 \div (-7) = 6$ Same sign: Quotient is positive.
- d. $20 \div (-5) = -4$ Different signs: Quotient is negative.



Find the product or quotient.

- 49. $-9(-12)$ 50. $52 \div (-4)$ 51. $-17(3)$ 52. $90 \div (-15)$
- 53. $\frac{-80}{-16}$ 54. $20(-12)$ 55. $\frac{48}{-16}$ 56. $-33(-3)$

1.8 The Coordinate Plane

Examples on
pp. 47-48

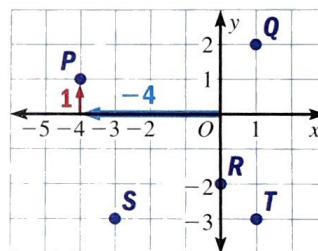
Goal

Identify and plot points in a coordinate plane.

Example

Give the coordinates of point P .

Point P is 4 units to the left of the origin and 1 unit up. The x -coordinate is -4 , and the y -coordinate is 1. The coordinates of point P are $(-4, 1)$.



Use the coordinate plane shown in the example. Give the coordinates of the point.

- 57. Q 58. R 59. S 60. T

Example

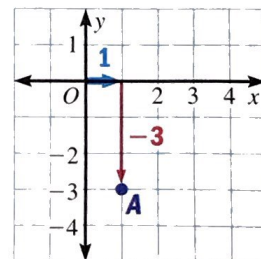
Plot the point $A(1, -3)$ in a coordinate plane. Describe the location of the point.

Begin at the origin and move 1 unit to the right, then 3 units down. Point A is in Quadrant IV.



Plot the point in a coordinate plane. Describe the location of the point.

- 61. $B(-2, 5)$ 62. $C(0, 4)$
- 63. $D(-3, -1)$ 64. $E(4, -2)$



Chapter Test

Evaluate the expression when $y = 16$ and $z = 4$.

1. $y + 9$

2. $11 - z$

3. $\frac{y}{z}$

4. yz

Write the power in words and as a repeated multiplication. Then evaluate the power.

5. 8^2

6. 2^7

7. $(0.2)^5$

8. $(0.7)^4$

9. **Sewing** You are making a beanbag footstool in the shape of a cube with an edge length of 50 centimeters. In order to fill the footstool with plastic beads, you need to know its volume. Find the volume of the footstool.

Evaluate the expression.

10. $70.2 + 4(3.5)$

11. $\frac{75 - 39}{4 \cdot 3}$

12. $90 \div 5 + 4$

13. $18 + 30 \div 6$

Evaluate the expression when $r = 4$ and $s = 6$.

14. $3.5s + r$

15. $(r + 1)^2 - s$

16. $4r + s^2$

17. $2(r^2 - 15)$

State the absolute value and the opposite of the number.

18. -78

19. 121

20. -33

21. 19

Find the sum or difference.

22. $35 + (-11)$

23. $-28 + (-40)$

24. $-38 + (-8)$

25. $43 + (-22)$

26. $5 - (-16)$

27. $-60 - 7$

28. $-19 - 35$

29. $-48 - (-72)$

Find the product or quotient.

30. $-20(32)$

31. $\frac{-76}{4}$

32. $-25(-30)$

33. $840 \div (-24)$

34. $18(-4)$

35. $700 \div (-35)$

36. $-12(-16)$

37. $\frac{-270}{-18}$

38. **Investments** The integers below represent the monthly gains and losses in the value of an investment over one year. Find the mean of the integers.

$-\$190, \$75, -\$65, \$100, \$72, -\$54, -\$62, -\$87, \$92, \$81, -\$73, \63

39. **Geometry** Plot the points listed below in the same coordinate plane. Describe any pattern you see in the graph.

$(-3, -6), (-2, -5), (-1, -4), (0, -3), (1, -2), (2, -1)$

Comparing and Ordering Decimals

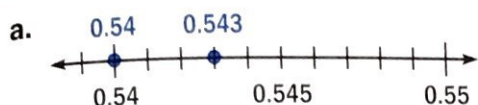
A **number line** is a line whose points are associated with numbers. You can use a number line to compare and order decimals. First graph the numbers on a number line. Then read the numbers in order as they appear from left to right. Remember that the symbol $<$ means *is less than* and the symbol $>$ means *is greater than*.

Example Copy and complete the statement using $<$, $>$, or $=$.

a. $0.543 \underline{\quad} 0.54$

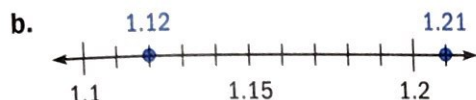
b. $1.12 \underline{\quad} 1.21$

Solution



0.543 is to the right of 0.54,
so 0.543 is greater than 0.54.

