Use the four-step plan to solve each problem.

1. **GAS MILEAGE** Each day Ernesto drives 52 miles. If he can drive 26 miles on one gallon of gasoline, how many days can he drive on 14 gallons of gasoline?

2. **FIELD TRIP** A school policy requires that there be at least one chaperone for every 8 students on a field trip. How many chaperones are required for a field trip with 67 students?

3. **EXERCISE** Trevor jogs every 3 days and swims every 4 days. How often does he jog and swim on the same day?

4. **PRODUCE** At the local grocery store, lemons are 52 cents each and limes are 21 cents each. How many lemons and limes can you buy for exactly $3.75?

5. **PIZZA** The Chess Club sold 2,116 pizzas during a fundraiser that lasted for all of March, April, and May. How many pizzas did they sell per day?

6. **GUPPIES** In January, Tate’s fish tank had 12 guppies. In February, it had 18, and in March it had 24. How many guppies do you expect to be in Tate’s fish tank in May?

Find a pattern in the list of numbers. Then find the next number in the list.

7. 1860, 1890, 1920, 1950, 1980

8. 1024, 256, 64, 16, 4

Draw the next two figures in each of the patterns below.

9. [Figure 1: Triangle, Square, Circle, Triangle]

10. [Figure 2: Arrow Right, Arrow Down, Arrow Right, Arrow Left]
### Evaluate each expression.

<p>| | |</p>
<table>
<thead>
<tr>
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<tbody>
<tr>
<td>1.</td>
<td>$10 \div 2 + 8$</td>
</tr>
<tr>
<td>2.</td>
<td>$4(9) - 36 \div 3$</td>
</tr>
<tr>
<td>3.</td>
<td>$24 - 12 \div 4$</td>
</tr>
<tr>
<td>4.</td>
<td>$25 + 2 \cdot 8 \div 4$</td>
</tr>
<tr>
<td>5.</td>
<td>$49 - (3^2 + 8 \cdot 3)$</td>
</tr>
<tr>
<td>6.</td>
<td>$2(20 - 5) + \frac{34 - 14}{4}$</td>
</tr>
<tr>
<td>7.</td>
<td>$(27 + 24)(27 - 24)$</td>
</tr>
<tr>
<td>8.</td>
<td>$2^3 \div 4 + 3 \times 6$</td>
</tr>
<tr>
<td>9.</td>
<td>$(4 + 4) \cdot 4 + 4 \div 4$</td>
</tr>
<tr>
<td>10.</td>
<td>$3[(8 - 2) - 5] + 7$</td>
</tr>
<tr>
<td>11.</td>
<td>$\frac{28 - 7}{4^2 - 13}$</td>
</tr>
<tr>
<td>12.</td>
<td>$(15 - 9)^2 \div (5 + 4)$</td>
</tr>
</tbody>
</table>

### Evaluate each expression if $n = 4$, $p = 3$, and $t = 6$.

<p>| | |</p>
<table>
<thead>
<tr>
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<tbody>
<tr>
<td>13.</td>
<td>$3n + p$</td>
</tr>
<tr>
<td>14.</td>
<td>$t - 2p$</td>
</tr>
<tr>
<td>15.</td>
<td>$3p - n + 4$</td>
</tr>
<tr>
<td>16.</td>
<td>$(np)^2$</td>
</tr>
<tr>
<td>17.</td>
<td>$np^2$</td>
</tr>
<tr>
<td>18.</td>
<td>$5(2t - n)$</td>
</tr>
<tr>
<td>19.</td>
<td>$p(n + t)$</td>
</tr>
<tr>
<td>20.</td>
<td>$6t^2 - t$</td>
</tr>
<tr>
<td>21.</td>
<td>$\frac{npt}{3}$</td>
</tr>
<tr>
<td>22.</td>
<td>$4(pt - 3) \div n$</td>
</tr>
<tr>
<td>23.</td>
<td>$\frac{p^2 + 4}{3t - 5}$</td>
</tr>
<tr>
<td>24.</td>
<td>$\frac{pn^2}{t + 10}$</td>
</tr>
<tr>
<td>25.</td>
<td>$n^2 - 3n + 8$</td>
</tr>
<tr>
<td>26.</td>
<td>$2t^2 - t + 9$</td>
</tr>
</tbody>
</table>

### Name the property shown by each statement.

<p>| | |</p>
<table>
<thead>
<tr>
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<tbody>
<tr>
<td>27.</td>
<td>$(4 + 5)3 = 4(3) + 5(3)$</td>
</tr>
<tr>
<td>28.</td>
<td>$1 \cdot x^2 = x^2$</td>
</tr>
<tr>
<td>29.</td>
<td>$2(bc) = (2b)c$</td>
</tr>
<tr>
<td>30.</td>
<td>$(6 + 2) + 5 = 6 + (2 + 5)$</td>
</tr>
<tr>
<td>31.</td>
<td>$2(bc) = 2(cb)$</td>
</tr>
<tr>
<td>32.</td>
<td>$(4 + 5) + 0 = 4 + 5$</td>
</tr>
<tr>
<td>33.</td>
<td>$13 + (5 + 10) = (5 + 10) + 13$</td>
</tr>
<tr>
<td>34.</td>
<td>$3(7 - 2) = 3(7) - 3(2)$</td>
</tr>
</tbody>
</table>
Write an integer for each situation.

1. 3 strokes below par
2. 10 strokes above par
3. a 6-yard loss
4. an 8-yard gain
5. 12 centimeters longer
6. 7 inches below normal
7. $5 off the original price
8. a gain of 6 hours
9. $2° above zero
10. a loss of 15 pounds
11. a $35 withdrawal
12. a $75 deposit
13. 1 mile above sea level
14. 20 fathoms below the surface

Replace \( \bullet \) with <, >, or = to make a true sentence.

15. \(-12 \bullet 4\)
16. \(-4 \bullet -5\)
17. \(-10 \bullet -8\)
18. \(3 \bullet -13\)
19. \(|-6| \bullet |6|\)
20. \(|-4| \bullet |-5|\)

Order the integers in each set from least to greatest.

21. \(\{0, -6, 7, 2, -4\}\)
22. \(\{-1, -2, -3, 3, 2, 1\}\)

Evaluate each expression.

23. \(|-8|\)
24. \(|31|\)
25. \(|-1|\)
26. \(-|-256|\)
27. \(|3| + |-19|\)
28. \(|-12| + |-13|\)
29. \(|28| - |-26|\)
30. \(|28| + |-26|\)
31. \(|24| - |-15|\)

Evaluate each expression if \(a = 3\), \(b = 8\), and \(c = -5\).

32. \(|a| + 5\)
33. \(|b| - 2\)
34. \(2|c| + b\)
35. \(a + |a|\)
36. \(|3b|\)
37. \(|a + 16|\)
Add.

1. \(-2 + (-3)\)  
2. \(4 + 7\)  
3. \(-8 + 9\)

4. \(12 + (-3)\)  
5. \(-27 + 18\)  
6. \(-11 + (-13)\)

7. \(-44 + 26\)  
8. \(44 + (-26)\)  
9. \(-15 + (-51)\)

10. \((-17) + (-13)\)  
11. \(53 + (-28)\)  
12. \(-86 + 77\)

13. \(10 + (-4) + 6\)  
14. \(-16 + (-5) + 12\)

15. \(-2 + 17 + (-12)\)  
16. \(-35 + (-31) + (-39)\)

17. \(8 + (-12) + 15 + (-13)\)  
18. \(-23 + (-18) + 41 + (-17)\)

Evaluate each expression if \(a = -9\), \(b = -12\), and \(c = 8\).

19. \(3 + a\)  
20. \(b + 8\)  
21. \(-6 + c\)

22. \(|a| + b\)  
23. \(|a| + |c|\)  
24. \(|b + c|\)
Subtract.

1. $6 - 7$
2. $12 - 8$
3. $-9 - 9$

4. $-17 - 18$
5. $-13 - (-25)$
6. $14 - (-19)$

7. $-25 - 15$
8. $21 - (-23)$
9. $-34 - (-11)$

10. $56 - 94$
11. $38 - (-39)$
12. $72 - 27$

13. $-36 - 47$
14. $-33 - (-68)$
15. $76 - 18$

16. $4 - |-6|$
17. $|-10| - |7|$
18. $|-52| - 49$

Evaluate each expression if $k = 8$, $m = -7$, and $p = -10$.

19. $k - 19$
20. $19 - m$
21. $p - 11$

22. $k - m$
23. $p - m$
24. $m - 3$

25. $m - k$
26. $k - m + 16$
27. $k - m - p$
Multiply.
1. \(-2 \cdot 3\)  
2. \(3(-3)\)  
3. \(-4(-2)\)  
4. \(5 \cdot 7\)  
5. \(-9(-8)\)  
6. \(-11 \cdot 12\)  
7. \(15(-3)\)  
8. \(-7(-13)\)  
9. \(-5(2)(-7)\)  
10. \((-10)^2\)  
11. \(6(8)(-3)\)  
12. \((-4)^3\)  
13. \((-9)^2\)  
14. \(-1(-3)(-4)\)  
15. \((-10)^3\)  
16. \(-3(-4)(-7)\)

Divide.
17. \(-15 \div 3\)  
18. \(40 \div (-5)\)  
19. \(-63 \div (-7)\)  
20. \(76 \div 4\)  
21. \(-\frac{56}{-4}\)  
22. \(-\frac{48}{16}\)  
23. \(-\frac{57}{-19}\)  
24. \(\frac{75}{-5}\)

Evaluate each expression if \(a = -2\), \(b = 5\), and \(c = -6\).
25. \(abc\)  
26. \(2b + c\)  
27. \(\frac{2b - c}{a}\)  
28. \(ab - c\)  
29. \(\frac{c}{a + b}\)  
30. \(\frac{2a + c}{b}\)  
31. \(b^2 - 5a\)  
32. \((-c)^2\)
Write each verbal phrase as an algebraic expression.

1. a number divided by 5
2. the sum of \(d\) and 7
3. the product of 10 and \(c\)
4. the difference of \(t\) and 1
5. the score increased by 8 points
6. the cost split among 4 people
7. the cost of 7 CDs at \($d\) each
8. the height decreased by 2 inches
9. $500 less than the sticker price
10. the total of Ben’s score and 75
11. 2 hours more than the estimate
12. 25 times the number of students

Write each verbal sentence as an algebraic equation.

13. The sum of a number and 16 is equal to 45.
14. The product of 6 and \(m\) is 216.
15. The difference of 100 and \(x\) is 57.
16. The quotient of \(z\) and 10 is equal to 32.
17. $12 less than the original price is $48.
18. 17 more than some number is equal to 85.
19. The number of members divided by 6 is 15.
20. The total of Joshua’s savings and $350 is $925.
21. \(-65\) is 5 times a number.
22. The total area decreased by 75 square feet is 250 square feet.
23. The cost of 10 books at \($d\) each is $159.50.
24. Carla’s height plus 4 inches is 68 inches.
Practice: Skills

Solving Addition and Subtraction Equations

Solve each equation. Check your solution.

1. \( x + 3 = 4 \)
2. \( y + 6 = 5 \)
3. \( t - 2 = 2 \)

4. \( z - 5 = 1 \)
5. \( a + 4 = -3 \)
6. \( h - 3 = -6 \)

7. \( u - 4 = -1 \)
8. \( 8 + d = 14 \)
9. \( 19 = x + 7 \)

10. \( 17 = b - 8 \)
11. \( -19 = z - 21 \)
12. \( 22 = y + 29 \)

13. \( 16 = 24 + p \)
14. \( -17 = 19 + x \)
15. \( f - 25 = 35 \)

16. \( y + 37 = 59 \)
17. \( s + 46 = 72 \)
18. \( m + 65 = 11 \)

19. \( r + 53 = -19 \)
20. \( n - 75 = 42 \)
21. \( g - 35 = -62 \)

22. \( 111 = x + 68 \)
23. \( -54 = -32 + w \)
24. \( -27 + z = 47 \)
Solve each equation. Check your solution.

1. \( \frac{u}{7} = 3 \)

2. \( 3c = 12 \)

3. \( 5x = -15 \)

4. \( -7z = 49 \)

5. \( \frac{n}{3} = -7 \)

6. \( \frac{a}{-9} = -11 \)

7. \( -14g = -56 \)

8. \( \frac{t}{-12} = 11 \)

9. \( 18y = -144 \)

10. \( 135 = 9z \)

11. \( 11d = -143 \)

12. \( 116 = -29k \)

13. \( \frac{w}{9} = 17 \)

14. \( -14 = \frac{y}{-7} \)

15. \( -112 = -8v \)

16. \( 17c = 136 \)

17. \( -21a = -126 \)

18. \( \frac{s}{-19} = 9 \)

19. \( \frac{m}{-31} = -7 \)

20. \( 16q = 272 \)

21. \( 15 = \frac{z}{-14} \)

22. \( \frac{g}{-22} = -23 \)

23. \( \frac{y}{25} = 16 \)

24. \( 47k = 517 \)
Practice: Skills

Fractions and Decimals

Write each fraction or mixed number as a decimal.

1. \( \frac{1}{10} \)

2. \( \frac{1}{8} \)

3. \( -\frac{3}{4} \)

4. \( -\frac{4}{5} \)

5. \( \frac{21}{50} \)

6. \( -\frac{9}{20} \)

7. \( \frac{9}{25} \)

8. \( \frac{7}{9} \)

9. \( 1\frac{1}{6} \)

10. \( -2\frac{4}{15} \)

11. \( \frac{5}{33} \)

12. \( 7\frac{3}{11} \)

Write each decimal as a fraction or mixed number in simplest form.

13. 0.9

14. 0.7

15. 0.84

16. 0.92

17. −1.12

18. −5.05

19. 2.35

20. 8.85

21. −0.1

22. 4.8

23. 6.7

24. −8.4
Replace each • with <, >, or = to make a true sentence.

1. \( \frac{1}{2} \) • \( \frac{3}{4} \) 
2. \( \frac{1}{3} \) • \( \frac{1}{6} \) 
3. \( \frac{2}{5} \) • \( \frac{3}{10} \) 

4. \( \frac{2}{9} \) • \( \frac{1}{3} \) 
5. \( \frac{3}{4} \) • \( -\frac{9}{12} \) 
6. \( \frac{3}{8} \) • \( \frac{2}{5} \) 

7. \( -\frac{5}{6} \) • \( -\frac{6}{7} \) 
8. \( -\frac{4}{9} \) • \( -\frac{5}{11} \) 
9. \( \frac{5}{9} \) • 0.55 

10. 4.72 • \( \frac{10}{13} \) 
11. \( -2\frac{7}{15} \) • –2.45 
12. 5.25 • 5.25 

13. –1.62 • –1\( \frac{5}{8} \) 
14. 11\( \frac{4}{9} \) • 11.4 
15. –1.27 • –1.27 

Order each set of rational numbers from least to greatest.

