Grade 9 Academic Math (MPM1D0)  
Summer Package  
Pre-Requisite Algebra Skills

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Practice 1-1 (Answers on page 16-17)

Using Variables

Write an algebraic expression for each phrase.

1. 7 increased by x
2. p multiplied by 3
3. 10 decreased by m
4. n less than 7
5. the product of 2 and q
6. 3 more than m

Write a phrase for each algebraic expression.

7. \( \frac{8}{a} \)
8. \( s - 10 \)
9. \( x + 13 \)
10. \( ab + 2 \)

Define a variable and write an algebraic expression for each phrase.

11. the difference of 8 and a number
12. the sum of 4 and a number
13. the product of 2 and a number
14. 3 increased by a number
15. 10 plus the quotient of a number and 15
16. 12 less than a number

Define a variable and write an algebraic equation to model each situation.

17. What is the total cost of buying several shirts at $24.95 each?
18. The number of gal of water used to water trees is 30 times the number of trees.
19. What is the amount of money in a bank containing only dimes?
20. What is the number of marbles left in a 48-marble bag after some marbles have been given away?
21. The total cost equals the price of the tickets multiplied by eight people.
22. What is the cost of buying several pairs of pants at $32.95 per pair?

Define variables and write an equation to model the relationship in each table.

23. | Number of Tickets | Total Cost |
<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>2</td>
<td>$7</td>
</tr>
<tr>
<td>4</td>
<td>$14</td>
</tr>
<tr>
<td>6</td>
<td>$21</td>
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</table>

24. | Number of Hours | Distance Traveled |
<table>
<thead>
<tr>
<th></th>
<th></th>
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<tbody>
<tr>
<td>1</td>
<td>55 mi</td>
</tr>
<tr>
<td>3</td>
<td>165 mi</td>
</tr>
<tr>
<td>5</td>
<td>275 mi</td>
</tr>
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25. | Number of Hours | Total Pay |
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<tbody>
<tr>
<td>8</td>
<td>$40</td>
</tr>
<tr>
<td>12</td>
<td>$60</td>
</tr>
<tr>
<td>16</td>
<td>$80</td>
</tr>
</tbody>
</table>

26. | Total Cost      | Change From $10 |
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>$10.00</td>
<td>$0</td>
</tr>
<tr>
<td>$9.00</td>
<td>$1.00</td>
</tr>
<tr>
<td>$7.50</td>
<td>$2.50</td>
</tr>
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</table>

27. | Number of Days | Length |
<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>1</td>
<td>0.45 in.</td>
</tr>
<tr>
<td>4</td>
<td>1.80 in.</td>
</tr>
<tr>
<td>8</td>
<td>3.60 in.</td>
</tr>
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</table>

28. | Miles Traveled | Miles Remaining |
<table>
<thead>
<tr>
<th></th>
<th></th>
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<tbody>
<tr>
<td>0</td>
<td>500</td>
</tr>
<tr>
<td>125</td>
<td>375</td>
</tr>
<tr>
<td>350</td>
<td>150</td>
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Practice 1-2 (Answers on page 16-17)  Exponents and Order of Operations  

Simplify each expression.

1. \(4 + 6(8)\)  
2. \(\frac{4(8 - 2)}{7}\)  
3. \(4 \times 3^2 + 2\)  
4. \(40 \div 5(2)\)  
5. \(2.7 + 3.6 \times 4.5\)  
6. \(3[4(8 - 2) + 5]\)  
7. \(4 + 3(15 - 2^3)\)  
8. \(17 - [(3 + 2) \times 2]\)  
9. \(6 \times (3 + 2) + 15\)  

Evaluate each expression.

10. \(\frac{a + 2b}{5}\) for \(a = 1\) and \(b = 2\)  
11. \(\frac{5m + n}{5}\) for \(m = 6\) and \(n = 15\)  
12. \(x + 3y^2\) for \(x = 3.4\) and \(y = 3\)  
13. \(7a - 4(b + 2)\) for \(a = 5\) and \(b = 2\)  

Simplify each expression.