Answer $0.543 > 0.54$

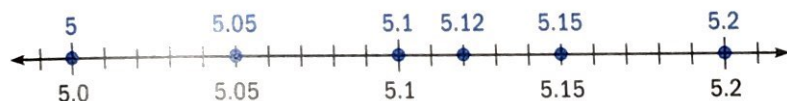


1.12 is to the left of 1.21,
so 1.12 is less than 1.21.

Answer $1.12 < 1.21$

Example Order the numbers 5.1, 5.2, 5.05, 5, 5.12, and 5.15 from least to greatest.

Graph all the numbers on the same number line.



Answer From least to greatest, the numbers are 5, 5.05, 5.1, 5.12, 5.15, and 5.2.

✓ Practice

Copy and complete the statement using $<$, $>$, or $=$.

1. $0.3 \underline{\quad} 0.28$

2. $0.57 \underline{\quad} 0.6$

3. $0.19 \underline{\quad} 0.190$

4. $4.5 \underline{\quad} 4.51$

5. $67.2 \underline{\quad} 66.9$

6. $1.03 \underline{\quad} 1.30$

Order the numbers from least to greatest.

7. 1.3, 1.29, 2.19, 1.9

8. 5.4, 4.55, 5.45, 4.44

9. 0.52, 0.55, 0.49, 0.5

10. 1.0, 0.97, 1.02, 0.99

11. 6.21, 6.19, 6.32, 6.3

12. 8.9, 9.02, 9.1, 8.69

Adding and Subtracting Decimals

Use a vertical format to add or subtract decimals. Begin by lining up the decimal points. Write zeros as placeholders if necessary. Then add or subtract as you would with whole numbers. Be sure to place the decimal point in the answer.

Example Find the sum $0.283 + 0.54$.

- 1 Line up the decimal points and write zero as a placeholder. Add the thousandths.

$$\begin{array}{r} 0.283 \\ + 0.540 \\ \hline 3 \end{array}$$

- 2 Add the hundredths. Regroup 12 hundredths as 1 tenth and 2 hundredths.

$$\begin{array}{r} 1 \\ 0.283 \\ + 0.540 \\ \hline 23 \end{array}$$

- 3 Add the tenths. Place the decimal point in the answer.

$$\begin{array}{r} 1 \\ 0.283 \\ + 0.540 \\ \hline 0.823 \end{array}$$

Answer $0.283 + 0.54 = 0.823$

Example Find the difference $20 - 2.8$.

- 1 Start with the tenths. There are no tenths in 20 from which to subtract 8 tenths.

$$\begin{array}{r} 20.0 \\ - 2.8 \\ \hline \end{array}$$

- 2 Move to the ones. There are no ones in 20, so regroup 1 ten as 9 ones and 10 tenths.

$$\begin{array}{r} 9 \\ 10 \\ 20.0 \\ - 2.8 \\ \hline \end{array}$$

- 3 Subtract. Place the decimal point in the answer.

$$\begin{array}{r} 9 \\ 10 \\ 20.0 \\ - 2.8 \\ \hline 17.2 \end{array}$$

Answer $20 - 2.8 = 17.2$

✓ **Check** Because addition and subtraction are inverse operations, you can check your answer by adding: $17.2 + 2.8 = 20$.

✓ Practice

Find the sum or difference.

- | | | | |
|---------------------|--------------------|--------------------|---------------------|
| 1. $4.1 + 2.3$ | 2. $0.37 + 0.55$ | 3. $8.7 - 4.5$ | 4. $2.6 - 0.9$ |
| 5. $1.34 + 0.9$ | 6. $6.78 + 4.99$ | 7. $41.39 - 23.17$ | 8. $67.38 - 37.46$ |
| 9. $84.34 + 67.23$ | 10. $28.4 + 3.7$ | 11. $0.67 - 0.43$ | 12. $4.956 - 1.234$ |
| 13. $3.596 + 5.618$ | 14. $8.95 + 3.476$ | 15. $3.7 - 2.95$ | 16. $8.267 - 6.52$ |

Multiplying Decimals

To multiply decimals, multiply as you would whole numbers, then place the decimal point in the product. The number of decimal places in the product is equal to the sum of the number of decimal places in the factors.

Example Find the product 4.94×0.45 .

2 decimal places
+ 2 decimal places

4 decimal places

After you place the decimal point, you can drop the zero at the end of the product.

Answer $4.94 \times 0.45 = 2.223$

You may need to write zeros as placeholders so that the answer has the correct number of decimal places.

Example Find the product 3.6×0.023 .

3.6 1 decimal place
 $\times 0.023$ + 3 decimal places

4 decimal places

Write a zero before the 8 as a placeholder so that the number has four decimal places.

Answer $3.6 \times 0.023 = 0.0828$

✓ Practice

Find the product.