16. 0.3, 0.2, \( \frac{1}{3} \), \( \frac{2}{9} \) 
17. 1\( \frac{2}{5} \), 1\( \frac{2}{3} \), 1.55, 1.67 

18. 2.7, 2\( \frac{1}{7} \), 3.13, \( \frac{9}{10} \) 
19. \( \frac{1}{4} \), –1.7, 0.2, –1\( \frac{3}{4} \) 

20. –2.21, –2.09, –2\( \frac{1}{9} \), –1\( \frac{10}{11} \) 
21. –3.1, 2.75, \( 1\frac{7}{8} \), \( -\frac{2}{3} \) 

22. \( 6\frac{7}{8} \), \( 6\frac{15}{16} \), 6.9, 5.3 
23. –4\( \frac{1}{6} \), –4.19, –5.3, –5\( \frac{1}{3} \) 

24. \( 5\frac{9}{11} \), 5.93, \( 5\frac{7}{20} \), 5.81 
25. –3\( \frac{1}{4} \), –4\( \frac{1}{8} \), –3.65, –3\( \frac{4}{11} \), –4.05
2-3 Practice: Skills

Multiplying Rational Numbers

Multiply. Write in simplest form.

1. \( \frac{1}{8} \cdot \frac{2}{3} \)
2. \( \frac{2}{9} \cdot \frac{7}{8} \)
3. \( \frac{5}{6} \cdot \frac{3}{11} \)

4. \( -\frac{4}{7} \cdot \frac{3}{10} \)
5. \( \frac{2}{9} \cdot \left( -\frac{3}{8} \right) \)
6. \( -\frac{3}{5} \cdot \left( -\frac{5}{9} \right) \)

7. \( 1\frac{3}{4} \cdot \frac{2}{3} \)
8. \( \frac{4}{5} \cdot 4\frac{3}{8} \)
9. \( -\frac{2}{15} \cdot 5\frac{5}{6} \)

10. \( -1\frac{3}{7} \cdot 1\frac{1}{5} \)
11. \( -2\frac{1}{4} \cdot 1\frac{2}{3} \)
12. \( 1\frac{9}{16} \cdot 2\frac{4}{5} \)

13. \( -3\frac{1}{7} \cdot \left( -1\frac{2}{11} \right) \)
14. \( 2\frac{2}{3} \cdot \left( -2\frac{1}{4} \right) \)
15. \( \left( -\frac{4}{5} \right) \left( -\frac{4}{5} \right) \)

ALGEBRA Evaluate each expression if \( r = \frac{5}{6}, s = -\frac{1}{3}, t = \frac{4}{5}, \) and \( v = -\frac{3}{4}. \)

16. \( rv \)
17. \( st \)
18. \( rs \)

19. \( stv \)
20. \( rst \)
21. \( rtv \)

ALGEBRA Evaluate each expression if \( a = -\frac{5}{9}, b = -\frac{1}{5}, c = \frac{2}{3}, \) and \( d = \frac{3}{4}. \)

22. \( ad \)
23. \( bc \)
24. \( abc \)
Write the multiplicative inverse of each number.

1. $\frac{2}{3}$
2. $-\frac{4}{7}$
3. $-\frac{1}{12}$
4. 22
5. $\frac{9}{35}$
6. $-\frac{14}{17}$
7. $1\frac{5}{7}$
8. $-1\frac{3}{13}$
9. $2\frac{3}{7}$
10. $-3\frac{6}{11}$
11. $4\frac{8}{15}$
12. $5\frac{3}{5}$

Divide. Write in simplest form.

13. $\frac{3}{7} \div \frac{3}{5}$
14. $\frac{2}{7} \div \frac{6}{7}$
15. $-\frac{5}{8} \div \frac{3}{4}$
16. $\frac{7}{9} \div \left(-\frac{14}{15}\right)$
17. $-\frac{4}{5} \div \frac{8}{9}$
18. $\frac{2}{11} \div \frac{4}{9}$
19. $1\frac{3}{4} \div 2\frac{1}{2}$
20. $-2\frac{3}{5} \div 1\frac{3}{10}$
21. $-3\frac{4}{7} \div \left(-1\frac{1}{14}\right)$
22. $\frac{10}{11} \div 5$
23. $-4 \div \frac{3}{5}$
24. $3\frac{4}{15} \div 4\frac{2}{3}$
25. $9\frac{1}{3} \div 5\frac{3}{5}$
26. $-12\frac{3}{4} \div \left(-2\frac{5}{6}\right)$
27. $2\frac{4}{9} \div \left(-6\frac{2}{7}\right)$
28. $-11\frac{1}{5} \div 3\frac{1}{9}$
### Practice: Skills

**Adding and Subtracting Like Fractions**

Add or subtract. Write in simplest form.

1. \( \frac{1}{5} + \frac{3}{5} \)
2. \( \frac{2}{9} + \frac{5}{9} \)
3. \( \frac{7}{11} + \frac{3}{11} \)

4. \( \frac{-1}{4} + \frac{3}{4} \)
5. \( \frac{-4}{9} + \frac{8}{9} \)
6. \( \frac{-5}{7} + \frac{2}{7} \)

7. \( \frac{7}{12} + \frac{5}{12} \)
8. \( \frac{1}{9} + \left( -\frac{4}{9} \right) \)
9. \( \frac{-5}{7} + \left( -\frac{3}{7} \right) \)

10. \( \frac{-9}{16} + \left( -\frac{3}{16} \right) \)
11. \( \frac{5}{8} - \frac{3}{8} \)
12. \( \frac{13}{19} - \frac{6}{19} \)

13. \( \frac{2}{7} - \frac{6}{7} \)
14. \( \frac{4}{15} - \frac{7}{15} \)
15. \( \frac{1}{9} - \left( -\frac{4}{9} \right) \)

16. \( \frac{3}{13} - \left( -\frac{11}{13} \right) \)
17. \( \frac{23}{7} + \frac{12}{7} \)
18. \( \frac{14}{15} + \frac{8}{15} \)

19. \( \frac{56}{7} - \frac{32}{7} \)
20. \( \frac{67}{12} - \frac{31}{12} \)
21. \( -\frac{25}{11} - 7\frac{1}{11} \)

22. \( -\frac{43}{8} - \frac{7}{8} \)
23. \( \frac{52}{9} - \frac{24}{9} \)
24. \( 8\frac{1}{5} - 4\frac{2}{5} \)
Add or subtract. Write in simplest form.

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

2. $\frac{4}{9} + \frac{1}{3}$

3. $\frac{7}{8} + \frac{1}{4}$

4. $\frac{3}{4} + \frac{2}{3}$

5. $\frac{6}{7} - \frac{3}{14}$

6. $\frac{4}{5} - \frac{1}{3}$

7. $\frac{1}{4} - \frac{5}{6}$

8. $-\frac{3}{5} + \frac{1}{4}$

9. $-\frac{3}{7} - \frac{2}{3}$

10. $\frac{4}{7} - \left(-\frac{1}{2}\right)$

11. $3\frac{2}{5} + 2\frac{1}{3}$

12. $5\frac{5}{7} + 3\frac{1}{2}$

13. $3\frac{1}{6} + 4\frac{1}{4}$

14. $1\frac{1}{2} + \left(-1\frac{1}{5}\right)$

15. $2\frac{3}{4} + \left(-6\frac{3}{8}\right)$

16. $5\frac{1}{4} + \left(-2\frac{2}{3}\right)$

17. $-5\frac{1}{12} - 3\frac{2}{3}$

18. $-3\frac{3}{5} - \frac{9}{10}$

19. $-2\frac{1}{5} - 3\frac{3}{4}$

20. $2\frac{1}{3} - \left(-4\frac{5}{6}\right)$

21. $3\frac{2}{7} - \left(-4\frac{2}{3}\right)$

22. $5\frac{7}{9} - \left(-2\frac{1}{3}\right)$

23. $10\frac{2}{9} - \left(-3\frac{1}{3}\right)$

24. $-2\frac{1}{3} - \left(-5\frac{4}{5}\right)$
Solve each equation. Check your solution.

1. \( x + 2.62 = 6.37 \)
2. \( y - 3.16 = 7.92 \)
3. \( -3.38 = r - 9.76 \)
4. \( s + \frac{5}{8} = \frac{7}{8} \)
5. \( \frac{5}{6} = x - \frac{1}{3} \)
6. \( -\frac{4}{5} + z = \frac{1}{10} \)
7. \( 3.4c = 6.8 \)
8. \( -1.56 = 0.26w \)
9. \( 12.8y = 6.4 \)
10. \( \frac{3}{4}x = 9 \)
11. \( \frac{4}{9} = \frac{8}{11}a \)
12. \( -\frac{2}{5}s = \frac{4}{15} \)
13. \( -\frac{2}{3} = \frac{3}{10}t \)
14. \( -\frac{4}{11}w = -\frac{19}{22} \)
15. \( 5.1 = -1.7r \)
16. \( z - (-3.2) = 3.69 \)
17. \( -2.11 = w - (-5.81) \)
18. \( \frac{w}{2.6} = 3.5 \)
19. \( -\frac{x}{1.8} = 7.2 \)
20. \( 2\frac{1}{4}y = 3\frac{3}{8} \)
21. \( -2\frac{2}{5}f = -3\frac{1}{5} \)
22. \( 1.5d = \frac{3}{8} \)
23. \( -7.5g = -6\frac{2}{3} \)
24. \( -2\frac{1}{5} = c - \left(-\frac{4}{5}\right) \)
Write each expression using exponents.

1. \(2 \cdot 2 \cdot 2 \cdot 2\)  
2. \(9 \cdot 9\)

3. \(7 \cdot 7 \cdot 7 \cdot 7 \cdot 7\)  
4. \(x \cdot x \cdot x\)

5. \(c \cdot c \cdot c \cdot c \cdot c\)  
6. \(s \cdot s \cdot s \cdot s \cdot s \cdot s \cdot s\)

7. \(5 \cdot 5 \cdot 5 \cdot 3 \cdot 3\)  
8. \(4 \cdot 4 \cdot 4 \cdot 6 \cdot 6 \cdot 6\)

9. \(8 \cdot 8 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 8\)  
10. \(a \cdot a \cdot b \cdot a \cdot b \cdot a \cdot a\)

11. \(m \cdot n \cdot n \cdot n \cdot m \cdot n\)  
12. \(y \cdot x \cdot x \cdot y \cdot x \cdot y \cdot y\)

Evaluate each expression.

13. \(4^3\)  
14. \(2^5\)

15. \(8^3\)  
16. \(5^4\)

17. \(2^8\)  
18. \(2^3 \cdot 5^2\)

19. \(4^2 \cdot 3^4\)  
20. \(2^6 \cdot 6^2\)

21. \(3^3 \cdot 7^3\)  
22. \(2^{-3}\)

23. \(8^{-2}\)  
24. \(7^{-4}\)
2-9 Practice: Skills

Scientific Notation

Write each number in standard form.

1. $6.7 \times 10^1$
2. $6.1 \times 10^4$
3. $1.6 \times 10^3$
4. $3.46 \times 10^2$
5. $2.91 \times 10^5$
6. $8.651 \times 10^7$
7. $3.35 \times 10^{-1}$
8. $7.3 \times 10^{-6}$
9. $1.49 \times 10^{-7}$
10. $4.0027 \times 10^{-4}$
11. $5.2277 \times 10^{-3}$
12. $8.50284 \times 10^{-2}$

Write each number in scientific notation.

13. 34
14. 273
15. 79,700
16. 6,590
17. 4,733,800
18. 2,204,000,000
19. 0.00916
20. 0.29
21. 0.00000571
22. 0.0008331
23. 0.0121
24. 0.00000018
3-1

Practice: Skills

Square Roots

Find each square root.

1. \( \sqrt{16} \)  
2. \( -\sqrt{9} \)

3. \( \sqrt{36} \)  
4. \( \sqrt{196} \)

5. \( \sqrt{121} \)  
6. \( -\sqrt{81} \)

7. \( -\sqrt{0.04} \)  
8. \( \sqrt{289} \)

9. \( \sqrt{0.81} \)  
10. \( -\sqrt{400} \)

11. \( \sqrt[4]{16} \)  
12. \( \sqrt[100]{49} \)

ALGEBRA Solve each equation.

13. \( s^2 = 81 \)  
14. \( t^2 = 36 \)

15. \( x^2 = 49 \)  
16. \( 256 = z^2 \)

17. \( 900 = y^2 \)  
18. \( 1,024 = h^2 \)

19. \( c^2 = \frac{49}{64} \)  
20. \( a^2 = \frac{25}{121} \)

21. \( \frac{1}{100} = d^2 \)  
22. \( \frac{144}{169} = r^2 \)

23. \( b^2 = \frac{9}{441} \)  
24. \( x^2 = \frac{121}{400} \)
Estimating Square Roots

Estimate to the nearest whole number.

1. \( \sqrt{5} \)  
2. \( \sqrt{18} \)  
3. \( \sqrt{10} \)

4. \( \sqrt{34} \)  
5. \( \sqrt{53} \)  
6. \( \sqrt{80} \)

7. \( \sqrt{69} \)  
8. \( \sqrt{99} \)  
9. \( \sqrt{120} \)

10. \( \sqrt{77} \)  
11. \( \sqrt{171} \)  
12. \( \sqrt{230} \)

13. \( \sqrt{147} \)  
14. \( \sqrt{194} \)  
15. \( \sqrt{290} \)

16. \( \sqrt{440} \)  
17. \( \sqrt{578} \)  
18. \( \sqrt{730} \)

19. \( \sqrt{1,010} \)  
20. \( \sqrt{1,230} \)  
21. \( \sqrt{8.42} \)

22. \( \sqrt{17.8} \)  
23. \( \sqrt{11.5} \)  
24. \( \sqrt{37.7} \)

25. \( \sqrt{23.8} \)  
26. \( \sqrt{59.4} \)  
27. \( \sqrt{97.3} \)

28. \( \sqrt{118.4} \)  
29. \( \sqrt{84.35} \)  
30. \( \sqrt{45.92} \)
Practice: Skills

The Real Number System

Name all sets of numbers to which each real number belongs.