14. \(\frac{100 - 15}{9 + 8}\)  
15. \(\frac{2(3 + 4)}{7}\)  
16. \(\frac{3(4 + 12)}{2(7 - 3)}\)  
17. \(14 + 3 \times 4\)  
18. \(8 + 3(4 + 3)\)  
19. \(3 + 4[13 - 2(6 - 3)]\)  
20. \(8(5 + 30 \div 5)\)  
21. \((3.4)(2.7) + 5\)  
22. \(50 \div 2 + 15 \times 4\)  
23. \(7(9 - 5)\)  
24. \(2(3^2) - 3(2)\)  
25. \(4 + 8 \div 2 + 6 \times 3\)  
26. \((7 + 8) \div (4 - 1)\)  
27. \(5[2(8 + 5) - 15]\)  
28. \((6 + 8) \times (8 - 4)\)  
29. \(12 \left(\frac{6 + 30}{9 - 3}\right)\)  
30. \(14 + 6 \times 2^3 - 8 \div 2^2\)  
31. \(\frac{7(14) - 3(6)}{2}\)  
32. \(14 \div [3(8 - 2) - 11]\)  
33. \(3 \left(\frac{9 + 13}{6}\right)\)  
34. \(\frac{4(8 - 3)}{5 + 2}\)  
35. \(5 + 4^2 \times 8 - 2^3 + 2^2\)  
36. \(4^2 + 5^2(8 - 3)\)  
37. \(5(3^2 + 2) - 2(6^2 - 5^2)\)  

Evaluate each expression for \(a = 2\) and \(b = 6\).

38. \(2(7a - b)\)  
39. \((a^3 + b^2) + a\)  
40. \(3b \div (2a - 1) + b\)  
41. \(\frac{5a + 2}{b}\)  
42. \(\frac{3(b - 2)}{4(a + 1)}\)  
43. \(9b + a^4 + 8\)  

Use the expression \(r + 0.12m\) to calculate the cost of renting a car. The basic rate is \(r\). The number of miles driven is \(m\).

44. The basic rate is $15.95. The car is driven 150 mi.
45. The basic rate is $32.50. The car is driven 257 mi.

Evaluate each expression for \(s = 3\) and \(t = 9\).

46. \(8(4s - t)\)  
47. \((2t - 3s) \div 4\)  
48. \(t^2 - s^4\)  
49. \(s(3t + 6)\)  
50. \(\frac{5s^2}{t}\)  
51. \(\frac{2t^2}{s^3}\)
Practice 2-3 (Answers on page 16-17)

Multiplying and Dividing Rational Numbers

Simplify each expression.

1. \((-2)(8)\)  
2. \((-6)(-9)\)  
3. \((-3)^4\)
4. \(-2^5\)  
5. \((6)(-8)\)  
6. \((-14)^2\)
7. \(2(-4)(-6)\)  
8. \(-30 + (-5)\)  
9. \(-\frac{52}{13}\)
10. \((-8)(5)(-3)\)  
11. \(-7^2\)  
12. \(-3^5\)
13. \(\frac{-68}{17}\)  
14. \(\frac{(-4)(-13)}{-26}\)  
15. \(\frac{225}{(-3)(-5)}\)

Evaluate each expression.

16. \(x^3\) for \(x = -5\)  
17. \(s^2t + 10\) for \(s = -2\) and \(t = 10\)
18. \(-2m + 4n^2\) for \(m = -6\) and \(n = -5\)  
19. \(\frac{v}{w}\) for \(v = \frac{2}{3}\) and \(w = -\frac{1}{2}\)
20. \(-cd^2\) for \(c = 2\) and \(d = -4\)  
21. \((x + 4)^2\) for \(x = -11\)
22. \(\left(\frac{a}{b}\right)^2 + b^3\) for \(a = 24\) and \(b = -6\)  
23. \(4p^2 + 7q^3\) for \(p = -3\) and \(q = -2\)
24. \((e + f)^4\) for \(e = -3\) and \(f = 7\)  
25. \(5f^2 - z^2\) for \(f = -1\) and \(z = -4\)

Simplify each expression.