- | | | | |
|------------------------|------------------------|------------------------|-------------------------|
| 1. 2.4×5.9 | 2. 1.2×2.3 | 3. 2.5×6.4 | 4. 2.53×0.8 |
| 5. 1.45×0.7 | 6. 1.4×0.35 | 7. 0.72×0.06 | 8. 0.91×0.6 |
| 9. 15.2×0.004 | 10. 13.4×0.65 | 11. 8.52×3.5 | 12. 0.05×0.03 |
| 13. 5.25×1.18 | 14. 7.2×0.053 | 15. 3.06×4.28 | 16. 4.33×0.019 |

Dividing Decimals

To divide decimals, multiply both the divisor and the dividend by a power of 10 that will make the divisor a whole number. Then line up the decimal point in the quotient with the decimal point in the dividend.

Example Find the quotient $7.848 \div 0.24$.

$$0.24 \overline{)7.848}$$

To multiply the divisor and dividend by 100, move both decimal points 2 places to the right.

$$\begin{array}{r} 32.7 \\ 24 \overline{)784.8} \\ \underline{72} \\ 64 \\ \underline{48} \\ 168 \\ \underline{168} \\ 0 \end{array}$$

Divide as you would with whole numbers. Place the decimal point in the quotient directly above the decimal point in the dividend.

Answer $7.848 \div 0.24 = 32.7$

You may need to write additional zeros in a dividend to continue dividing. The zeros do not change the value of the dividend.

Example Find the quotient $7 \div 1.4$.

$$1.4 \overline{)7.0}$$

To multiply the divisor and dividend by 10, move both decimal points 1 place to the right. Write a zero as a placeholder.

$$\begin{array}{r} 5 \\ 14 \overline{)70} \\ \underline{70} \\ 0 \end{array}$$

Divide as you would with whole numbers.

Answer $7 \div 1.4 = 5$

✓ Practice

Find the quotient.

- | | | | |
|-----------------------|-----------------------|------------------------|------------------------|
| 1. $1.2 \div 0.3$ | 2. $2.6 \div 0.2$ | 3. $1.25 \div 0.25$ | 4. $8.84 \div 3.4$ |
| 5. $51.3 \div 2.7$ | 6. $1.44 \div 3.6$ | 7. $4.41 \div 2.1$ | 8. $2.52 \div 0.7$ |
| 9. $4.95 \div 5.5$ | 10. $43.25 \div 2.5$ | 11. $70.59 \div 54.3$ | 12. $160.72 \div 32.8$ |
| 13. $87.92 \div 6.28$ | 14. $206.08 \div 2.3$ | 15. $628.2 \div 34.9$ | 16. $1.593 \div 5.9$ |
| 17. $6.7 \div 0.05$ | 18. $36.75 \div 2.45$ | 19. $289.25 \div 12.5$ | 20. $332.88 \div 36.5$ |

Mixed Numbers and Improper Fractions

Recall that a mixed number is the sum of a whole number and a fraction. An **improper fraction**, such as $\frac{21}{8}$, is any fraction in which the numerator is greater than or equal to the denominator.

Example Write $2\frac{5}{8}$ as an improper fraction.

$$2\frac{5}{8} = 2 + \frac{5}{8}$$

Definition of mixed number

$$= \frac{16}{8} + \frac{5}{8}$$

1 whole = $\frac{8}{8}$, so 2 wholes = $\frac{2 \times 8}{8}$, or $\frac{16}{8}$.

$$= \frac{21}{8}$$

Add.

Answer The mixed number $2\frac{5}{8}$ is equivalent to the improper fraction $\frac{21}{8}$.

Example Write $\frac{19}{6}$ as a mixed number.

$$\begin{array}{r} 3 \text{ R}1 \\ 6 \overline{)19} \\ \underline{18} \\ 1 \end{array}$$

Divide 19 by 6.

$$3 + \frac{1}{6} = 3\frac{1}{6}$$

Write the remainder as a fraction, $\frac{\text{remainder}}{\text{divisor}}$.

Answer The improper fraction $\frac{19}{6}$ is equivalent to the mixed number $3\frac{1}{6}$.

✓ Practice

Write the mixed number as an improper fraction.

1. $1\frac{9}{10}$

2. $1\frac{3}{5}$

3. $9\frac{1}{6}$

4. $5\frac{1}{9}$

5. $3\frac{4}{7}$

6. $4\frac{2}{5}$

7. $2\frac{3}{8}$

8. $8\frac{1}{2}$

9. $6\frac{2}{3}$

10. $4\frac{3}{11}$

11. $7\frac{3}{4}$

12. $4\frac{7}{13}$

13. $8\frac{11}{20}$

14. $12\frac{13}{15}$

15. $15\frac{7}{9}$

Write the improper fraction as a mixed number.