1. 12
2. −15

3. $1\frac{1}{2}$
4. 3.18

5. $\frac{8}{4}$
6. $9.\overline{3}$

7. $-2\frac{7}{9}$
8. $\sqrt{25}$

9. $\sqrt{3}$
10. $-\sqrt{64}$

11. $-\sqrt{12}$
12. $\sqrt{13}$

Estimate each square root to the nearest tenth. Then graph the square root on a number line.

13. $\sqrt{5}$
14. $\sqrt{14}$

15. $-\sqrt{6}$
16. $-\sqrt{13}$

Replace each • with <, >, or = to make a true sentence.

17. $1.7 \bullet \sqrt{3}$
18. $\sqrt{6} \bullet 2\frac{1}{2}$

19. $4\frac{2}{5} \bullet \sqrt{19}$
20. $4.\overline{8} \bullet \sqrt{24}$

21. $6\frac{1}{6} \bullet \sqrt{38}$
22. $\sqrt{55} \bullet 7.\overline{42}$

23. $2.1 \bullet \sqrt{4.41}$
24. $2.\overline{7} \bullet \sqrt{7.7}$
Write an equation you could use to find the length of the missing side of each right triangle. Then find the missing length. Round to the nearest tenth if necessary.

1. \( \triangle ABC \) with sides 8 in., 7 in., \( c \) in.

2. \( \triangle ABC \) with sides 10 m, 5 m, \( a \) m

3. \( \triangle ABC \) with sides 3 cm, 11 cm, \( b \) cm

4. \( \triangle ABC \) with sides 18 ft, 15 ft, \( c \) ft

5. \( \triangle ABC \) with sides 24 yd, 30 yd, \( a \) yd

6. \( \triangle ABC \) with sides 20 ft, 13 ft, \( b \) ft

7. \( a = 1 \text{ m}, b = 3 \text{ m} \)

8. \( a = 2 \text{ in.}, c = 5 \text{ in.} \)

9. \( b = 4 \text{ ft}, c = 7 \text{ ft} \)

10. \( a = 4 \text{ km}, b = 9 \text{ km} \)

11. \( a = 10 \text{ yd}, c = 18 \text{ yd} \)

12. \( b = 18 \text{ ft}, c = 20 \text{ ft} \)

13. \( a = 5 \text{ yd}, b = 11 \text{ yd} \)

14. \( a = 12 \text{ cm}, c = 16 \text{ cm} \)

15. \( b = 22 \text{ m}, c = 25 \text{ m} \)

16. \( a = 21 \text{ ft}, b = 72 \text{ ft} \)

17. \( a = 36 \text{ yd}, c = 60 \text{ yd} \)

18. \( b = 25 \text{ mm}, c = 65 \text{ mm} \)

Determine whether each triangle with sides of given lengths is a right triangle.

19. 10 yd, 15 yd, 20 yd

20. 21 ft, 28 ft, 35 ft

21. 7 cm, 14 cm, 16 cm

22. 40 m, 42 m, 58 m

23. 24 in., 32 in., 38 in.

24. 15 mm, 18 mm, 24 mm
Write an equation that can be used to answer the question. Then solve. Round to the nearest tenth if necessary.

1. How far apart are the spider and the fly?

\[ c^2 = 2^2 + 3^2 \]

2. How long is the tabletop?

\[ c^2 = 6^2 + 3^2 \]

3. How high will the ladder reach?

\[ h^2 = 16^2 - 4^2 \]

4. How high is the ramp?

\[ h^2 = 17^2 - 15^2 \]

5. How far apart are the two cities?

\[ c^2 = 41^2 - 19^2 \]

6. How far is the bear from camp?

\[ d^2 = 60^2 - 20^2 \]

7. How tall is the table?

\[ h^2 = 40^2 - 30^2 \]

8. How far is it across the pond?

\[ d^2 = 90^2 - 75^2 \]
Find the distance between each pair of points whose coordinates are given. Round to the nearest tenth if necessary.

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

Graph each pair of ordered pairs. Then find the distance between the points. Round to the nearest tenth if necessary.
7. (-3, 0), (3, -2)
8. (-4, -3), (2, 1)
9. (0, 2), (5, -2)
10. (-2, 1), (-1, 2)
11. (0, 0), (-4, -3)
12. (-3, 4), (2, -3)
Express each ratio in simplest form.

1. 15 cats:50 dogs
2. 18 adults to 27 teens
3. 27 nurses to 9 doctors
4. 12 losses in 32 games
5. 50 centimeters:1 meter
6. 1 foot:1 yard
7. 22 players:2 teams
8. $28:8 pounds
9. 8 completions:12 passes
10. 21 hired out of 105 applicants
11. 18 hours out of 1 day
12. 64 boys to 66 girls
13. 66 miles on 4 gallons
14. 48 wins:18 losses
15. 112 peanuts:28 cashews
16. 273 miles in 6 hours

Express each rate as a unit rate.

17. 96 students in 3 buses
18. $9,650 for 100 shares of stock
19. $21.45 for 13 gallons of gasoline
20. 125 meters in 10 seconds
21. 30.4 pounds of tofu in 8 weeks
22. 6.5 inches of rainfall in 13 days
23. 103.68 miles in 7.2 hours
24. $94.99 for 7 pizzas
TEMPERATURE Use the table below that shows the high temperature of a city for the first part of August.

<table>
<thead>
<tr>
<th>Date</th>
<th>1</th>
<th>5</th>
<th>14</th>
<th>15</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Temperature (°F)</td>
<td>85</td>
<td>93</td>
<td>102</td>
<td>102</td>
</tr>
</tbody>
</table>

1. Find the rate of change in the high temperature between August 1 and August 5.

2. Find the rate of change in the high temperature between August 5 and August 14.

3. During which of these two time periods did the high temperature rise faster?

4. Find the rate of change in the high temperature between August 14 and August 15. Then interpret its meaning.

COMPANY GROWTH Use the graph that shows the number of employees at a company between 1994 and 2002.

5. Find the rate of change in the number of employees between 1994 and 1996.

6. Find the rate of change in the number of employees between 1996 and 1999.

7. During which of these two time periods did the number of employees grow faster?

8. Find the rate of change in the number of employees between 1999 and 2002. Then interpret its meaning.
Find the slope of each line.

1. 

2. 

3. 

4. 

5. 

6. 

The points given in each table lie on a line. Find the slope of the line. Then graph the line.

7. | x | 0 | 3 | 6 | 9 |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>y</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

8. | x | 1 | 3 | 5 | 7 |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>y</td>
<td>6</td>
<td>5</td>
<td>4</td>
</tr>
</tbody>
</table>

9. | x | -2 | -1 | 0 | 1 |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>y</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

10. | x | -4 | -2 | 0 | 2 |
    |----|----|---|---|
    | y | 3  | 3  | 3 | 3 |

11. | x | -7 | -5 | -3 | -1 |
    |----|----|----|----|
    | y | -6 | -3 | 0  | 3  |

12. | x | -8 | -4 | 0  | 4  |
    |----|----|---|----|
    | y | 8  | 5  | 2 | -1 |
Practice: Skills
Solving Proportions

Determine whether each pair of ratios forms a proportion.

1. \( \frac{5}{8} : \frac{2}{3} \)
2. \( \frac{7}{3} : \frac{14}{6} \)
3. \( \frac{6}{8} : \frac{9}{12} \)
4. \( \frac{16}{9} : \frac{11}{6} \)
5. \( \frac{55}{10} : \frac{12}{2} \)
6. \( \frac{6}{8} : \frac{15}{20} \)
7. \( \frac{5}{9} : \frac{15}{27} \)
8. \( \frac{3}{18} : \frac{11}{66} \)
9. \( \frac{7}{11} : \frac{15}{23} \)
10. \( \frac{9}{13} : \frac{13}{17} \)
11. \( \frac{3}{42} : \frac{5}{70} \)
12. \( \frac{6}{7} : \frac{36}{49} \)

Solve each proportion.

13. \( \frac{4}{12} = \frac{y}{9} \)
14. \( \frac{6}{18} = \frac{4}{c} \)
15. \( \frac{7}{z} = \frac{84}{12} \)
16. \( \frac{5}{10} = \frac{8}{w} \)
17. \( \frac{x}{9} = \frac{4}{15} \)
18. \( \frac{6}{20} = \frac{y}{5} \)
19. \( \frac{5}{9} = \frac{6}{r} \)
20. \( \frac{8}{n} = \frac{10}{7} \)
21. \( \frac{d}{5} = \frac{12}{80} \)
22. \( \frac{y}{5} = \frac{13}{10} \)
23. \( \frac{2}{28} = \frac{p}{35} \)
24. \( \frac{11}{t} = \frac{100}{11} \)
25. \( \frac{1.2}{m} = \frac{3}{5} \)
26. \( \frac{0.9}{1.5} = \frac{a}{10} \)
27. \( \frac{3}{7} = \frac{k}{4.2} \)
28. \( \frac{6.3}{x} = \frac{18}{5} \)
29. \( \frac{3.6}{9} = \frac{b}{0.5} \)
30. \( \frac{14}{1.5} = \frac{4.2}{y} \)
Determine whether each pair of polygons is similar. Explain your reasoning.

1. 

2. 

3. 

4. 

5. 

6. 

7. 

8. 

Scale Drawings and Models

ARCHITECTURE The scale on a set of architectural drawings for a house is 1.5 inches = 2 feet. Find the length of each part of the house.

<table>
<thead>
<tr>
<th>Room</th>
<th>Drawing Length</th>
<th>Actual Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Living Room</td>
<td>15 inches</td>
<td></td>
</tr>
<tr>
<td>2. Dining Room</td>
<td>10.5 inches</td>
<td></td>
</tr>
<tr>
<td>3. Kitchen</td>
<td>12(\frac{3}{4}) inches</td>
<td></td>
</tr>
<tr>
<td>4. Laundry Room</td>
<td>8(\frac{1}{4}) inches</td>
<td></td>
</tr>
<tr>
<td>5. Hall</td>
<td>13(\frac{7}{8}) inches</td>
<td></td>
</tr>
<tr>
<td>6. Garage</td>
<td>16.5 inches</td>
<td></td>
</tr>
</tbody>
</table>

7. What is the scale factor of these drawings?

TOWN PLANNING For Exercises 8–11, use the following information.

As part of a downtown renewal project, businesses have constructed a scale model of the town square to present to the city commission for its approval. The scale of the model is 1 inch = 7 feet.

8. The courthouse is the tallest building in the town square. If it is 5\(\frac{1}{2}\) inches tall in the model, how tall is the actual building?

9. The business owners would like to install new lampposts that are each 12 feet tall. How tall are the lampposts in the model?

10. In the model, the lampposts are 3\(\frac{3}{7}\) inches apart. How far apart will they be when they are installed?

11. What is the scale factor?

12. MAPS On a map, two cities are 6\(\frac{1}{2}\) inches apart. The actual distance between the cities is 104 miles. What is the scale of the map?
Practice: Skills

Indirect Measurement

Write a proportion and solve the problem.

1. **HEIGHT** How tall is Becky?

   ![Diagram of a triangle with sides 7 ft, 3 ft, and h ft, and a smaller triangle with sides 4 ft and h ft.]

2. **FLAGS** How tall is the flagpole?

   ![Diagram of a triangle with sides 31 1/2 ft, 9 ft, and h ft, and a smaller triangle with sides 6 1/2 ft and h ft.]

3. **BEACH** How deep is the water 50 feet from shore?

   ![Diagram of a triangle with sides 8 ft, 50 ft, and h ft, and a smaller triangle with sides 1 ft and h ft.]

4. **ACCESSIBILITY** How high is the ramp when it is 2 feet from the building? (Hint: \( \triangle ABE \sim \triangle ACD \))

   ![Diagram of a triangle with sides 20 ft, 2 ft, and h ft, and a smaller triangle with sides 2.5 ft and h ft.]

5. **AMUSEMENT PARKS** The triangles in the figure are similar. How far is the water ride from the roller coaster? Round to the nearest tenth.

   ![Diagram of a triangle with sides 45 m and 21 m, and a smaller triangle with sides d m and 25 m.]

6. **CLASS CHANGES** The triangles in the figure are similar. How far is the entrance to the gymnasium from the band room?

   ![Diagram of a triangle with sides 30 m and 25 m, and a smaller triangle with sides d m and 32 m.]

NAME ________________________ DATE ______________ PERIOD _____
Practice: Skills

Dilations

Find the coordinates of the vertices of triangle $A'B'C'$ after triangle $ABC$ is dilated using the given scale factor. Then graph triangle $ABC$ and its dilation.

1. $A(1, 1), B(1, 3), C(3, 1); \text{ scale factor 3}$

2. $A(-2, -2), B(-1, 2), C(2, 1); \text{ scale factor 2}$

3. $A(-4, 6), B(2, 6), C(0, 8); \text{ scale factor } \frac{1}{2}$

4. $A(-3, -2), B(1, 2), C(2, -3); \text{ scale factor 1.5}$

Segment $P'Q'$ is a dilation of segment $PQ$. Find the scale factor of the dilation and classify it as an enlargement or a reduction.

5.

6.

7.

8.
Write each ratio or fraction as a percent.

1. 3 out of 100
2. 49 out of 100
3. 73 out of 100
4. 0.9 out of 100
5. 99 out of 100
6. 2:4
7. 2:10
8. 1:20
9. 19:25
10. 31:50
11. $\frac{8}{10}$
12. $\frac{3}{4}$
13. $\frac{7}{50}$
14. $\frac{13}{25}$
15. $\frac{19}{20}$
16. $\frac{3}{8}$

Write each percent as a fraction in simplest form.

17. 31%
18. 51%
19. 67%
20. 89%
21. 97%
22. 50%
23. 90%
24. 26%
25. 85%
26. 36%
27. 94%
28. 48%
29. 15%
30. 92%
31. 54%
32. 12.5%
Write each percent as a decimal.

1. 50%  
2. 13%  
3. 26%  
4. 41%  
5. 79%  
6. 9.1%  
7. 17.5%  
8. 33.4%  
9. 91.5%  
10. 122%  
11. 282%  
12. 331%

Write each decimal as a percent.

13. 0.6  
14. 0.05  
15. 0.17  
16. 0.38  
17. 0.81  
18. 0.453  
19. 0.572  
20. 0.737  
21. 0.061  
22. 1.19  
23. 1.47  
24. 2.38

Write each fraction as a percent.

25. \(\frac{9}{20}\)  
26. \(\frac{2}{25}\)  
27. \(\frac{5}{16}\)  
28. \(\frac{33}{40}\)  
29. \(\frac{3}{80}\)  
30. \(\frac{13}{16}\)  
31. \(\frac{17}{40}\)  
32. \(\frac{59}{80}\)  
33. \(\frac{14}{10}\)  
34. \(\frac{28}{25}\)  
35. \(\frac{9}{4}\)  
36. \(\frac{33}{20}\)
Write a percent proportion to solve each problem. Then solve. Round to the nearest tenth if necessary.