26. \(2^4 - 3^2 + 5^2\)  
27. \((-8)^3 - 4^3\)  
28. \(32 ÷ (-7 + 5)^3\)
29. \(\frac{3}{4} ÷ \left(\frac{-3}{7}\right)\)  
30. \(18 + 4^2 ÷ (-8)\)  
31. \(26 ÷ [4 - (-9)]\)
32. \(4^3 - (2 - 5)^3\)  
33. \(-(-4)^3\)  
34. \((-8)(-5)(-3)\)
35. \((-3)^2 - 4^2\)  
36. \(-\frac{45}{15}\)  
37. \((-2)^6\)
38. \(-\frac{90}{6}\)  
39. \(-\frac{15}{7 - 4}\)  
40. \(-\frac{195}{13}\)

Evaluate each expression.

41. \((a + b)^2\) for \(a = 6\) and \(b = -8\)  
42. \(d^3 ÷ e\) for \(d = -6\) and \(e = -3\)
43. \((m + 5n)^3\) for \(m = 2\) and \(n = -1\)  
44. \(j^5 - 5k\) for \(j = -4\) and \(k = -1\)
45. \(xy + z\) for \(x = -4\), \(y = 3\), and \(z = -3\)  
46. \(4s + (-3t)\) for \(s = -6\) and \(t = -2\)
47. \(\frac{r^3}{s}\) for \(r = -6\) and \(s = -2\)  
48. \(-\frac{h^3}{4}\) for \(h = 4\)
Practice 2-4 (Answers on page 16-17)  The Distributive Property

Simplify each expression.

1. \(2(x + 6)\)  2. \(-5(8 - b)\)  3. \(4(-x + 7)\)
4. \((5c - 7)(-3)\)  5. \(-2.5(3a + 5)\)  6. \(-(3k - 12)\)
7. \(-\frac{3}{4}((12-16d)\)  8. \(\frac{2}{5}(6h - 1)\)  9. \((-3.2x + 2.1)(-6)\)
10. \(3.5(3x - 8)\)  11. \(4(x + 7)\)  12. \(-2.5(2a - 4)\)
13. \(\frac{2}{3}(12 - 15d)\)  14. \(-2(k - 11)\)  15. \(-\frac{1}{3}(6h + 15)\)
16. \((2c - 8)(-4)\)  17. \(-(4 - 2b)\)  18. \(2(3x - 9)\)
19. \(4(2r + 8)\)  20. \(-5(b - 5)\)  21. \(3(f + 2)\)
22. \(6h + 5(h - 5)\)  23. \(-5d + 3(2d - 7)\)  24. \(7 + 2(4x - 3)\)
25. \(2(3h + 2) - 4h\)  26. \(2(4 + y)\)  27. \(\frac{1}{2}(2n - 4) - 2n\)
28. \(-w + 4(w + 3)\)  29. \(0.4(3d - 5)\)  30. \(-4d + 2(3 + d)\)
31. \(2x + \frac{3}{4}(4x + 16)\)  32. \(2(3a + 2)\)  33. \(5(t - 3) - 2t\)
34. \(5(b + 4) - 6b\)  35. \(\frac{2}{3}(5k + 35) - 8\)  36. \(0.4(2x + 4)\)
37. \(\frac{2}{3}(9b - 27)\)  38. \(\frac{1}{2}(12n - 8)\)  39. \(0.5(2x - 4)\)
40. \(2(a - 4) + 15\)  41. \(13 + 2(5c - 2)\)  42. \(7 + 2(\frac{1}{3}a - 3)\)
43. \(5(3x + 12)\)  44. \(2(m + 1)\)  45. \(4(2a + 2) - 17\)
46. \(-4x + 3(2x - 5)\)  47. \(3(t - 12)\)  48. \(-6 - 3(2k + 4)\)

Write an expression for each phrase.

49. 5 times the quantity \(x\) plus 6
50. twice the quantity \(y\) minus 8
51. the product of \(-15\) and the quantity \(x\) minus 5
52. 32 divided by the quantity \(y\) plus 12
53. \(-8\) times the quantity \(4\) decreased by \(w\)
54. the quantity \(x\) plus 9, times the quantity \(7\) minus \(x\)
Practice 3-1 (Answers on page 16-17)  

Solving Two-Step Equations

Solve each equation. Check your answer.