16. $\frac{14}{5}$

17. $\frac{11}{2}$

18. $\frac{22}{3}$

19. $\frac{29}{9}$

20. $\frac{53}{10}$

21. $\frac{37}{6}$

22. $\frac{43}{4}$

23. $\frac{31}{8}$

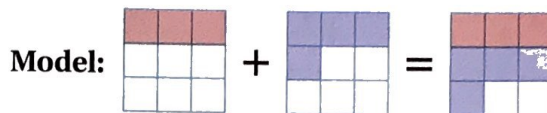
24. $\frac{57}{7}$

25. $\frac{115}{12}$

Adding and Subtracting Fractions

To add fractions with a common denominator, write the sum of the numerators over the denominator.

Numbers: $\frac{3}{9} + \frac{4}{9} = \frac{3+4}{9} = \frac{7}{9}$



Example Find the sum $\frac{7}{8} + \frac{4}{8}$.

$$\frac{7}{8} + \frac{4}{8} = \frac{7+4}{8}$$

Write sum of numerators over common denominator.

$$= \frac{11}{8}$$

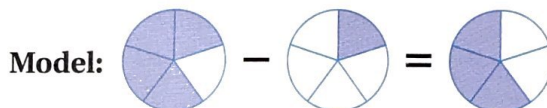
Add.

$$= 1\frac{3}{8}$$

Write improper fraction as a mixed number.

To subtract fractions with a common denominator, write the difference of the numerators over the denominator.

Numbers: $\frac{4}{5} - \frac{1}{5} = \frac{4-1}{5} = \frac{3}{5}$



Example Find the difference $\frac{7}{20} - \frac{4}{20}$.

$$\frac{7}{20} - \frac{4}{20} = \frac{7-4}{20}$$

Write difference of numerators over common denominator.

$$= \frac{3}{20}$$

Subtract.

✓ Practice

Find the sum or difference.

1. $\frac{2}{5} + \frac{2}{5}$

2. $\frac{7}{15} + \frac{6}{15}$

3. $\frac{4}{7} - \frac{1}{7}$

4. $\frac{8}{9} - \frac{4}{9}$

5. $\frac{6}{11} - \frac{5}{11}$

6. $\frac{8}{13} - \frac{3}{13}$

7. $\frac{9}{14} + \frac{4}{14}$

8. $\frac{3}{20} + \frac{8}{20}$

9. $\frac{5}{6} - \frac{4}{6}$

10. $\frac{11}{12} - \frac{6}{12}$

11. $\frac{19}{20} - \frac{6}{20}$

12. $\frac{22}{27} - \frac{5}{27}$

13. $\frac{12}{13} + \frac{9}{13}$

14. $\frac{9}{10} + \frac{8}{10}$

15. $\frac{26}{18} - \frac{7}{18}$

16. $\frac{17}{16} + \frac{15}{16}$

17. $\frac{5}{6} + \frac{1}{6}$

18. $\frac{7}{8} + \frac{6}{8}$

19. $\frac{2}{3} + \frac{2}{3}$

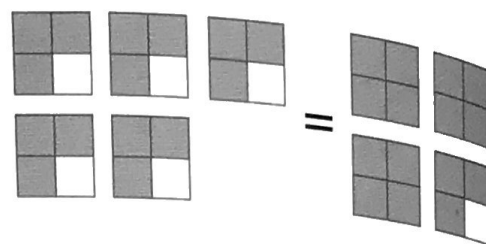
20. $\frac{19}{21} - \frac{6}{21}$

Multiplying Fractions and Whole Numbers

Multiplying a fraction by a whole number can be thought of as repeated addition.

Numbers: $5 \times \frac{3}{4} = \frac{3}{4} + \frac{3}{4} + \frac{3}{4} + \frac{3}{4} + \frac{3}{4}$
 $= \frac{15}{4} = 3\frac{3}{4}$

Model:



The above example suggests the following rule: To multiply a fraction by a whole number, multiply the numerator of the fraction by the whole number and write the product over the denominator of the fraction. Simplify if possible.

Example Find the product $18 \times \frac{5}{6}$.

$$18 \times \frac{5}{6} = \frac{18 \times 5}{6}$$

Write product of whole number and numerator over denominator.

$$= \frac{90}{6}$$

Multiply.

$$= 15$$

Write improper fraction as whole number.

Example Find the product $\frac{2}{3} \times 14$.

$$\frac{2}{3} \times 14 = \frac{2 \times 14}{3}$$

Write product of whole number and numerator over denominator.

$$= \frac{28}{3}$$

Multiply.

$$= 9\frac{1}{3}$$

Write improper fraction as mixed number.

✓ Practice

Find the product.