1. 1 is what percent of 5? 
2. What number is 25% of 40?

3. 30 is 60% of what number? 
4. What percent of 8 is 6?

5. Find 15% of 20. 
6. 33 is 33% of what number?

7. 15 is what percent of 150? 
8. What number is 30% of 140?

9. 90 is 60% of what number? 
10. What percent of 60 is 42?

11. Find 90% of 40. 
12. 21 is 35% of what number?

13. 36 is what percent of 45? 
14. What number is 75% of 44?

15. 12 is 40% of what number? 
16. What percent of 40 is 15?

17. Find 5% of 80. 
18. 45 is 60% of what number?

19. 46 is what percent of 69? 
20. Find 55% of 120.

21. 11 is 44% of what number? 
22. 19 is what percent of 20?

23. What number is 85% of 40? 
24. 9 is 18% of what number?
Compute mentally.

1. 50% of 40
2. 25% of 36
3. 10% of 60
4. 1% of 100
5. 20% of 15
6. 40% of 30
7. \(33 \frac{1}{3}\)% of 21
8. \(12 \frac{1}{2}\)% of 32
9. 75% of 28
10. 10% of 230
11. 90% of 30
12. \(83 \frac{1}{3}\)% of 18
13. 1% of 300
14. \(62 \frac{1}{2}\)% of 24
15. 60% of 45
16. 70% of 50
17. \(16 \frac{2}{3}\)% of 48
18. 10% of 66
19. 30% of 70
20. 1% of 240
21. \(66 \frac{2}{3}\)% of 51
22. 10% of 45
23. 1% of 73
24. 10% of 12.4
25. 1% of 18.9
26. 10% of 107
27. 1% of 153
28. \(87 \frac{1}{2}\)% of 72
29. \(83 \frac{1}{3}\)% of 54
30. \(62 \frac{1}{2}\)% of 64
### Practice: Skills

#### Percent and Estimation

**Estimate.**

1. 9% of 40
2. 20% of 16
3. 76% of 36
4. 31% of 80
5. 33% of 46
6. 26% of 79
7. 89% of 31
8. 42% of 54
9. 11% of 89
10. 79% of 66
11. 72% of 109
12. 19% of 116

**Estimate each percent.**

13. 6 out of 29
14. 7 out of 27
15. 12 out of 17
16. 44 out of 50
17. 4 out of 41
18. 9 out of 28
19. 9 out of 19
20. 10 out of 26
21. 29 out of 41
22. 37 out of 46
23. 17 out of 23
24. 7 out of 11
Solve each problem using the percent equation.

1. Find 50% of 40.

2. What is 90% of 20?

3. What percent of 64 is 16?

4. 24 is what percent of 30?

5. Find 20% of 55.

6. What is 60% of 45?

7. 16 is 40% of what number?

8. 70% of what number is 63?

9. What percent of 84 is 63?

10. 9 is what percent of 30?

11. 35 is 10% of what number?

12. 15% of what number is 24?

13. What percent of 2,000 is 4?

14. 5 is what percent of 1,000?

15. What percent of 3,000 is 9?

16. 16 is what percent of 4,000?

17. What percent of 2,000 is 14?

18. What is 120% of 20?

19. What percent of 5,000 is 20?

20. What is 140% of 60?

21. Find 250% of 40.

22. 2% of what number is 5?

23. Find 175% of 28.

24. 6% of what number is 21?

25. 12 is 10% of what number?

26. 5% of what number is 20?

27. 75 is 20% of what number?

28. 15% of what number is 42?
Find each percent of change. Round to the nearest tenth of a percent if necessary. State whether the percent of change is an increase or a decrease.

1. original: 4  
   new: 6
2. original: 35  
   new: 28
3. original: 80  
   new: 52
4. original: 45  
   new: 63
5. original: 120  
   new: 132
6. original: 210  
   new: 105
7. original: 84  
   new: 111
8. original: 91  
   new: 77

Find the selling price for each item given the cost to the store and the markup.

9. suit: $200, 50% markup
10. tire: $50, 40% markup
11. sport bag: $40, 30% markup
12. radio: $120, 25% markup
13. grill: $85, 15% markup
14. microwave: $96, 20% markup
15. chair: $140, 45% markup
16. camcorder: $350, 33% markup
17. camera: $245, 10% markup
18. diamond ring: $470, 35% markup

Find the sale price of each item to the nearest cent.

19. shoes: $70, 10% off
20. artwork: $250, 20% off
21. speakers: $180, 30% off
22. bicycle: $320, 25% off
23. antique chest: $179, 15% off
24. pendant: $93.50, 5% off
25. sofa: $749.95, 35% off
26. oven: $535.99, 20% off
27. guitar: $488.20, 25% off
28. weight machine: $919.70, 10% off
Practice: Skills

Simple Interest

Find the simple interest to the nearest cent.

1. $500 at 4% for 2 years
2. $800 at 9% for 4 years
3. $350 at 6.2% for 3 years
4. $280 at 5.5% for 4 years
5. $740 at 3.25% for 2 years
6. $1,150 at 7.6% for 5 years
7. $725 at 4.3% for 2 \(\frac{1}{2}\) years
8. $266 at 5.2% for 3 years
9. $955 at 6.75% for 3 \(\frac{1}{4}\) years
10. $1,245 at 5.4% for 4 years
11. $1,540 at 8.25% for 2 years
12. $2,180 at 7.7% for 2 \(\frac{1}{2}\) years
13. $3,500 at 4.2% for 1 \(\frac{3}{4}\) years
14. $2,650 at 3.65% for 4 \(\frac{1}{2}\) years

Find the total amount in each account to the nearest cent.

15. $200 at 5% for 3 years
16. $700 at 6% for 2 years
17. $850 at 4% for 3 years
18. $350 at 8% for 2 years
19. $540 at 2.75% for 4 years
20. $360 at 4.5% for 5 years
21. $446 at 2.5% for 4 years
22. $780 at 3.6% for 3 years
23. $840 at 5.75% for 2 \(\frac{1}{2}\) years
24. $530 at 7.25% for 1 \(\frac{3}{4}\) years
25. $1,400 at 6.5% for 2 years
26. $1,880 at 4.3% for 3 \(\frac{1}{2}\) years
27. $2,470 at 5.5% for 4 years
28. $3,200 at 9.75% for 1 \(\frac{1}{2}\) years
29. $2,810 at 3.95% for 2 \(\frac{1}{4}\) years
30. $4,340 at 8.12% for 3 \(\frac{1}{4}\) years
Classify each angle or angle pair using all names that apply.

1. 
2. 
3. 

4. 
5. 
6. 

Find the value of $x$ in each figure.

7. 
8. 
9. 

10. 
11. 
12. 

For Exercises 13–22, use the figure at the right.

13. Find $m\angle 5$ if $m\angle 1 = 127^\circ$.
14. Find $m\angle 2$ if $m\angle 7 = 65^\circ$.
15. Find $m\angle 3$ if $m\angle 6 = 29^\circ$.
16. Find $m\angle 8$ if $m\angle 4 = 132^\circ$.
17. Find $m\angle 5$ if $m\angle 8 = 106^\circ$.
18. Find $m\angle 3$ if $m\angle 4 = 128^\circ$.
19. Find $m\angle 4$ if $m\angle 5 = 151^\circ$.
20. Find $m\angle 1$ if $m\angle 2 = 51^\circ$.
21. Find $m\angle 6$ if $m\angle 7 = 81^\circ$.
22. Find $m\angle 3$ if $m\angle 1 = 143^\circ$. 

Find the value of $x$ in each triangle.

1. $\angle x = 57^\circ$, $\angle 28^\circ$
2. $\angle x = 26^\circ$
3. $\angle x = 56^\circ$, $\angle 71^\circ$

4. $\angle x = 39^\circ$
5. $\angle x = 40^\circ$
6. $\angle x = 100^\circ$, $\angle 37^\circ$

7. $\angle x = 46^\circ$, $\angle 66^\circ$
8. $\angle x = 32^\circ$
9. $\angle x = 71^\circ$

Classify each triangle by its angles and by its sides.

10. $\triangle 60^\circ$, $\triangle 60^\circ$
11. $\triangle 98^\circ$, $\triangle 41^\circ$
12. $\triangle 59^\circ$

13. $\triangle 88^\circ$, $\triangle 46^\circ$
14. $\triangle 66^\circ$
15. $\triangle 106^\circ$

16. $\triangle 39^\circ$, $\triangle 102^\circ$
17. $\triangle 24^\circ$
18. $\triangle 55^\circ$, $\triangle 70^\circ$
Find each missing length. Round to the nearest tenth if necessary.

1. \( \triangle \) with sides labeled as follows:
   - Side opposite \( 30^\circ \): \( b \), \( 60^\circ \) angle
   - Hypotenuse: \( c \), \( 4 \text{ cm} \)

2. \( \triangle \) with sides labeled as follows:
   - Leg opposite \( 45^\circ \): \( a \), \( 2 \text{ ft} \)
   - Hypotenuse: \( c \)

3. \( \triangle \) with sides labeled as follows:
   - Leg opposite \( 45^\circ \): \( a \), \( 6 \text{ m} \)
   - Hypotenuse: \( c \)

4. \( \triangle \) with sides labeled as follows:
   - Leg opposite \( 60^\circ \): \( b \), \( 30^\circ \) angle
   - Hypotenuse: \( c \), \( 26 \text{ yd} \)

5. \( \triangle \) with sides labeled as follows:
   - Leg opposite \( 60^\circ \): \( a \), \( 14 \text{ mm} \)
   - Hypotenuse: \( c \)

6. \( \triangle \) with sides labeled as follows:
   - Leg opposite \( 45^\circ \): \( a \), \( 3 \text{ mi} \)
   - Hypotenuse: \( c \)

7. \( \triangle \) with sides labeled as follows:
   - Leg opposite \( 45^\circ \): \( a \), \( 10 \text{ km} \)
   - Hypotenuse: \( c \)

8. \( \triangle \) with sides labeled as follows:
   - Leg opposite \( 60^\circ \): \( a \), \( 32 \text{ in} \)
   - Hypotenuse: \( c \)

9. \( \triangle \) with sides labeled as follows:
   - Leg opposite \( 30^\circ \): \( b \), \( 21 \text{ cm} \)
   - Hypotenuse: \( c \)

10. \( \triangle \) with sides labeled as follows:
    - Leg opposite \( 45^\circ \): \( a \), \( 19 \text{ yd} \)
    - Hypotenuse: \( c \)

11. \( \triangle \) with sides labeled as follows:
    - Leg opposite \( 45^\circ \): \( b \), \( 22 \text{ m} \)
    - Hypotenuse: \( c \)

12. \( \triangle \) with sides labeled as follows:
    - Leg opposite \( 30^\circ \): \( b \), \( 38 \text{ ft} \)
    - Hypotenuse: \( a \)

13. The length of the hypotenuse of a \( 30^\circ-60^\circ \) right triangle is 5.4 feet. Find the lengths of the other sides.

14. The length of one of the legs in a \( 45^\circ-45^\circ \) right triangle is 3.7 meters. Find the lengths of the other sides.
Classifying Quadrilaterals

Find the value of $x$ in each quadrilateral.

1. \[130^\circ \quad 50^\circ \quad 160^\circ \quad x^\circ\]
2. \[100^\circ \quad 170^\circ \quad x^\circ\]
3. \[x^\circ \quad 120^\circ \quad 110^\circ \quad 80^\circ\]
4. \[x^\circ \quad 70^\circ \quad 135^\circ \quad 95^\circ\]
5. \[45^\circ \quad x^\circ \quad 145^\circ \quad 90^\circ\]
6. \[95^\circ \quad 85^\circ \quad 60^\circ \quad x^\circ\]

Classify each quadrilateral using the name that best describes it.

7. 
8. 
9. 
10. 
11. 
12. 
13. 
14. 
15.
Practice: Skills

Congruent Polygons

Determine whether the polygons shown are congruent. If so, name the corresponding parts and write a congruence statement.

1. \( \triangle ABC \) and \( \triangle RST \)

2. \( \triangle RST \) and \( \triangle VQU \)

3. \( \triangle VQU \) and \( \triangle LMN \)

4. \( \triangle ABC \) and \( \triangle DEF \)

5. \( \triangle DEF \) and \( \triangle GHI \)

6. \( \square ABCD \) and \( \square EFGH \)

In the figure, \( \triangle HFI \cong \triangle MLK \). Find each measure.

7. \( m \angle M \)

8. \( ML \)

9. \( m \angle K \)

10. \( KM \)

In the figure, quadrilateral \( ACDB \cong \) quadrilateral \( EFGH \). Find each measure.

11. \( m \angle H \)

12. \( EF \)

13. \( m \angle F \)

14. \( HG \)
For Exercises 1–12, complete parts a and b for each figure.

a. Determine whether the figure has line symmetry. If it does, draw all lines of symmetry. If not, write none.

b. Determine whether the figure has rotational symmetry. Write yes or no. If yes, name its angles of rotation.

1. 2. 3.
4. 5. 6.
7. 8. 9.
10. 11. 12.
Practice: Skills

Reflections

Draw the image of the figure after a reflection over the given line.

1. 2. 3. 4.

Graph the figure with the given vertices. Then graph the image of the figure after a reflection over the given axis and write the coordinates of its vertices.

5. triangle $ABC$ with vertices $A(1, 4)$, $B(4, 1)$, and $C(2, 5)$; $x$-axis

6. triangle $DEF$ with vertices $D(-1, 2)$, $E(-3, 1)$, and $F(-4, 5)$; $y$-axis

7. trapezoid $WXYZ$ with vertices $W(2, 4)$, $X(2, -2)$, $Y(4, -1)$, and $Z(4, 3)$; $y$-axis

8. rhombus $QRST$ with vertices $Q(-1, 5)$, $R(-4, 3)$, $S(-1, 1)$, and $T(2, 3)$; $x$-axis
6-8 Practice: Skills
Translations

Draw the image of the figure after the indicated translation.

1. 2 units left and 3 units up
2. 4 units right and 1 unit up
3. 1 unit left and 2 units down
4. 5 units right and 3 units down

Graph the figure with the given vertices. Then graph the image of the figure after the indicated translation and write the coordinates of its vertices.