1. \( \frac{5a}{2} + 2 = 7 \)  
2. \( 2x + 3 = 7 \)  
3. \( 3b + 6 = 12 \)
4. \( 9 = 5 + 4t \)  
5. \( 4a + 1 = 13 \)  
6. \( -t + 2 = 12 \)

Write an equation to model each situation. Then solve.

7. You want to buy a bouquet of yellow roses and baby’s breath for $16.  
The baby’s breath costs $3.50 per bunch, and the roses cost $2.50 each.  
You want one bunch of baby’s breath and some roses for your bouquet.  
How many roses can you buy?

8. Suppose you walk at the rate of 210 ft/min. You need to walk 10,000 ft.  
How many more minutes will it take you to finish if you have already  
walked 550 ft?

9. Suppose you have shelled 6.5 lb of pecans, and you can shell pecans at a  
rate of 1.5 lb per hour. How many more hours will it take you to shell a  
total of 11 lb of pecans?

10. To mail a first class letter, the U.S. Postal Service charges $.34 for the  
first ounce and $.21 for each additional ounce. It costs $1.18 to mail  
your letter. How many ounces does your letter weigh?

11. Suppose you want to buy one pair of pants and several pairs of socks.  
The pants cost $24.95, and the socks are $5.95 per pair. How many  
pairs of socks can you buy if you have $50.00 to spend?

Solve each equation. Check your answer.

12. \( 5.8n + 3.7 = 29.8 \)  
13. \( 67 = -3y + 16 \)  
14. \( -d + 7 = 3 \)
15. \( \frac{m}{9} + 7 = 3 \)  
16. \( 6.78 + 5.2x = -36.9 \)  
17. \( 5z + 9 = -21 \)
18. \( 3x - 7 = 35 \)  
19. \( 36.9 = 3.7b - 14.9 \)  
20. \( 4s - 13 = 51 \)
21. \( 9f + 16 = 70 \)  
22. \( 11.6 + 3a = -16.9 \)  
23. \( -9 = - \frac{h}{12} + 5 \)
24. \( -c + 2 = 5 \)  
25. \( -67 = -8n + 5 \)  
26. \( 22 = 7 - 3a \)
27. \( \frac{k}{3} - 19 = -26 \)  
28. \( -21 = \frac{n}{3} + 2 \)  
29. \( 3x + 5.7 = 15 \)
30. \( \frac{a}{5} - 2 = -13 \)  
31. \( 2x + 23 = 49 \)  
32. \( \frac{x}{2} + 8 = -3 \)

Justify each step.

33. \( 24 - x = -16 \)  
a. \( 24 - x - 24 = -16 - 24 \)  
b. \( -x = -40 \)  
c. \( -1(-x) = -1(-40) \)  
d. \( x = 40 \)

34. \( \frac{x}{7} + 4 = 15 \)  
a. \( \frac{x}{7} + 4 - 4 = 15 - 4 \)  
b. \( \frac{x}{7} = 11 \)  
c. \( 7(\frac{x}{7}) = 7(11) \)  
d. \( x = 77 \)

35. \( -8 = 2x - 5 \)  
a. \( -8 + 5 = 2x - 5 + 5 \)  
b. \( -3 = 2x \)  
c. \( -\frac{3}{2} = \frac{2x}{2} \)  
d. \( -\frac{3}{2} = x \)
Practice 3-2  (Answers on page 16–17)  Solving Multi-Step Equations

Solve each equation. Check your answer.