1. $6 \times \frac{1}{2}$

2. $10 \times \frac{4}{5}$

3. $16 \times \frac{7}{8}$

4. $\frac{9}{10} \times 20$

5. $\frac{3}{7} \times 24$

6. $24 \times \frac{1}{5}$

7. $20 \times \frac{3}{5}$

8. $\frac{5}{8} \times 16$

9. $\frac{1}{4} \times 9$

10. $\frac{1}{5} \times 21$

11. $12 \times \frac{5}{7}$

12. $\frac{5}{11} \times 24$

13. $\frac{5}{9} \times 27$

14. $\frac{3}{8} \times 15$

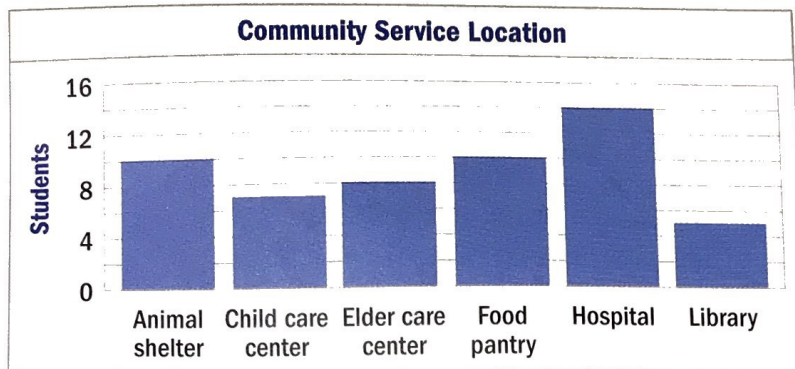
15. $\frac{3}{4} \times 12$

16. $\frac{5}{6} \times 7$

Reading Bar Graphs

Data are numbers or facts. A *bar graph* is one way to display data. A **bar graph** uses bars to show how quantities in categories compare.

Example The bar graph below shows the results of a survey of students who perform community service. More students serve in which location than in any other location? Fewer students serve in which location than in any other location?



Solution

The longest bar on the graph represents the 14 students who serve in a hospital. So, more students serve in a hospital than in any other location.

The shortest bar on the graph represents the 5 students who serve in a library. So, fewer students serve in a library than in any other location.

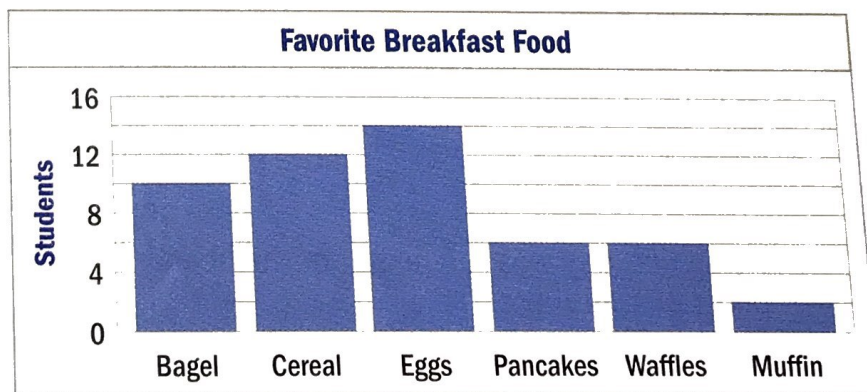
✓ Practice

In Exercises 1–3, use the bar graph above to answer the question.

1. How many of the students serve in a food pantry?
2. Students serve in equal numbers in which two locations?
3. How many more students serve in a hospital than in an animal shelter?

In Exercises 4–7, use the bar graph, which shows the results of a survey on favorite breakfast foods.

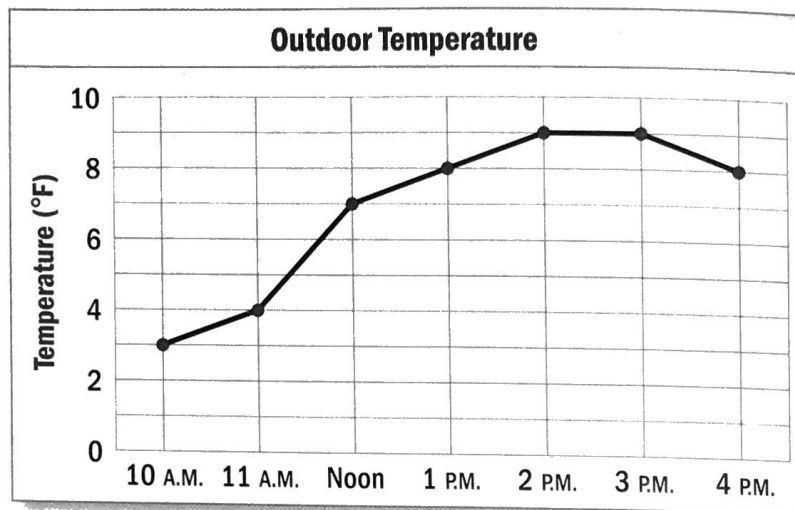
4. Which food was chosen by the greatest number of people?
5. Which two foods were chosen by the same number of people?
6. How many more people chose eggs than chose pancakes?
7. Which foods were chosen by fewer than 12 people?