5. triangle \(ABC\) with vertices \(A(-3, -1), B(-4, -4),\) and \(C(-1, -2)\) translated 4 units right and 1 unit up

6. triangle \(XYZ\) with vertices \(X(1, -2), Y(3, -5),\) and \(Z(4, 1)\) translated 5 units left and 3 units up

7. triangle \(EFG\) with vertices \(E(1, 4), F(-1, 1),\) and \(G(2, -1)\) translated 3 units left and 1 unit down

8. rhombus \(WXYZ\) with vertices \(W(-4, 3), X(-1, 1), Y(2, 3),\) and \(Z(-1, 5)\) translated 2 units right and 5 units down

9. rectangle \(QRST\) with vertices \(Q(-2, -4), R(-2, 1), S(-4, 1),\) and \(T(-4, -4)\) translated 3 units right and 3 units up

10. trapezoid \(BCDE\) with vertices \(B(2, -1), C(3, -3), D(-3, -3),\) and \(E(0, -1)\) translated 1 unit left and 4 units up
Graph the figure with the given vertices. Then graph the image of the figure after the indicated rotation about the origin and write the coordinates of its vertices.

1. triangle \( ABC \) with vertices \( A(1, 5), B(3, 4), \) and \( C(4, 0) \); 90° counterclockwise

2. triangle \( FGH \) with vertices \( F(4, 2), G(1, 1), \) and \( H(1, 5) \); 180°

3. triangle \( XYZ \) with vertices \( X(4, -4), Y(0, -5), \) and \( Z(1, 2) \); 180°

4. triangle \( LMN \) with vertices \( L(-1, -4), M(-4, -3), \) and \( N(-2, -1) \); 90° counterclockwise

5. square \( DEFG \) with vertices \( D(-4, 5), E(-1, 5), F(-1, 2), \) and \( G(-4, 2) \); 90° counterclockwise

6. quadrilateral \( TUVW \) with vertices \( T(-2, 1), U(-1, 4), V(-4, 4), \) and \( W(-5, 0) \); 180°
Find the area of each figure.

1. parallelogram: base, 9 km; height, 11 km
2. triangle: base, 10 ft; height, 13 ft
3. trapezoid: height, 9 mm; bases, 7 mm and 13 mm
4. parallelogram: base, 7.8 in.; height, 7.5 in.
5. triangle: base, 7.2 cm; height, 3.5 cm
6. trapezoid: height, 2.8 mi; bases, 3.4 mi and 7.6 mi
7. parallelogram: base, 6.6 ft; height, 7.4 ft
8. triangle: base, 10.5 ft; height, 6.6 ft
9. trapezoid: height, 4 cm; bases, 4 cm and 4.3 cm

10. parallelogram: base, 9 km; height, 11 km
11. triangle: base, 10 ft; height, 13 ft
12. trapezoid: height, 9 mm; bases, 7 mm and 13 mm
13. parallelogram: base, 7.8 in.; height, 7.5 in.
14. triangle: base, 7.2 cm; height, 3.5 cm
15. trapezoid: height, 2.8 mi; bases, 3.4 mi and 7.6 mi
16. parallelogram: base, 4\frac{1}{3} \text{ m}; height, 3 \text{ m}
17. triangle: base, 8 \text{ yd}; height, 9\frac{1}{4} \text{ yd}
18. trapezoid: height, 6 \text{ cm}; bases, 2\frac{1}{3} \text{ cm and } 4\frac{2}{3} \text{ cm}
Find the circumference and area of each circle. Round to the nearest tenth.

1. The diameter is 7.7 feet.
2. The radius is 3.8 meters.
3. The radius is 11.3 centimeters.
4. The radius is 2\(\frac{1}{3}\) inches.
5. The radius is 5.25 meters.
6. The radius is 9.6 millimeters.
7. The diameter is 17.4 yards.
8. The diameter is 4\(\frac{3}{4}\) miles.
9. The diameter is 7\(\frac{5}{8}\) feet.
10. The radius is 11.3 centimeters.
11. The radius is 9.6 millimeters.
12. The radius is 11.3 centimeters.
13. The diameter is 17.4 yards.
14. The radius is 11.3 centimeters.
15. The diameter is 4\(\frac{3}{4}\) miles.
16. The radius is 2\(\frac{1}{3}\) inches.
17. The diameter is 7\(\frac{5}{8}\) feet.
18. The radius is 5.25 meters.
19. The diameter is 12\(\frac{3}{4}\) yards.
Find the area of each figure. Round to the nearest tenth if necessary.

1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11.

10. What is the area of a figure formed using a semicircle with a diameter of 16 feet and a trapezoid with a height of 8 feet and bases of 12 feet and 14 feet?

11. What is the area of a figure formed using a rectangle with a length of 13 kilometers and a width of 7 kilometers and a triangle with a base of 14 kilometers and a height of 11 kilometers?
Three-Dimensional Figures

Identify each solid. Name the number and shapes of the faces. Then name the number of edges and vertices.

1. 2. 3. 4. 5. 6. 7. 8. 9.
Find the volume of each solid. Round to the nearest tenth if necessary.

1. rectangular prism: length, 6 in.; width, 4 in.; height, 13 in.
2. triangular prism: base of triangle, 9 cm; altitude 1 cm; height of prism, 15 cm
3. rectangular prism: length, 3.6 mm; width, 4 mm; height, 15.5 mm
4. triangular prism: base of triangle, 6 yd; altitude 5.9 yd; height of prism, 12 yd
5. cylinder: diameter, 8 m; height, 16.2 m
6. triangular prism: base of triangle, 6 yd; altitude 5 yd; height of prism, 12 yd
Find the volume of each solid. Round to the nearest tenth if necessary.

1. cone: diameter, 10 cm; height, 12 cm
2. triangular pyramid: triangle base, 20 mm; triangle height, 22 mm; pyramid height, 14 mm
3. triangular pyramid: triangle base, 19 in.; triangle height, 21 in.; pyramid height, 9 in.
4. cone: radius, 9.7 ft; height, 18 ft

13. cone: diameter, 10 cm; height, 12 cm
14. triangular pyramid: triangle base, 20 mm; triangle height, 22 mm; pyramid height, 14 mm
15. triangular pyramid: triangle base, 19 in.; triangle height, 21 in.; pyramid height, 9 in.
16. cone: radius, 9.7 ft; height, 18 ft
Practice: Skills

Surface Area of Prisms and Cylinders

Find the surface area of each solid. Round to the nearest tenth if necessary.

1. cube: edge length, 11 m
2. rectangular prism: length, 9 cm; width, 13 cm; height, 18.4 cm
3. cylinder: radius, 9.4 mm; height, 15 mm
4. cylinder: diameter, 28 in.; height, 12.6 in.

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Find the surface area of each solid. Round to the nearest tenth if necessary.

1. square pyramid: base side length, 4 cm; slant height, 7.3 cm

2. cone: diameter, 26 in.; slant height, 8 in.

3. square pyramid: base side length, 5 yd; slant height, 12.7 yd

4. cone: diameter, 26 in.; slant height, 8 in.

5. cone: diameter, 26 in.; slant height, 8 in.

6. cone: diameter, 26 in.; slant height, 8 in.

7. cone: diameter, 26 in.; slant height, 8 in.

8. cone: diameter, 26 in.; slant height, 8 in.

9. cone: diameter, 26 in.; slant height, 8 in.

10. cone: diameter, 26 in.; slant height, 8 in.

11. cone: diameter, 26 in.; slant height, 8 in.

12. cone: diameter, 26 in.; slant height, 8 in.

13. square pyramid: base side length, 4 cm; slant height, 7.3 cm

14. square pyramid: base side length, 5 yd; slant height, 12.7 yd

15. cone: diameter, 26 in.; slant height, 8 in.
Identify the precision unit of each measuring instrument.

1. 0.764 m
2. 1.072 m

Determine the number of significant digits in each measure.

3. 12 ft
4. 9.012 in.
5. 70,002 cm
6. 0.764 m
7. 50.02 g
8. 548,000 mm
9. 90,000 s
10. 6,012 mi
11. 0.048 cm
12. 32.021 kg
13. 80.0 ft
14. 1,900 yd
15. 1.072 m
16. 150.00 kg
17. 0.008 s

Find each sum or difference using the correct precision.

18. 12 ft + 4 ft
19. 45.3 s − 9.2 s
20. 10.12 m + 1.3 m
21. 54 g − 1.27 g
22. 5.6 yd + 1.458 yd
23. 6.25 kg − 0.086 kg

Find each product or quotient using the correct number of significant digits.

24. 130 m ÷ 7.8 m
25. 6.2 ft × 3 ft
26. 11 m × 12 m
27. 14.5 g ÷ 3.4 g
28. 0.7 s ÷ 2.15 s
29. 4.15 yd ÷ 23 yd
30. 152 kg ÷ 3 kg
31. 3.4 m × 0.48 m
32. 12.5 mL ÷ 0.04 mL
8-1 Practice: Skills

Probability of Simple Events

A bag contains 4 black, 8 red, 5 orange, and 7 green jelly beans. A student selects one jelly bean at random. Write each probability as a fraction, a decimal, and a percent. Round decimals to the nearest hundredth and percents to the nearest percent.

1. $P(\text{red})$  
2. $P(\text{not green})$

3. $P(\text{black or orange})$  
4. $P(\text{blue})$

5. $P(\text{not yellow})$  
6. $P(\text{red, green, or orange})$

Numbers from 1 to 30 are painted on white balls and mixed by a machine. One ball is selected at random. Write each probability as a fraction, a decimal, and a percent. Round decimals to the nearest hundredth and percents to the nearest percent.

7. $P(\text{odd})$  
8. $P(\text{one-digit number})$

9. $P(\text{negative})$  
10. $P(\text{ending in 0})$

11. $P(\text{divisible by 6})$  
12. $P(\text{two-digit number})$

13. $P(1 \text{ or } 30)$  
14. $P(\text{greater than 17 but less than 26})$

Each letter of the word probabilities is written on a slip of paper and shuffled in a bowl. Natalie selects one slip of paper at random. Write each probability as a fraction, a decimal, and a percent. Round decimals to the nearest hundredth and percents to the nearest percent.

15. $P(\text{b})$  
16. $P(\text{not a})$  
17. $P(\text{u})$

18. $P(\text{vowel})$  
19. $P(\text{i or l})$  
20. $P(\text{not p or b})$

21. What is the probability of rolling a number divisible by 2 on a number cube?

22. What is the probability that a month picked at random ends with the letter $y$?
Practice: Skills

Counting Outcomes

Draw a tree diagram to determine the number of outcomes.

1. A hat comes in black, red, or white, and medium or large.

2. You have a choice of peach or vanilla yogurt topped with peanuts, granola, walnuts, or almonds.

Use the Fundamental Counting Principle to find the number of possible outcomes.

3. A test consists of 5 true-false questions.

4. A number cube is rolled, and a dime and penny are tossed.

5. Canned beans are packed in 3 sizes and 7 varieties.

6. There are 5 choices for each of 6 multiple-choice questions on a history quiz.
Find each value.

1. \( P(5, 4) \)

2. \( P(9, 3) \)

3. \( P(8, 4) \)

4. \( P(8, 8) \)

5. \( P(16, 3) \)

6. \( P(12, 5) \)

7. \( P(20, 3) \)

8. \( P(21, 4) \)

9. \( P(75, 3) \)

10. \( 4! \)

11. \( 5! \)

12. \( 9! \)

13. How many ways can 5 friends line up for lunch in a cafeteria?

14. How many ways can you arrange the letters in the word \( rainbow \)?

15. Four employees of a company take a commuter van to work. In how many different orders can the driver pick up the four riders in the morning?

16. A bread recipe has 6 ingredients. How many ways can you place the first 4 ingredients in a bread maker?

17. How many ways can you arrange 8 books on a shelf?

18. Five students are finalists in a spelling bee. How many ways can they finish in first, second, and third place?

19. A flock of 9 pigeons lands on a telephone wire. How many ways can they be arranged on the wire?

20. How many even four-digit numbers can you form from the digits 1, 2, 3, and 5 where no digit is used twice?
Find each value.
1. \(C(6, 4)\)  
2. \(C(8, 2)\)  
3. \(C(10, 3)\)  
4. \(C(9, 4)\)  
5. \(C(10, 6)\)  
6. \(C(11, 3)\)  
7. \(C(7, 5)\)  
8. \(C(11, 6)\)  
9. \(C(12, 5)\)  
10. \(C(15, 4)\)  
11. \(C(16, 2)\)  
12. \(C(20, 4)\)  

For Exercises 13–18, determine whether each situation is a permutation or a combination.
13. choosing the arrangement of 6 glass animals on a shelf  
14. choosing 3 Chinese dishes from a menu  
15. choosing 5 friends to invite to a birthday party  
16. choosing a president, vice-president, treasurer, and secretary from the members of the student council  
17. choosing 2 colors of paint from a paint chart to blend together for the walls in your room  
18. choosing the order in which to watch 3 videotapes you rented from the video store  
19. How many ways can a coach choose the 6 starting players from a volleyball team of 13 players?  
20. How many ways can 4 textbooks be chosen from 8 textbooks in a locker?  
21. You have 7 clean shirts in a laundry basket. How many ways can you fold 4 shirts and stack them in a drawer?  
22. How many ways can a delegation of 4 students be chosen from a class of 22 students?  
23. On her birthday, Yolanda brings cupcakes to school for her 28 classmates. How many ways can she hand out cupcakes to the first 3 students returning from recess?  
24. How many three-card hands can be dealt from a deck of 52 cards?
Practice: Skills

8-5

Probability of Compound Events

For Exercises 1–6, a number cube is rolled and the spinner at the right is spun. Find each probability.

1. \( P(1 \text{ and } A) \)
2. \( P(\text{odd and } B) \)
3. \( P(\text{prime and } D) \)
4. \( P(\text{greater than 4 and } C) \)
5. \( P(\text{less than 3 and consonant}) \)
6. \( P(\text{prime and consonant}) \)

7. What is the probability of spinning the spinner above 3 times and getting a vowel each time?

8. What is the probability of rolling a number cube 3 times and getting a number less than 3 each time?

Each spinner at the right is spun. Find each probability.

9. \( P(A \text{ and } 2) \)
10. \( P(\text{vowel and even}) \)
11. \( P(\text{consonant and } 1) \)
12. \( P(D \text{ and greater than } 1) \)

There are 3 red, 1 blue, and 2 yellow marbles in a bag. Once a marble is selected, it is not replaced. Find each probability.