1. \(2n + 3n + 7 = -41\)
2. \(2x - 5x + 6.3 = -14.4\)
3. \(2z + 9.75 - 7z = -5.15\)
4. \(3h - 5h + 11 = 17\)
5. \(2t + 8 - t = -3\)
6. \(6a - 2a = -36\)
7. \(3c - 8c + 7 = -18\)
8. \(7g + 14 - 5g = -8\)
9. \(2b - 6 + 3b = 14\)
10. \(2(a - 4) + 15 = 13\)
11. \(7 + 2(a - 3) = -9\)
12. \(13 + 2(5c - 2) = 29\)
13. \(5(3x + 12) = -15\)
14. \(4(2a + 2) - 17 = 15\)
15. \(2(m + 1) = 16\)
16. \(-4x + 3(2x - 5) = 31\)
17. \(-6 - 3(2k + 4) = 18\)
18. \(3(t - 12) = 27\)
19. \(-w + 4(w + 3) = -12\)
20. \(4 = 0.4(3d - 5)\)
21. \(-4d + 2(3 + d) = -14\)
22. \(2x + \frac{3}{2}(4x + 16) = 7\)
23. \(2(3a + 2) = -8\)
24. \(5(t - 3) - 2t = -30\)
25. \(5(b + 4) - 6b = -24\)
26. \(\frac{2}{3}(5k + 35) - 8 = 12\)
27. \(0.4(2x + 4) = 4.8\)
28. \(\frac{2}{3}(9b - 27) = 36\)
29. \(\frac{1}{2}(12n - 8) = 26\)
30. \(0.5(2x + 4) = -17\)
31. \(18 = \frac{c + 5}{2}\)
32. \(\frac{2}{9}s = -6\)
33. \(\frac{1}{3}x = \frac{1}{2}\)
34. \(\frac{2}{3}g + \frac{1}{2}g = 14\)
35. \(\frac{3x + 7}{2} = 8\)
36. \(\frac{2x - 6}{4} = -7\)
37. \(\frac{2}{3}k + \frac{1}{4}k = 22\)
38. \(-\frac{4}{7}h = -28\)
39. \(-8 = \frac{4}{5}k\)
40. \(\frac{3}{4} - \frac{1}{3}z = \frac{1}{4}\)
41. \(-9 = \frac{3}{4}m\)
42. \(\frac{5}{6}c - \frac{2}{3}c = \frac{1}{3}\)
43. \(\frac{4}{5} = -\frac{4}{7}g\)
44. \(\frac{9x + 6 - 4x}{2} = 8\)
45. \(-\frac{1}{6}d = -4\)

Write an equation to model each situation. Then solve.

46. The attendance at a baseball game was 400 people. Student tickets cost $2 and adult tickets cost $3. Total ticket sales were $1050. How many tickets of each type were sold?
47. The perimeter of a pool table is 30 ft. The table is twice as long as it is wide. What is the length of the pool table?
48. Lopez spent \(\frac{1}{2}\) of his vacation money for travel and \(\frac{3}{5}\) of his vacation money for lodging. He spent $1100 for travel and lodging. What is the total amount of money he spent on his vacation?
49. Victoria weighs \(\frac{5}{7}\) as much as Mario. Victoria weighs 125 lb. How much does Mario weigh?
50. Denise’s cell phone plan is $29.95 per month plus $.10 per minute for each minute over 300 minutes of call time. Denise’s cell phone bill is $99.95. For how many minutes was she billed?
Practice 3-3 Equations With Variables on Both Sides

Solve each equation. Check your answer. If appropriate, write identity or no solution.

1. \(7 - 2n = n - 14\)
2. \(2(4 - 2r) = -2(r + 5)\)
3. \(3d + 8 = 2d - 7\)
4. \(6t = 3(t + 4) - t\)
5. \(8z - 7 = 3z - 7 + 5z\)
6. \(7x - 8 = 3x + 12\)
7. \(3(n - 1) = 5n + 3 - 2n\)
8. \(2(6 - 4d) = 25 - 9d\)
9. \(3(n - 1) = 5n + 3 - 2n\)
10. \(2(4 - 2r) = -2(r + 5)\)
11. \(3d + 8 = 2d - 7\)
12. \(6t = 3(t + 4) - t\)
13. \(8(2f - 3) = 4(4f - 8)\)
14. \(6k - 25 = 7 - 2k\)
15. \(4b - 1 = -4 + 4b + 3\)
16. \(2 \cdot 3 - \frac{3}{2} = \frac{3}{4}a\)
17. \(2s - 12 + 2s = 4s - 12\)
18. \(3.6y = 5.4 + 3.3y\)
19. \(4.3v - 6 = 8 + 2.3v\)
20. \(4b - 1 = -4 + 4b + 3\)
21. \(2.3(6x + 3) = 4x + 2\)
22. \(6y + 9 = 3(2y + 3)\)
23. \(4g + 7 = 5g - 1 - g\)
24. \(2(n + 2) = 5n - 5\)
25. \(6 - 3d = 5(2 - d)\)
26. \(6.1h = 9.3 - 3.2h\)
27. \(-4.4s - 2 = -5.5s - 4.2\)
28. \(3(2f + 4) = 2(3f - 6)\)
29. \(\frac{2}{4}t - \frac{5}{6} = \frac{7}{3}t\)
30. \(3v + 8 = 8 + 2v + v\)
31. \(\frac{1}{2}d - \frac{3}{4} = \frac{3}{5}d\)
32. \(5(r + 3) = 2r + 6\)
33. \(8 - 3(p - 4) = 2p\)

Write an equation to model each situation. Then solve. Check your answer.