Reading Line Graphs

You can use a *line graph* to display data. A **line graph** uses segments to show how a quantity changes over time.

Example Students recorded the outdoor temperature every hour from 10 A.M. until 4 P.M. on one day. The line graph below shows the results. Between which two hours did the greatest increase in temperature occur? What was the amount of that increase?



Solution

The steepest segment in the line graph is from 11 A.M. to noon. The temperature was 4°F at 11 A.M. and 7°F at noon, an increase of 3°F.

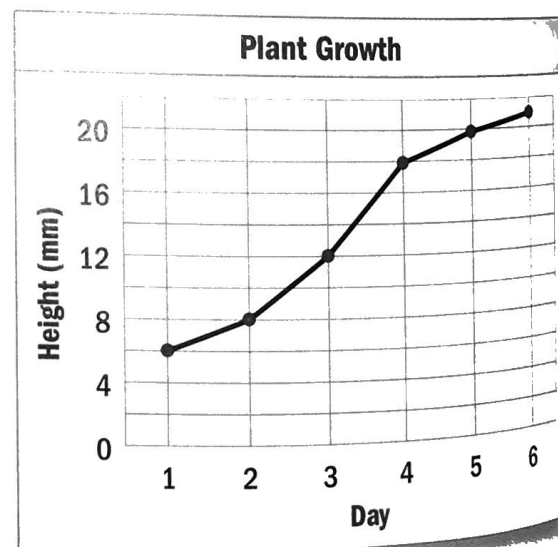
✓ Practice

In Exercises 1–3, use the line graph above to answer the question.

1. What was the temperature at 1 P.M.?
2. At what time was the temperature 3°F?
3. Between which two hours did the temperature decrease? What was the amount of that decrease?

In Exercises 4–7, use the line graph, which shows the height (in millimeters) of a bean plant as it grew over six days.

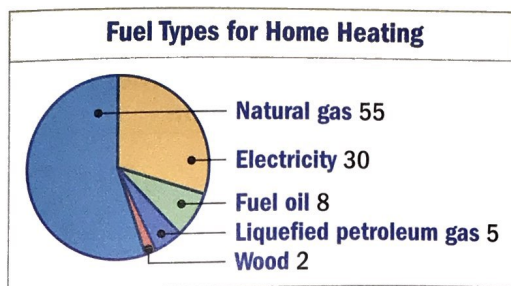
4. Between which two days was the increase in height the greatest? What was that increase?
5. Between which two days was the increase in height 4 millimeters?
6. On which day was the height of the bean plant 21 millimeters?
7. What was the total increase in the height of the plant over the six days?



Reading Circle Graphs

A **circle graph** displays data as sections of a circle. The entire circle represents all of the data. The sections of the graph may be labeled using the actual data or the data expressed as fractions, decimals, or percents. When expressed as fractions, decimals, or percents, the data have a sum of 1.

Example The circle graph below shows the results of a survey that asked 100 people how their homes are heated. How many more homes are heated by natural gas than by electricity?



Solution

The graph shows that 55 homes are heated by natural gas and 30 homes are heated by electricity. Because $55 - 30 = 25$, there are 25 more homes that are heated by natural gas than by electricity.

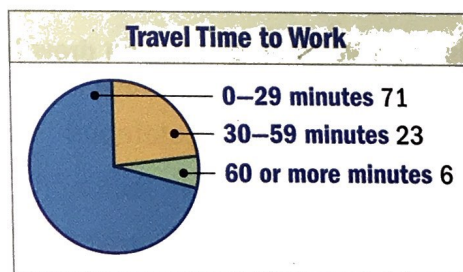
✓ Practice

In Exercises 1–4, use the circle graph above to answer the question.

1. How many homes are heated by liquefied petroleum gas?
2. How many homes are heated by either fuel oil or electricity?
3. How many homes are heated using a source *other* than fuel oil, electricity, or natural gas?
4. How does the number of homes heated by natural gas compare with the total number of homes heated by all other sources in the graph?

In Exercises 5–8, use the circle graph, which shows the results of a survey that asked 100 people who do not work at home how long their travel time to work is.

5. How many people have a travel time of 60 or more minutes?
6. How many people have a travel time of 30 or more minutes?
7. How many people have a travel time of less than 30 minutes?
8. How many people have a travel time of less than 1 hour?