13. \( P(\text{red and then yellow}) \)
14. \( P(\text{blue and then yellow}) \)
15. \( P(\text{red and then blue}) \)
16. \( P(\text{two yellow marbles}) \)
17. \( P(\text{two red marbles in a row}) \)
18. \( P(\text{three red marbles}) \)

The face cards are removed from a standard deck of 52 cards, and the rest are set aside. Two cards are drawn at random from the face cards. Once a card is selected, it is not replaced. Find each probability.

19. \( P(2 \text{ queens}) \)
20. \( P(\text{jack and then king}) \)
21. \( P(\text{black jack and then red queen}) \)
22. \( P(\text{two black cards}) \)
23. \( P(\text{black card and then red king}) \)
24. \( P(\text{black jack and then black card}) \)
8-6 Practice: Skills

Experimental Probability

Use the table that shows the results of rolling a number cube 50 times.

<table>
<thead>
<tr>
<th>Result</th>
<th>Number of Times</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>6</td>
<td>9</td>
</tr>
</tbody>
</table>

1. Based on the results, what is the probability of getting a five?
2. Based on the results, how many fives would you expect to occur in 300 rolls?
3. What is the theoretical probability of getting a five?
4. Based on the theoretical probability, how many fives would you expect to occur in 300 rolls?
5. Compare the theoretical probability to the experimental probability.

ARCHERY Use the following information.
In archery class, Jocelyn missed the target 5 times in 40 shots.

6. What is the probability that her next shot will miss the target?
7. In her next 160 shots, how many times would you expect Jocelyn to miss the target?

PETS For Exercises 8–11, use the results of a survey of 200 people shown at the right.

<table>
<thead>
<tr>
<th>First Pet</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>bird</td>
<td>32</td>
</tr>
<tr>
<td>cat</td>
<td>56</td>
</tr>
<tr>
<td>dog</td>
<td>66</td>
</tr>
<tr>
<td>rabbit</td>
<td>19</td>
</tr>
<tr>
<td>other</td>
<td>27</td>
</tr>
</tbody>
</table>

8. What is the probability that a person says his or her first pet was a cat?
9. Out of 500 people, how many would you expect to say a cat was his or her first pet?
10. What is the probability that a person says his or her first pet was a bird?
11. Out of 500 people, how many would you expect to say a bird was their first pet?

12. FIGURE SKATING At figure skating practice, Michelle successfully landed 15 out of 18 attempts at a double axel. What is the experimental probability that she will successfully land a double axel?
Describe each sample.

1. To evaluate the defect rate of its memory chips, an integrated circuit manufacturer tests every 100th chip off the production line.

2. Students who wish to represent the school at a school board meeting are asked to stop by the office after lunch.

3. To determine if the class understood the homework assignment, the math teacher checks the top 3 papers in the pile of collected homework.

4. To determine the representatives to the recess activities meeting, 2 students are selected at random from each homeroom.

5. A member of the cafeteria staff asks every fifth student leaving the cafeteria to rank 5 vegetables from most favorite to least favorite.

6. One bead for every member of the school orchestra is placed in a bag. All but 2 of the beads are white. Each member draws a bead from the bag, and the members who pick the non-white beads will represent the orchestra.

7. A real estate agent surveys people about their housing preferences at an open house for a luxury townhouse.

8. To determine the most popular children’s programs, a television station asks parents to call in and complete a phone survey.

9. Two teachers from each school in the district are chosen at random to fill out a survey on classroom behavior.

10. Airline boarding passes are marked with red stars at random to decide which passengers should have their carry-on luggage inspected.

11. To determine how often people eat out, every tenth person entering a fast-food restaurant is surveyed.
### Practice: Skills

**Histograms**

1. **Basketball** The frequency table at the right shows the average points per game for all NBA teams for the 2001–2002 season. Draw a histogram to represent the set of data.

   **Average Points per Game for NBA Teams, 2001–2002 Regular Season**

<table>
<thead>
<tr>
<th>Points</th>
<th>Tally</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>87–90.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>91–94.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>95–98.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>99–102.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>103–106.9</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. **Golf** The frequency table at the right shows the score of the winner of the Masters golf tournament for the years 1950–2002. Draw a histogram to represent the set of data.

   **Score of the Winner of the Masters from 1950–2002**

<table>
<thead>
<tr>
<th>Score</th>
<th>Tally</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>265–270</td>
<td></td>
<td></td>
</tr>
<tr>
<td>271–275</td>
<td></td>
<td></td>
</tr>
<tr>
<td>276–280</td>
<td></td>
<td></td>
</tr>
<tr>
<td>281–285</td>
<td></td>
<td></td>
</tr>
<tr>
<td>286–290</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. **Rainfall** The frequency table at the right shows the average annual precipitation for the 50 states. Draw a histogram to represent the set of data.

   **Average Annual Precipitation for the 50 States**

<table>
<thead>
<tr>
<th>Precipitation (in.)</th>
<th>Tally</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>0–11.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12–23.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>24–35.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>36–47.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>48–59.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>60–71.9</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Make a circle graph for each set of data.

1. **U.S. Energy Consumption, 2000**

<table>
<thead>
<tr>
<th>Type</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commercial and Industrial</td>
<td>51%</td>
</tr>
<tr>
<td>Transportation</td>
<td>27%</td>
</tr>
<tr>
<td>Residential</td>
<td>20%</td>
</tr>
<tr>
<td>Other</td>
<td>2%</td>
</tr>
</tbody>
</table>

2. **Color of Trucks Sold in U.S., 2000**

<table>
<thead>
<tr>
<th>Color</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td>23%</td>
</tr>
<tr>
<td>Silver</td>
<td>14%</td>
</tr>
<tr>
<td>Blue</td>
<td>11%</td>
</tr>
<tr>
<td>Black</td>
<td>11%</td>
</tr>
<tr>
<td>Red</td>
<td>15%</td>
</tr>
<tr>
<td>Other</td>
<td>26%</td>
</tr>
</tbody>
</table>

3. **Davis Cup Winner, 1981–2000**

<table>
<thead>
<tr>
<th>Country</th>
<th>Wins</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>3</td>
</tr>
<tr>
<td>France</td>
<td>2</td>
</tr>
<tr>
<td>Germany</td>
<td>3</td>
</tr>
<tr>
<td>Spain</td>
<td>1</td>
</tr>
<tr>
<td>Sweden</td>
<td>6</td>
</tr>
<tr>
<td>U.S.</td>
<td>5</td>
</tr>
</tbody>
</table>

4. **Top 5 Largest American Indian Tribes**

<table>
<thead>
<tr>
<th>Tribe</th>
<th>Number (thousands)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cherokee</td>
<td>369</td>
</tr>
<tr>
<td>Navajo</td>
<td>225</td>
</tr>
<tr>
<td>Sioux</td>
<td>107</td>
</tr>
<tr>
<td>Chippewa</td>
<td>106</td>
</tr>
<tr>
<td>Choctaw</td>
<td>86</td>
</tr>
</tbody>
</table>
Choose an appropriate type of display for each situation.

1. energy usage in your home for the past year, categorized by month

2. exam scores for a whole class, arranged in intervals

3. sales of a leading brand of toothpaste for the last 10 years

4. average weight of a pet dog, categorized by breed

5. runs scored by individual members of a baseball team, as compared to the team total

6. ages of all 40 employees of a small company

Choose an appropriate type of display for each situation. Then make a display.

7. Points per Game by Shaquille O’Neal, 1998–2002

<table>
<thead>
<tr>
<th>Season</th>
<th>Points per Game</th>
</tr>
</thead>
<tbody>
<tr>
<td>97–98</td>
<td>28.3</td>
</tr>
<tr>
<td>98–99</td>
<td>26.3</td>
</tr>
<tr>
<td>99–00</td>
<td>29.7</td>
</tr>
<tr>
<td>00–01</td>
<td>28.7</td>
</tr>
<tr>
<td>01–02</td>
<td>27.2</td>
</tr>
</tbody>
</table>

8. Share of Workers by Commute Time, 2000

<table>
<thead>
<tr>
<th>Commute Time</th>
<th>Percent of Workers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 15 min</td>
<td>30%</td>
</tr>
<tr>
<td>15–29 min</td>
<td>36%</td>
</tr>
<tr>
<td>30–39 min</td>
<td>16%</td>
</tr>
<tr>
<td>40–59 min</td>
<td>11%</td>
</tr>
<tr>
<td>60 min or more</td>
<td>7%</td>
</tr>
</tbody>
</table>
Find the mean, median, and mode of each set of data. Round to the nearest tenth if necessary.

1. 4, 7, 1
2. 2, 1, 2, 3, 2
3. 6, 8, 7, 6, 1
4. 14, 24, 9, 12, 27
5. 16, 12, 23, 24, 16, 27
6. 22, 7, 26, 32, 38, 7
7. 14, 9, 22, 14, 22, 18
8. 36, 35, 36, 32, 35, 36
9. 13, 15, 11, 9, 14, 11, 12
10. 2.4, 2.8, 1.4, 1.7, 2.5, 2.9, 1.5
11. 9, 15, 6, 5, 11, 14, 4, 11
12. 25, 27, 24, 22, 21, 23, 27, 25
13. 35, 26, 33, 32, 26, 27, 29, 30
14. 15, 14, 28, 17, 24, 25, 24, 28, 21
15. 14, 18, 11, 16, 21, 15, 22, 15, 21
16. 5.9, 8.4, 4.2, 4.7, 3.4, 2.8, 1.6, 2.1, 7.5
17. 14, 18, 14, 15, 19, 14, 12, 17, 9
18. 33, 26, 24, 27, 24, 28, 38, 29, 29, 24
19. 17, 25, 15, 19, 14, 21, 21, 15, 17, 24
20. 4.2, 1.7, 6.8, 7.3, 2.1, 5.5, 8.7, 7.6, 3.3, 7.3

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517 Mathematics: Applications and Concepts, Course 3
Find the range, median, upper and lower quartiles, interquartile range, and any outliers for each set of data.

1. 15, 17, 10, 12, 19, 20, 16
2. 52, 72, 89, 21, 58, 42, 75

3. 20, 23, 18, 21, 4, 17, 15
4. 24, 37, 32, 39, 35, 42, 44, 28

5. 48, 56, 72, 47, 43, 36, 47, 14

7. 2.2, 2.6, 2.5, 3.6, 2.9, 2.8, 2.2, 2.4
8. 59, 72, 57, 51, 62, 77, 73, 64, 54

9. 81, 79, 88, 67, 89, 87, 85, 83, 83

11. 6.3, 6.7, 6.2, 4.9, 6.7, 6.6, 5.3, 6.3, 6.4
12. 22, 27, 25, 11, 29, 28, 41, 26, 28, 23

13. 90, 88, 72, 85, 92, 95, 93, 86, 92, 91

15. 8.3, 8.5, 9.5, 8.7, 8.9, 8.3, 8.6, 8.8, 8.9, 8.7
16. 42, 36, 58, 47, 34, 43, 54, 49, 48, 41, 38

17. 8.3, 9.0, 8.1, 9.5, 8.2, 8.9, 9.4, 7.9, 8.3, 8.4, 8.0
18. 15, 16, 18, 9, 18, 17, 19, 19, 10, 12, 15, 13, 16
Practice: Skills

Box-and-Whisker Plots

Draw a box-and-whisker plot for each set of data.

1. 23, 21, 20, 22, 24, 17, 15
2. 54, 61, 64, 68, 60, 53, 66
3. 61, 96, 97, 87, 84, 91, 98, 86
4. 27, 35, 35, 32, 26, 34, 36, 27, 38
5. 67, 74, 78, 69, 78, 70, 67, 72, 69
6. 39, 41, 30, 14, 44, 40, 48, 39, 40, 36
7. 86, 83, 98, 99, 81, 86, 95, 84, 79, 90
8. 45, 58, 78, 57, 58, 55, 61, 47, 52, 40, 46
9. 169, 163, 153, 166, 149, 148, 146, 145, 152, 163, 152
10. 245, 250, 205, 240, 250, 275, 260, 295, 255, 225, 25
1. Which graph could you use to indicate that the number of gas stations has greatly decreased since 1993? Explain.

Graph A

<table>
<thead>
<tr>
<th>Year</th>
<th>'93</th>
<th>'95</th>
<th>'97</th>
<th>'99</th>
<th>'01</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Stations (thousands)</td>
<td>250</td>
<td>200</td>
<td>150</td>
<td>100</td>
<td>50</td>
</tr>
</tbody>
</table>

Graph B

<table>
<thead>
<tr>
<th>Year</th>
<th>'93</th>
<th>'95</th>
<th>'97</th>
<th>'99</th>
<th>'01</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Stations (thousands)</td>
<td>220</td>
<td>180</td>
<td>140</td>
<td>100</td>
<td>60</td>
</tr>
</tbody>
</table>

2. Which graph would you use to indicate that the average operating expenses for a minivan are much greater than for a medium-size car? Explain.

Graph A

<table>
<thead>
<tr>
<th>Size</th>
<th>Medium</th>
<th>Minivan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost (cents/mi)</td>
<td>46</td>
<td>51</td>
</tr>
</tbody>
</table>

Graph B

<table>
<thead>
<tr>
<th>Size</th>
<th>Medium</th>
<th>Minivan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost (cents/mi)</td>
<td>46</td>
<td>51</td>
</tr>
</tbody>
</table>

3. Which graph would you use to indicate that the world record for the one mile run has decreased greatly since 1981? Explain.

Graph A

<table>
<thead>
<tr>
<th>Student</th>
<th>1981</th>
<th>1985</th>
<th>1993</th>
<th>1999</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time (min)</td>
<td>3:50</td>
<td>3:45</td>
<td>3:40</td>
<td>3:35</td>
</tr>
</tbody>
</table>

Graph B

<table>
<thead>
<tr>
<th>Student</th>
<th>1981</th>
<th>1985</th>
<th>1993</th>
<th>1999</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time (min)</td>
<td>3:50</td>
<td>3:45</td>
<td>3:40</td>
<td>3:35</td>
</tr>
</tbody>
</table>
Matrices

State the dimensions of each matrix. Then identify the position of the circled element.

1. \([0 \textcircled{7} 5]\)

2. \([\begin{array}{cc}-4 & 8 \\ 9 & 3\end{array}]\)

3. \([\begin{array}{c}7 \\ 10 \end{array}]\)

4. \([\begin{array}{ccc}-7 & 4 & \textcircled{9} \\ 0 & 11 & -12\end{array}]\)

5. \([\begin{array}{ccc}7 & 0 & -3 \\ 2 & 5 & 10 \\ -4 & \textcircled{0} & 1\end{array}]\)

6. \([\begin{array}{ccc}1 & 7 & -10 \\ 6 & 5 & 0 \end{array}]\)

Add or subtract. If there is no sum or difference, write impossible.