34. Hans needs to rent a moving truck. Suppose Company A charges a rate of $40 per day and Company B charges a $60 fee plus $20 per day. For what number of days is the cost the same?

35. Suppose a video store charges nonmembers $4 to rent each video. A store membership costs $21 and members pay only $2.50 to rent each video. For what number of videos is the cost the same?

36. Suppose your club is selling candles to raise money. It costs $100 to rent a booth from which to sell the candles. If the candles cost your club $1 each and are sold for $5 each, how many candles must be sold to equal your expenses?

Find the value of \(x\).

37. \((4x - 2)^\circ\) \((5x - 3)^\circ\)
38. \((\frac{1}{4}x + 3)^\circ\) \((\frac{3}{4}x - 7)^\circ\)
39. \((1.15 + 0.8x)^\circ\) \((2.3 - 1.5x)^\circ\)
Practice 3-4 (Answers on page 16-17)  

**Ratio and Proportion**

**Find each unit rate.**

1. $60 \text{ for } 8 \text{ h}$
2. $\frac{3}{8}$
3. $\frac{861 \text{ bagels}}{3 \text{ d}}$
4. $\frac{850 \text{ cal}}{1.25 \text{ h}}$

5. An 8-ounce bottle of lotion costs $4.50. What is the cost per ounce?
6. A pound of coffee costs $14.99. What is the cost per ounce?

**Which pairs of ratios could form a proportion? Justify your answer.**

7. $\frac{10}{24} = \frac{7}{18}$
8. $\frac{6}{10} = \frac{9}{15}$
9. $\frac{3}{4} = \frac{18}{24}$
10. $\frac{16}{2} = \frac{8}{1}$
11. $\frac{-4.8}{4} = \frac{-6.4}{5}$

**Solve each proportion.**

12. $\frac{g}{5} = \frac{6}{10}$
13. $\frac{z}{4} = \frac{7}{8}$
14. $\frac{13.2}{6} = \frac{m}{12}$
15. $\frac{m}{5} = \frac{-2}{5}$

16. $\frac{5.5}{11} = \frac{x}{5}$
17. $\frac{-2}{3} = \frac{-10}{t}$
18. $\frac{4}{6} = \frac{x}{24}$
19. $\frac{s}{3} = \frac{7}{10}$

20. $\frac{4}{9} = \frac{10}{x}$
21. $\frac{x}{4.8} = \frac{6}{3.2}$
22. $\frac{5}{4} = \frac{c}{12}$
23. $\frac{-32}{h} = \frac{-1}{3}$

24. $\frac{2}{6} = \frac{p}{9}$
25. $\frac{f}{6} = \frac{3}{4}$
26. $\frac{15}{x} = \frac{3}{8}$
27. $\frac{3}{4} = \frac{k}{24}$

28. $\frac{a}{6} = \frac{3}{9}$
29. $\frac{4}{5} = \frac{k}{7}$
30. $\frac{3}{y} = \frac{5}{8}$
31. $\frac{t}{7} = \frac{9}{21}$

32. $\frac{2}{9} = \frac{10}{x}$
33. $\frac{x}{15} = \frac{3}{4}$
34. $\frac{18}{11} = \frac{49.5}{x}$
35. $\frac{2}{12} = \frac{5}{x}$

36. $\frac{-x - 1}{4} = \frac{2}{3}$
37. $\frac{3}{6} = \frac{x - 3}{8}$
38. $\frac{2x - 2}{14} = \frac{2x - 4}{6}$
39. $\frac{x + 2}{x - 2} = \frac{4}{8}$
40. $\frac{x + 2}{6} = \frac{x - 1}{12}$
41. $\frac{-x + 8}{10} = \frac{-x - 3}{2}$

42. You are riding your bicycle. It takes you 28 min to go 8 mi. If you continue traveling at the same rate, how long will it take you to go 15 mi?