Chapter 1

1.1 Evaluate the expression when $x = 9$, $y = 3$, and $z = 12$.

1. $17 - x$

2. $8y$

3. $z - y$

4. $\frac{z}{y}$

1.2 Write the power in words and as a repeated multiplication. Then evaluate the power.

5. 1^8

6. 11^3

7. 5^3

8. $(1.3)^2$

1.3 Evaluate the expression.

9. $9 \cdot 6 - 5 \cdot 8$

10. $\frac{49 - 11}{12 + 7}$

11. $6(14 + 4^2)$

12. $72 \div [(15 - 9) \cdot 2]$

1.4 Graph the integers on a number line. Then write the integers in order from least to greatest.

13. $-7, 0, -3, 9, 4$

14. $-1, -13, -10, 2, 5$

15. $-67, -19, -34, -51$

1.4 State the absolute value and the opposite of the number.

16. -88

17. 43

18. 15

19. -3

1.5 Find the sum.

20. $15 + (-18)$

21. $-17 + 56$

22. $-42 + (-31)$

23. $-28 + 16 + 34$

1.6 Find the difference.

24. $6 - 13$

25. $14 - (-9)$

26. $-8 - 15$

27. $-3 - (-22)$

1.7 Find the product or quotient.

28. $11(-6)$

29. $-4(-9)$

30. $\frac{-420}{-6}$

31. $-45 \div 15$

1.8 Give the coordinates of the point.

32. A

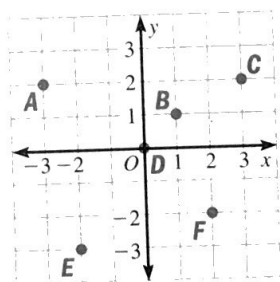
33. B

34. C

35. D

36. E

37. F



1.8 Plot the point in a coordinate plane. Describe the location of the point.

38. $M(0, -4)$

39. $N(5, 6)$

40. $P(-3, 2)$

41. $Q(-2, -4)$

Chapter 2

2.1 Evaluate the expression. Justify each of your steps.

1. $(17 + 9) + 3$

2. $(5.63)(2.45)(0)$

3. $0 + 8 \cdot 1$

4. $2(-18)(5)$

2.1 Evaluate the expression when $x = -7$ and $y = 5$.

5. $8xy$

6. $27 + 3y^2 + x$

7. $35 + 4x + y$

8. $12xy^2$

2.1 Simplify the expression.

9. $-4(11m)$

10. $(3a)(17)$

11. $b + (-14) + 35$

12. $8 + c + (-5)$

2.1 Identify the property that the statement illustrates.

13. $-5a + 0 = -5a$

14. $4^4 + 21 = 21 + 4^4$

15. $(3 \cdot 5) \cdot 6 = 3 \cdot (5 \cdot 6)$

2.2 Use the distributive property to evaluate the expression.

16. $4(8 - 13)$

17. $(6 + 12)3$

18. $-9(3 + 10)$

19. $(-5 - 2)(-6)$

2.2 Use the distributive property to write an equivalent variable expression.

20. $7(m - 5)$

21. $-3(5a + 3)$

22. $(15 + 4b)(-2)$

23. $(2 - 3z)6$

2.3 Simplify the expression.

24. $d + 7d$

25. $-5y + 8y - 2y$

26. $6x - (x - 1)$

27. $2(c + 4) + 3c$

28. $4m - 6m - 7m$

29. $-3b + 11b$

30. $-3(r + 2) - 3r$

31. $-p + 3(p - 5)$

2.4 Solve the equation using mental math.

32. $3 + x = 19$

33. $n - 9 = -4$

34. $32 = -8u$

35. $5 = \frac{55}{g}$

Solve the equation. Check your solution.

2.5 36. $y + 8 = 17$

37. $r - 13 = -5$

38. $18 = p - 4$

39. $-15 = 7 + u$

40. $742 + b = 534$

41. $157 = c + 48$

42. $173 = x - 23$

43. $j - 15 = -47$

2.6 44. $-15z = 0$

45. $-78 = 3g$

46. $17 = -t$

47. $-13w = -91$

48. $\frac{k}{14} = 5$

49. $\frac{s}{-9} = 16$

50. $-20 = \frac{x}{-17}$

51. $-7 = \frac{r}{50}$

2.7 Perform the indicated operation.

52. $6.3 + (-11.9)$

53. $-9.8 - 1.34$

54. $13.16 \div (-2.35)$

55. $3.7(-4.9)$

2.7 Solve the equation. Check your solution.

56. $-9.5 = \frac{u}{-2.72}$

57. $g + 4.6 = 19.3$

58. $-0.32b = 2.08$

59. $-12.3 = h - 5.47$

Chapter 7

7.1 Write the percent as a fraction or the fraction as a percent.

1. 43% 2. 15% 3. $\frac{13}{20}$ 4. $\frac{8}{25}$

7.1 Find the percent of the number.

5. 40% of 300 6. 25% of 28 7. 75% of 76 8. 90% of 430

7.2 Use a proportion to answer the question.

9. What percent of 140 is 28? 10. 15 is 60% of what number?
11. What number is 45% of 180? 12. What percent of 136 is 850?