7. \([1 \ 2] + [7 \ 11]\)

8. \([\begin{array}{c}0 \\ 5\end{array}] - [\begin{array}{c}7 \\ 2\end{array}]\)

9. \([\begin{array}{cc}3 & 0 \\ 4 & 2\end{array}] + [\begin{array}{c}9 \\ 1\end{array}]\)

10. \([\begin{array}{ccc}4 & 7 & \textcircled{2} \\ 10 & 0 & 9 \\ -9 & 3 & -2 \end{array}] - [\begin{array}{ccc}7 & 9 \\ -2 & -4 \end{array}]\)

11. \([\begin{array}{cc}6 & \textcircled{4} \\ 5 & -2 \\ -11 & 5\end{array}] - [\begin{array}{c}4 \\ -2 \\ 5\end{array}]\)

12. \([\begin{array}{ccc}1 & 6 & 0 \\ -2 & 3 & 9 \\ 4 & -4 & 5\end{array}] + [\begin{array}{ccc}0 & 4 & \textcircled{7} \\ 9 & -1 & 3 \\ 6 & 0 & -2\end{array}]\)

13. \([\begin{array}{ccc}1 & -7 & 4 \\ -5 & 0 & 9\end{array}] - [\begin{array}{ccc}5 & 4 & -2 \\ 0 & -3 & 5\end{array}]\)

14. \([\begin{array}{ccc}1 & 9 & 0 \\ 6 & -2 & 12\end{array}] + [\begin{array}{c}10 \\ 7 \\ -1 \end{array}]\)
Use the Distributive Property to rewrite each expression.

1. \(4(j + 4)\)  
2. \(5(n + 2)\)  
3. \((c + 9)3\)

4. \(2(w - 8)\)  
5. \((s - 7)7\)  
6. \(-4(e + 6)\)

7. \((b + 3)(-7)\)  
8. \(-8(v - 7)\)  
9. \((2n + 3)6\)

10. \(5(c + d)\)  
11. \(-7(3x - 1)\)  
12. \((e - f)3\)

13. \(2(-3m + 1)\)  
14. \((2b - 3)(-9)\)  
15. \(-5(s + 7)\)

16. \((t + 7)3\)  
17. \(6(-2v + 4)\)  
18. \((m - n)(-3)\)

Identify the terms, like terms, coefficients, and constants in each expression.

19. \(4e + 7e + 5\)

20. \(5 - 4x - 8\)

21. \(-3h - 2h + 6h + 9\)

22. \(7 - 5y + 2 + 1\)

23. \(9k + 7 -k + 4\)

24. \(4z + 3 - 2z - z\)

Simplify each expression.

25. \(3t + 6t\)  
26. \(4r + r\)  
27. \(7f - 2f\)

28. \(9a - 8a\)  
29. \(5c + 8c\)  
30. \(2g - 5g\)

31. \(8k + 3 + 4k\)  
32. \(7m - 5m - 6\)  
33. \(9 - 6x + 5\)

34. \(7p - 1 - 9p + 5\)  
35. \(-b - 3b + 8b + 4\)  
36. \(5h - 6 - 8 + 7h\)

37. \(8b + 6 - 8b + 1\)  
38. \(t - 5 - 2t + 5\)  
39. \(4w - 5w + w\)

40. \(6m - 7 + 2m + 7\)  
41. \(5f - 7f + f\)  
42. \(12y - 8 + 4y + y\)

43. \(9a + 5 - 7a - 2a\)  
44. \(6g - 7g + 13\)  
45. \(7x + 6 - 9x - 3\)
Practice: Skills

Solving Two-Step Equations

Solve each equation. Check your solution.

1. \(3n + 4 = 7\)
   \[n = 1\]

2. \(9 = 2s + 1\)
   \[s = 4\]

3. \(4c - 6 = 2\)
   \[c = 2\]

4. \(-4 = 2t - 2\)
   \[t = 1\]

5. \(3f - 12 = -3\)
   \[f = 3\]

6. \(8 = 4v + 12\)
   \[v = -2\]

7. \(5d - 6 = 9\)
   \[d = 3\]

8. \(2k + 12 = -4\)
   \[k = -8\]

9. \(-5 = 3m - 14\)
   \[m = 3\]

10. \(0 = 8z + 8\)
    \[z = -1\]

11. \(9a - 2 = -2\)
    \[a = 0\]

12. \(-8 + 4s = -16\)
    \[s = -2\]

13. \(-1 = 4 - 5x\)
    \[x = 1\]

14. \(5 = 9 - 2x\)
    \[x = 2\]

15. \(-2x + 12 = 14\)
    \[x = 1\]

16. \(1 - x = 8\)
    \[x = -7\]

17. \(-2 = -x + 4\)
    \[x = 6\]

18. \(11 = 2 - 3x\)
    \[x = -3\]

19. \(12 - 3x = 6\)
    \[x = 2\]

20. \(-6x + 5 = 17\)
    \[x = -2\]

21. \(13 = 18 - 5x\)
    \[x = -1\]

22. \(4x + 2x + 2 = 26\)
    \[x = 3\]

23. \(-18 = 9y - 5y + 10\)
    \[y = 7\]

24. \(-24 = 6a - 15 - 5a\)
    \[a = 9\]

25. \(3z - 17 + 2z = 13\)
    \[z = 4\]

26. \(22 = 4 + 8e - 2e\)
    \[e = 3\]

27. \(-15 = 9r + 1 - 7r\)
    \[r = -2\]

28. \(8k - 8 + k = 10\)
    \[k = 2\]

29. \(-27 = 2c - 7 - 6c\)
    \[c = 4\]

30. \(11 = 18 + 3f + 4f\)
    \[f = -1\]
Translate each sentence into an equation. Then find each number.

1. Four more than twice a number is 8.

2. Three more than four times a number is 15.

3. Five less than twice a number is 7.

4. One less than four times a number is 11.

5. Seven more than the quotient of a number and 2 is 10.

6. Six less than six times a number is 12.

7. Five less than the quotient of a number and 3 is −7.

8. Seven more than twice a number is 1.

9. The difference between 5 times a number and 3 is 12.

10. Nine more than three times a number is −6.

11. Nine more than the quotient of a number and 4 is 12.

12. Four less than the quotient of a number and 3 is −10.

13. Nine less than six times a number is −15.

14. Three less than the quotient of a number and 6 is 1.

15. Eight more than the quotient of a number and 5 is 3.

16. The difference between twice a number and 11 is −23.
Practice: Skills

Solving Equations with Variables on Each Side

Solve each equation. Check your solution.

1. \(3w + 6 = 4w\)  
2. \(a + 18 = 7a\)

3. \(8c = 5c + 21\)  
4. \(11d + 10 = 6d\)

5. \(2e = 4e - 16\)  
6. \(7v = 2v - 20\)

7. \(4n - 6 = 10n\)  
8. \(2y + 27 = 5y\)

9. \(8h = 6h - 14\)  
10. \(18 - 2g = 4g\)

11. \(4x - 9 = 6x - 13\)  
12. \(5c - 15 = 2c + 6\)

13. \(t + 10 = 7t - 14\)  
14. \(8z + 6 = 7z + 4\)

15. \(2e - 12 = 7e + 8\)  
16. \(9k + 6 = 8k + 13\)

17. \(2d + 10 = 6d - 10\)  
18. \(-2a - 9 = 6a + 15\)

19. \(8 - 3k = 3k + 2\)  
20. \(7t - 4 = 10t + 14\)

21. \(3c - 15 = 17 - c\)  
22. \(14 + 3n = 5n - 6\)

23. \(3y + 5.2 = 2 - 5y\)  
24. \(10b - 2 = 7b - 7.4\)

25. \(2m - 2 = 6m - 4\)  
26. \(3g + 5 = 7g + 4\)

27. \(4s - 1 = 8 - 2s\)  
28. \(9w + 3 = 4w - 9\)

29. \(6z - 7 = 2z - 2\)  
30. \(3 - a = 4a + 12\)
Write an inequality for each sentence.

1. **SPORTS** You need to score at least 30 points to take the lead.

2. **SEASONS** There are less than 12 hours of daylight each day in winter.

3. **TRAVEL** The bus seats at most 60 people.

4. **MONEY** The coupon is good for any item that costs less than $10.

5. **TESTS** A score of at least 92 on the test is considered an “A.”

6. **HEALTH** The baby weighed more than 7 pounds at birth.

7. **DRIVING** Victor drives less than 12,000 miles per year.

8. **TRAVEL** Your waiting time will be 18 minutes or less.

9. **SCHOOL TRIPS** At least 15 students must sign up for the school trip.

For the given value, state whether each inequality is true or false.

10. \(y + 2 < 8, y = 3\)
11. \(12 > u - 1, u = 14\)
12. \(p + 5 \geq -6, p = 1\)
13. \(-6 < a - 3, a = -1\)
14. \(4s \leq 15, s = 4\)
15. \(-5 > 1 - d, d = -9\)
16. \(-2 - g \geq -7, g = 5\)
17. \(\frac{k}{3} > 4, k = 12\)
18. \(4 < -\frac{10}{z}, z = -2\)
19. \(\frac{12}{m} \geq 3, m = 4\)

Graph each inequality on a number line.

20. \(v \geq 3\)
21. \(b > 5\)
22. \(n \leq -3\)
23. \(w < 4\)
24. \(r > -1\)
25. \(h \geq -7\)
10-6 Practice: Skills

Solving Inequalities by Adding or Subtracting

Solve each inequality. Check your solution.

1. \( r + 5 < 6 \)
2. \( e - 3 > 2 \)
3. \( -8 \geq k - 5 \)

4. \( y + 6 > 5 \)
5. \( n - 4 \geq 6 \)
6. \( -4 > g - 10 \)

7. \( -1 \leq m + 8 \)
8. \( t + 1 \leq 6 \)
9. \( -17 > u - 2 \)

10. \( 5 + x \leq -7 \)
11. \( 10 > p + 9 \)
12. \( -4 + z < -12 \)

13. \( 5 \leq q + 8 \)
14. \( k - 6 > -5 \)
15. \( s + 7 \leq -13 \)

Write an inequality and solve each problem.

16. Two more than a number is less than eleven.

17. Five less than a number is at least \(-2\).

18. The difference between a number and 6 is no more than 5.

19. The sum of a number and 7 is more than 1.

20. The difference between a number and ten is greater than 9.

21. Four less than a number is less than 11.

Solve each inequality and check your solution. Then graph the solution on a number line.

22. \( 9 < p - 6 \)

23. \( w + 4 \geq -3 \)

24. \( 1 > z + 5 \)

25. \( -6 \leq s - 7 \)

26. \( b - 3 \leq 7 \)

27. \( v + 9 > 23 \)

28. \( 4 + v \geq 5 \)

29. \( m + 7 < 11 \)
Practice: Skills

Solving Inequalities by Multiplying or Dividing

Solve each inequality and check your solution. Then graph the solution on a number line.

1. \(2v > 10\)

2. \(\frac{p}{3} < -21\)

3. \(-12 \leq 4g\)

4. \(60 \geq 5c\)

5. \(\frac{a}{2} > -2\)

6. \(1 \leq \frac{u}{6}\)

7. \(-14 > 14n\)

8. \(-4d \geq -28\)

Solve each inequality. Check your solution.

9. \(3a + 2 < -4\)

10. \(5b - 4 \geq -29\)

11. \(\frac{m}{4} + 6 < 10\)

12. \(-7d + 8 \leq 1\)

13. \(\frac{z}{-8} - 5 < -2\)

14. \(2 + \frac{r}{6} > -1\)

15. \(4v - 6 \leq 2\)

16. \(3 + \frac{h}{-7} \geq 1\)

17. \(-2y - 5 \leq 19\)

Write an inequality for each sentence. Then solve the inequality.

18. Six times a number is less than 60.

19. The quotient of a number and 2 is more than \(-11\).

20. The quotient of a number and 5 is at most \(-5\).

21. Two times a number is more than 36.

22. Negative three times a number is at least \(-60\).

23. Four times a number is greater than \(-56\).
State whether each sequence is arithmetic, geometric, or neither. If it is arithmetic or geometric, state the common difference or common ratio. Write the next three terms of the sequence.

1. 1, 5, 9, 13, 17, . . .  
2. –3, –6, –12, –24, –48, . . .

3. 2, 5, 8, 11, 14, . . .  
4. 1, 6, 16, 31, 51, . . .

5. 3, 7, 11, 15, 19, . . .  
6. 4, 9, 14, 19, 24, . . .

7. 1, –3, 9, –27, 81, . . .  
8. 1, 2, 1, 2, 1, . . .

9. 7, 4, 1, –2, –5, . . .  
10. –4, 4, –4, 4, –4, . . .

11. –5, 10, –20, 40, –80, . . .  

13. 0, –2, –5, –9, –14, . . .  
14. 4, 12, 36, 108, 324, . . .

15. –2, 10, –50, 250, –1,250, . . .  

17. 448, 224, 112, 56, 28, . . .  
18. 2, 2, 4, 12, 48, . . .

19. 3, 6 1/2, 10, 13 1/2, 17, . . .  
20. 81, 27, 9, 3, 1, . . .
11-2 Practice: Skills

Functions

Find each function value.

1. \( f(2) \) if \( f(x) = x + 4 \)
2. \( f(9) \) if \( f(x) = x - 8 \)
3. \( f(3) \) if \( f(x) = 2x + 2 \)
4. \( f(6) \) if \( f(x) = 2x - 5 \)
5. \( f(-7) \) if \( f(x) = 3x + 6 \)
6. \( f(8) \) if \( f(x) = 3x - 10 \)
7. \( f(-5) \) if \( f(x) = 4x + 2 \)
8. \( f(-3) \) if \( f(x) = -4x - 4 \)
9. \( f(-4) \) if \( f(x) = -5x - 3 \)

Complete each function table.

10. \( f(x) = x + 7 \)
11. \( f(x) = x - 13 \)
12. \( f(x) = 2x + 8 \)

<table>
<thead>
<tr>
<th>( x )</th>
<th>( x + 7 )</th>
<th>( f(x) )</th>
</tr>
</thead>
<tbody>
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13. \( f(x) = 2x - 3 \)
14. \( f(x) = 3x + 4 \)
15. \( f(x) = 7 - 3x \)

<table>
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<tr>
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16. \( f(x) = 4x + 5 \)
17. \( f(x) = 1 - 4x \)
18. \( f(x) = 6x - 2 \)

<table>
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<tr>
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<th>( 4x + 5 )</th>
<th>( f(x) )</th>
</tr>
</thead>
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<th>( f(x) )</th>
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<tr>
<td>7</td>
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</table>
Complete the function table. Then graph the function.