43. Suppose you traveled 84 mi in 1.5 h. Moving at the same speed, how many mi would you cover in 3 $\frac{1}{4}$ h?

44. A canary’s heart beats 130 times in 12 s. Use a proportion to find how many times its heart beats in 50 s.

45. Your car averages 18 mi per gal on the highway. If gas costs $1.85 per gal, how much does it cost in dollars per mi to drive your car on the highway?
Write and solve an equation for each situation.

1. A passenger train’s speed is 60 mi/h, and a freight train’s speed is 40 mi/h. The passenger train travels the same distance in 1.5 h less time than the freight train. How long does each train take to make the trip?

2. Lois rode her bike to visit a friend. She traveled at 10 mi/h. While she was there, it began to rain. Her friend drove her home in a car traveling at 25 mi/h. Lois took 1.5 h longer to go to her friend’s than to return home. How many hours did it take Lois to ride to her friend’s house?

3. May rides her bike the same distance that Leah walks. May rides her bike 10 km/h faster than Leah walks. If it takes May 1 h and Leah 3 h to travel that distance, how fast does each travel?

4. The length of a rectangle is 4 in. greater than the width. The perimeter of the rectangle is 24 in. Find the dimensions of the rectangle.

5. The length of a rectangle is twice the width. The perimeter is 48 in. Find the dimensions of the rectangle.

6. At 10:00 A.M., a car leaves a house at a rate of 60 mi/h. At the same time, another car leaves the same house at a rate of 50 mi/h in the opposite direction. At what time will the cars be 330 miles apart?

7. Marla begins walking at 3 mi/h toward the library. Her friend meets her at the halfway point and drives her the rest of the way to the library. The distance to the library is 4 miles. How many hours did Marla walk?

8. Fred begins walking toward John’s house at 3 mi/h. John leaves his house at the same time and walks toward Fred’s house on the same path at a rate of 2 mi/h. How long will it be before they meet if the distance between the houses is 4 miles?

9. A train leaves the station at 6:00 P.M. traveling west at 80 mi/h. On a parallel track, a second train leaves the station 3 hours later traveling west at 100 mi/h. At what time will the second train catch up with the first?

10. It takes 1 hour longer to fly to St. Paul at 200 mi/h than it does to return at 250 mi/h. How far away is St. Paul?

11. Find three consecutive integers whose sum is 126.

12. The sum of four consecutive odd integers is 216. Find the four integers.

13. A rectangular picture frame is to be 8 in. longer than it is wide. Dennis uses 84 in. of oak to frame the picture. What is the width of the frame?

14. Each of two congruent sides of an isosceles triangle is 8 in. less than twice the base. The perimeter of the triangle is 74 in. What is the length of the base?
Practice 3-7 (Answers on page 16-17)  

Percent of Change

Find each percent of change. Describe the percent of change as an increase or decrease. Round to the nearest whole number.

1. 36 g to 27 g  
2. 40 cm to 100 cm  
3. 90 in. to 45 in.  
4. 500 lb to 1500 lb  
5. $90 to $84.50  
6. $100 to $140  
7. $15 to $5.50  
8. 100 mi to 175 mi  
9. 280 m to 320 m  
10. 58 to 76  
11. 60 to 150  
12. 600 mi to 480 mi  
13. 18 to 27  
14. 290 yd to 261 yd  
15. 26.2 to 22.8  
16. $8.50 to $12.75  
17. $36\frac{1}{2} to $29\frac{1}{4}$  
18. $74\frac{3}{4} to 66\frac{1}{2}$  
19. $6\frac{3}{4} to 8\frac{1}{4}$  
20. $15\frac{1}{2} to 18\frac{1}{4}$

Find each percent of change. Describe the percent of change as an increase or decrease. Round to the nearest whole number.

21. In 1985, the average price for gasoline was $1.20/gal. In 2000, the average price for gasoline was $1.56. Find the percent of change.


23. In 1980, the average annual tuition charge for a four-year public university was $840. The average annual tuition charge in 2000 was $3356. What is the percent of change?