7.3 Write the decimal as a percent or the percent as a decimal.

13. 0.045 14. 1.34 15. 7% 16. 0.25%

7.3 Write the fraction as a percent.

17. $\frac{7}{12}$ 18. $\frac{13}{15}$ 19. $\frac{15}{8}$ 20. $\frac{11}{6}$

7.4 Use the percent equation to answer the question.

21. What number is 52% of 625? 22. What percent of 72 is 252?
23. 117 is 45% of what number? 24. What number is 0.5% of 3400?

7.5 Identify the percent of change as an *increase* or a *decrease*. Then find the percent of change.

25. Original: 40 26. Original: 650 27. Original: 92 28. Original: 248
New: 62 New: 806 New: 23 New: 217

7.6 Use the given information to find the new price.

29. Wholesale price: \$130 30. Wholesale price: \$14 31. Original price: \$24
Markup percent: 80% Markup percent: 120% Discount percent: 30%

7.6 In Exercises 32–34, use the given information to find the total cost.

32. Original price: \$90 33. Original price: \$65 34. Original price: \$34
Sales tax: 6% Sales tax: 5% Sales tax: 4%

7.7 35. A \$400 bond earns 2% simple annual interest. After how many years will it earn \$72 in interest?

7.7 36. You deposit \$600 into a savings account that earns 3% interest compounded annually. Find the balance of the account after 5 years. Round your answer to the nearest cent.

Chapter 6

6.1 Find the unit rate.

1. $\frac{\$13.92}{8 \text{ gallons}}$

2. $\frac{58 \text{ mi}}{4 \text{ h}}$

3. $\frac{15 \text{ L}}{5 \text{ days}}$

4. $\frac{\$87.50}{5 \text{ tickets}}$

6.1 Write the equivalent rate.

5. $\frac{50 \text{ mi}}{1 \text{ h}} = \frac{? \text{ ft}}{1 \text{ h}}$

6. $\frac{\$58}{1 \text{ day}} = \frac{? \text{ dollars}}{1 \text{ week}}$

7. $\frac{440 \text{ ft}}{1 \text{ min}} = \frac{? \text{ ft}}{1 \text{ h}}$

8. $\frac{70 \text{ m}}{30 \text{ sec}} = \frac{? \text{ m}}{1 \text{ min}}$

Solve the proportion.

6.2 9. $\frac{4}{5} = \frac{x}{20}$

10. $\frac{5}{12} = \frac{a}{84}$

11. $\frac{z}{15} = \frac{12}{45}$

12. $\frac{c}{8} = \frac{28}{32}$

13. $\frac{8}{13} = \frac{w}{52}$

14. $\frac{3}{7} = \frac{d}{42}$

15. $\frac{b}{6} = \frac{75}{90}$

16. $\frac{n}{9} = \frac{56}{72}$

6.3 17. $\frac{12}{18} = \frac{2}{p}$

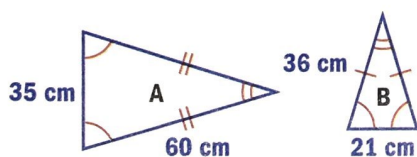
18. $\frac{24}{y} = \frac{21}{35}$

19. $\frac{36}{g} = \frac{27}{63}$

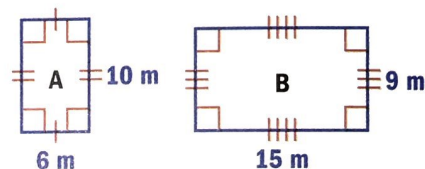
20. $\frac{3.8}{95} = \frac{5.7}{s}$

6.4 In Exercises 21 and 22, the figures are similar. Find the ratio of the lengths of corresponding sides of figure A to figure B.

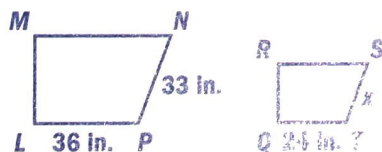
21.



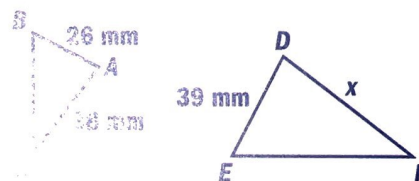
22.



6.5 23. Given $LMNP \sim QRST$, find ST .



24. Given $\triangle ABC \sim \triangle DEF$, find DF .



6.6 A map has a scale of 1 inch : 25 miles. Use the given map distance to find the actual distance.

25. 2 inches

26. 5 inches

27. 0.5 inch

28. 6.5 inches

6.7 In Exercises 29–32, suppose you roll a number cube. Find the probability of the event.

29. A multiple of 3

30. A multiple of 4

31. A factor of 6

32. An even number

6.8 33. You are working on a page for the yearbook and can choose one of 5 action photos, one of 3 group photos, and one of 6 individual photos. How many different groups of 3 photos can you choose?