1. \( y = x + 4 \)

<table>
<thead>
<tr>
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<th>( x + 4 )</th>
<th>( y )</th>
<th>( (x, y) )</th>
</tr>
</thead>
<tbody>
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<tr>
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<td></td>
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<tr>
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<tr>
<td>1</td>
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</tbody>
</table>

Graph each function.

3. \( y = x - 6 \)

4. \( y = 2x - 3 \)

5. \( y = 1 - x \)

6. \( y = 3x + 2 \)

7. \( y = \frac{x}{2} + 2 \)

8. \( y = \frac{x}{3} - 1 \)
11-4 Practice: Skills

The Slope Formula

Find the slope of the line that passes through each pair of points.

1. \(A(-2, -4), B(2, 4)\)  
2. \(C(0, 2), D(-2, 0)\)  
3. \(E(3, 4), F(4, -2)\)

4. \(G(-3, -1), H(-2, -2)\)  
5. \(I(0, 6), J(-1, 1)\)  
6. \(K(0, -2), L(2, 4)\)

7. \(O(1, -3), P(2, 5)\)  
8. \(Q(1, 0), R(3, 0)\)  
9. \(S(0, 4), T(1, 0)\)

10. \(U(1, 3), V(1, 5)\)  
11. \(W(2, -2), X(-1, 1)\)  
12. \(Y(-5, 0), Z(-2, -4)\)

13. \(A(2, -1), B(-4, -4)\)  
14. \(C(-2, 2), D(-4, 2)\)  
15. \(E(-1, -4), F(-3, 0)\)

16. \(G(7, 4), H(2, 0)\)  
17. \(K(2, -2), L(2, -3)\)  
18. \(M(-1, -1), N(-4, -5)\)

19. \(O(5, -3), P(-3, 4)\)  
20. \(Q(-1, -3), R(1, 2)\)  
21. \(W(3, -5), X(1, 1)\)

22. \(Y(2, 2), Z(-5, -4)\)  
23. \(C(0, -2), D(3, -2)\)  
24. \(G(-3, 5), H(-3, 2)\)
State the slope and 
\( y \)-intercept of the graph of each equation.

1. \( y = x + 4 \)  
2. \( y = 2x - 2 \)  
3. \( y = 3x - 1 \)  
4. \( y = -x + 3 \)  
5. \( y = \frac{1}{2}x - 5 \)  
6. \( y = -\frac{1}{3}x + 4 \)  
7. \( y - 2x = -1 \)  
8. \( y + 4x = 2 \)  
9. \( y = \frac{3}{2}x - 3 \)

10. Graph a line with a slope of 1 and a 
\( y \)-intercept of -4.  
11. Graph a line with a slope of 2 and a 
\( y \)-intercept of -3.  
12. Graph a line with a slope of \( \frac{1}{3} \) and a 
\( y \)-intercept of 1.

Graph each equation using the slope and 
\( y \)-intercept.

13. \( y = 3x - 3 \)  
14. \( y = -x + 1 \)  
15. \( y = \frac{1}{2}x - 2 \)  
16. \( y = 4x - 2 \)  
17. \( y = -\frac{3}{2}x + 1 \)  
18. \( y = \frac{2}{3}x - 3 \)
Determine whether a scatter plot of the data for the following might show a positive, negative, or no relationship.

1. rotations of a bicycle tire and distance traveled on the bicycle

2. number of pages printed by an inkjet printer and the amount of ink in the cartridge

3. age of a child and the child’s shoe size

4. number of letters in a person’s first name and the person’s height

5. shots attempted and points made in a basketball game

6. year and winning time in the 100-meter dash in the Olympics

7. diameter of the trunk of a tree and the height of the tree

8. number of a bank account and the amount of money in the bank account

9. length of a taxi ride and the amount of the fare

10. daily high temperature and the amount of clothing a person wears

11. a person’s age and a person’s street address

12. outside temperature and the cost of air conditioning

13. the age of a car and how many people fit inside of it

14. inches of rainfall in the last 30 days and the water level in a reservoir

15. miles ridden on a bicycle tire and thickness of the tire tread

16. population of a U.S. state and the number of U.S. senators a state has
Solve each system of equations by graphing.

1. \( y = -x + 3 \)
   \( y = x - 1 \)

2. \( y = x + 1 \)
   \( y = -2x - 2 \)

3. \( y = 3x + 5 \)
   \( y = -x - 3 \)

4. \( y = -\frac{1}{2}x + 4 \)
   \( y = 3x - 3 \)

Solve each system of equations by substitution.

5. \( y = x + 2 \)
   \( y = 6 \)

6. \( y = x + 3 \)
   \( x = 2 \)

7. \( y = 2x + 6 \)
   \( y = 2 \)

8. \( y = -2x - 5 \)
   \( x = -3 \)

9. \( y = 3x - 7 \)
   \( y = -1 \)

10. \( y = -3x + 2 \)
    \( x = 5 \)

11. \( y = 4x + 3 \)
    \( y = 7 \)

12. \( y = -5x - 2 \)
    \( x = -2 \)

13. \( y = 6x - 5 \)
    \( y = 7 \)
Graph each inequality.

1. \( y > x - 3 \)

2. \( y \leq -x + 2 \)

3. \( y < 2x + 1 \)

4. \( y \geq -2x - 3 \)

5. \( y > 3x + 2 \)

6. \( y < -4x - 3 \)

7. \( y \geq 5x - 1 \)

8. \( y > \frac{1}{2}x + 1 \)

9. \( y \leq -\frac{2}{3}x + 3 \)

10. \( y \leq \frac{1}{2}x - 3 \)

11. \( y > -2x - 2 \)

12. \( y \geq \frac{1}{4}x + 1 \)
Determine whether each graph, equation, or table represents a \textit{linear} or \textit{nonlinear} function. Explain.

1. \[ y = 2x \]
2. \[ y = 3x^2 + 5 \]
3. \[ y = \frac{6}{x} \]
4. \[ y = x^3 + 7 \]
5. \[ y = -6 \]
6. \[ y = -\frac{5x}{2} \]
7. \[ y = 2x \]
8. \[ y = 3x^2 + 5 \]
9. \[ y = \frac{6}{x} \]
10. \[ y = x^3 + 7 \]
11. \[ y = -6 \]
12. \[ y = -\frac{5x}{2} \]

13. \[
\begin{array}{cccc}
  x & 1 & 2 & 3 \\
  y & 5 & 7 & 9 \\
\end{array}
\]

14. \[
\begin{array}{cccc}
  x & -2 & 0 & 2 \\
  y & 0 & 1 & 3 \\
\end{array}
\]

15. \[
\begin{array}{cccc}
  x & -1 & 0 & 1 \\
  y & 8 & 4 & 0 \\
\end{array}
\]

16. \[
\begin{array}{cccc}
  x & 2 & 3 & 4 & 5 \\
  y & 3 & 5 & 8 & 12 \\
\end{array}
\]

17. \[
\begin{array}{cccc}
  x & -2 & 1 & 4 & 7 \\
  y & -4 & 1 & 6 & 11 \\
\end{array}
\]

18. \[
\begin{array}{cccc}
  x & 3 & 6 & 9 & 12 \\
  y & 10 & 6 & 3 & 1 \\
\end{array}
\]
Graph each function.

1. $y = -4x^2$
2. $y = 1.5x^2$
3. $y = x^2 + 4$
4. $y = x^2 - 5$
5. $y = -x^2 + 3$
6. $y = -x^2 - 1$
7. $y = 2x^2 - 3$
8. $y = -2x^2 + 1$
9. $y = -2x^2 - 2$
10. $y = 3x^2 + 1$
11. $y = -3x^2 + 3$
12. $y = 0.5x^2 + 2$
13. $y = 1.5x^2 - 1$
14. $y = 2.5x^2 + 1$
15. $y = -0.5x^2 - 1$
Simplify each polynomial. If the polynomial cannot be simplified, write simplest form.

1. \(2x + x^2 + 3x\)

2. \(3x^2 + 4 - 2x^2 - 5\)

3. \(2s + 3d + 3s + 2d\)

4. \(3f - 5g - f - 2g\)

5. \(-3h + 6k + 2 - 2k\)

6. \(5z + x + 9\)

7. \(2c - 4v + 5c - 3\)

8. \(-5n - 6m + 2 + 6m\)

9. \(w^2 + 3 - 5\)

10. \(2e^2 - 3e + 6e\)

11. \(3r + 2r^2 - 4r^2\)

12. \(5t^2 - 6t - 8\)

13. \(4y^2 - 6y - y^2 + 3\)

14. \(2u^2 + 5u + 9 - 8u\)

15. \(-p^2 - 2p + 4 - 2p^2 + 2\)

16. \(7a^2 + 5a + 1 + 3a^2 - 8a\)

17. \(2s^2 - 7s - 6 - 2s + 4\)

18. \(-3d^2 + 5d - 8 + 2d^2 - d + 5\)

19. \(2f^2 + 3f + 8 + 4f + f^2 + 6\)

20. \(-6k^2 - 4k + 5 - 3k^2 + 7k + 6\)
Add. Then evaluate each sum if $x = 3$, $y = -2$, and $z = 4$.

21. $(4x + 5y) + (2x - 3y)$
22. $(-3x + 4z) + (2y - x)$

23. $(z - 2x) + (-8z + y)$
24. $(2x - 4y) + (3x - 6z)$
Practice: Skills

Subtracting Polynomials

Subtract.

1. \(5w + 6\)  
   \((-) 3w + 2\)

2. \(7r + 9\)  
   \((-) 4r - 6\)

3. \(5t^2 + 9t + 5\)  
   \((-) 2t^2 + 4t + 9\)

4. \(6y^2 + 3y + 2\)  
   \((-) y^2 + 2y - 6\)

5. \(9a^2 + 2a + 5\)  
   \((-) 4a^2 + 1\)

6. \(8d^2 + 4d + 5\)  
   \((-) 7d^2 - 1\)

7. \((8f + 7) - (4f + 3)\)

8. \((9g + 6) - (3g - 1)\)

9. \((7h + 9) - (-2h + 6)\)

10. \((5k^2 + 5) - (-2k + 3)\)

11. \((8z^2 - 4) - (7z + 1)\)

12. \((9x^2 + 11x + 5) - (7x^2 + 2x + 3)\)

13. \((4c^2 + 5c + 2) - (c^2 - 3c - 4)\)

14. \((3v^2 + 4v + 6) - (7v^2 + 2v - 1)\)

15. \((6b^2 - 4b + 9) - (5b^2 + 3b - 4)\)

16. \((8n^2 + 7n - 5) - (-n^2 + 2n - 3)\)

Subtract. Then evaluate the difference if \(x = 4\) and \(y = -6\).

17. \((6x + 5) - (3x + 1)\)

18. \((3x + 9y) - (5x + 7y)\)

19. \((-2y - x) - (-3y + 1)\)

20. \((7x + 3) - (4y + x)\)

21. \((5x - 6) - (-8y - 3x)\)

22. \((-2y + 9) - (6x + y)\)
Multiply or divide. Express using exponents.

1. \(2^7 \cdot 2^2\)  
2. \(4^2 \cdot 4^4\)  
3. \(10^2 \cdot 10^3\)

4. \(k^8 \cdot k\)  
5. \(t^7 \cdot t^6\)  
6. \(2w^2 \cdot 5w^2\)

7. \(3e^3 \cdot 7e^3\)  
8. \(4r^4(-4r^3)\)  
9. \((-6t^7)(5t^2)\)

10. \(7y^3 \cdot 6y\)  
11. \((3u^5)(-9u^6)\)  
12. \((-2p^7)(-8p^3)\)

13. \((5c^4)(-7c)\)  
14. \((8z^7)(3z^6)\)  
15. \((-3l^2w^3)(2lw^4)\)

16. \(\frac{2^9}{2^3}\)  
17. \(\frac{3^8}{3^4}\)  
18. \(\frac{5^9}{5^2}\)

19. \(\frac{8^7}{8}\)  
20. \(\frac{b^{12}}{b^5}\)  
21. \(\frac{12n^5}{4n^2}\)

22. \(\frac{14m^3}{7m^2}\)  
23. \(\frac{9r^8}{3r^4}\)  
24. \(\frac{24q^9}{6q^3}\)

25. \(\frac{18y^6}{2y}\)  
26. \(a^4c^6(a^2c)\)  
27. \(\frac{15x^3y^4}{3x^2y^2}\)

28. \(\frac{-21s^6t^3}{3s^2t}\)  
29. \(\frac{34v^7}{2v^3}\)  
30. \(\frac{4^2q^5}{2q^2}\)
Multiply.

1. \( z(z + 3) \)
2. \( x(x - 5) \)
3. \( (c + 6)e \)

4. \( b(2b + 3) \)
5. \( 4n(3n - 2) \)
6. \( (6m + 4)3m \)

7. \( -5a(3a + 5) \)
8. \( (8s - 1)(-2s) \)
9. \( 6d(5 + 3d) \)

10. \( -h(7 + 12h) \)
11. \( (1 + 5k)(5k) \)
12. \( (3 - w)(4w) \)

13. \( 2r(5r^2 + 3) \)
14. \( 3y(6y^2 - 9) \)
15. \( -7p(3p^2 - 4) \)

16. \( 2a(a^2 + 3a + 5) \)
17. \( d(8d^2 - 4d - 6) \)
18. \( 3g(7g^2 - 5g + 3) \)

19. \( -8h(4h^2 + 2h + 1) \)
20. \( -5k(4k^2 - k - 6) \)
21. \( -6z(2z^2 + 9z + 7) \)

22. \( 10c(7c^2 - 3c - 6) \)
23. \( 12c(-3c^2 + 5c - 4) \)
24. \( -15d(-d^2 - 3d + 2) \)

25. \( (7e^2 + 3e - 6)(-4e) \)
26. \( -3t(8 - 6t + 15t^2) \)
27. \( -9u(7u^2 - 2u - 4) \)

28. \( 6w(-2 - 6w - 9w^2) \)
29. \( (-3s^2 - 9)(-11s) \)
30. \( (-7 + 5z - 3z^2)(5z) \)

31. \( -12t(-4t^2 + 5t - 6) \)
32. \( 9q(-4q^2 + 7q - 10) \)
33. \( (7 - 12n + 11n^2)(-6n) \)

34. \( 2f^2(7f - 8) \)
35. \( -3x(7x^4 - 2) \)
36. \( (3 - 5h^3)(-4h) \)