24. The United States imported 6,909,000 barrels of oil per day in 1980. In 2000, the United States imported 11,459,000 barrels of oil per day. What is the percent of change?

25. In 1977, the average number of households with cable television was 16.6%. In 2000, the average number of households with cable television was 68%. What is the percent of change?

26. In 1989, there were 38,000 licensed drivers under the age of 16. In 1999, the total number of licensed drivers under 16 was 33,248. Find the percent of change.

27. In 1990, Atlanta, GA, failed to meet air quality standards on 42 days. In 1999, Atlanta failed to meet air quality standards on 61 days. What is the percent of change?

Find the greatest possible error and the percent error for each measurement.

28. 3 cm  
29. 0.5 cm  
30. 6 cm  
31. 16 in.  
32. 36.85 g  
33. 0.9 cm

Find the minimum and maximum possible areas for rectangles with the following measurements.

34. 8 cm \times 10 \text{ cm}  
35. 3 \text{ in.} \times 5 \text{ in.}  
36. 8 \text{ m} \times 12 \text{ m}

Find the minimum and maximum possible volume for a rectangular solid with the following measurements.

37. 16 \text{ in.} \times 22 \text{ in.} \times 18 \text{ in.}  
38. 13 \text{ cm} \times 15 \text{ cm} \times 18 \text{ cm}  
39. 3 \text{ m} \times 4 \text{ m} \times 5 \text{ m}
Practice 3-9 (Answers on page 16-17) The Pythagorean Theorem

Use the triangle at the right. Find the length of the missing side to the nearest tenth.

1. \( a = 12, b = 35, c = \boxed{36} \)
2. \( a = 10, b = 15, c = \boxed{26} \)
3. \( a = 11, b = 12, c = 61 \)
4. \( a = 36, b = 15, c = \boxed{45} \)
5. \( a = 8, b = 15, c = \boxed{17} \)
6. \( a = 17, b = 12, c = 49 \)
7. \( a = 18, b = 14, c = \boxed{35} \)
8. \( a = 8, b = 8, c = \boxed{8} \)
9. \( a = 42, b = 37, c = \boxed{53} \)
10. \( a = 8, b = 80, c = 90 \)
11. \( a = 8, b = 8, c = 8 \)
12. \( a = 19, b = 12, c = \boxed{26} \)
13. \( a = \boxed{27}, b = 9, c = 33 \)
14. \( a = \boxed{13}, b = 12, c = 24 \)
15. \( a = 9, b = \boxed{13}, c = 13 \)
16. \( a = 19, b = 45, c = \boxed{50} \)
17. \( a = \boxed{24}, b = 24, c = 39 \)
18. \( a = 14, b = 14, c = \boxed{17} \)

Determine whether the given lengths are sides of a right triangle.

19. \( 20, 21, 29 \)
20. \( 16, 30, 34 \)
21. \( 24, 60, 66 \)
22. \( 23, 18, 14 \)
23. \( 10, 24, 28 \)
24. \( 45, 28, 53 \)
25. \( \frac{4}{3}, \frac{3}{5}, 1 \)
26. \( \frac{2}{3}, \frac{4}{3}, \frac{1}{3} \)
27. \( 3.5, 4.4, 5.5 \)
28. \( 10.5, 11.3, 13.8 \)
29. \( 3.3, 6.5, 5.6 \)
30. \( 24, 70, 74 \)
31. \( 4.2, 7.0, 5.6 \)
32. \( 5.2, 6.5, 3.9 \)
33. \( 2.1, 3.5, 2.8 \)
34. \( 4.8, 7.5, 5.4 \)
35. \( 7.5, 4.3, 6.7 \)
36. \( \frac{1}{9}, \frac{1}{15}, \frac{1}{18} \)
37. \( \frac{1}{2}, \frac{6}{5}, \frac{13}{10} \)
38. \( \frac{1}{5}, \frac{1}{4}, \frac{1}{3} \)

Find the missing length to the nearest tenth.

39. A ladder is 25 ft long. The ladder needs to reach to a window that is 24 ft above the ground. How far away from the building should the bottom of the ladder be placed?

40. Suppose you are making a sail in the shape of a right triangle for a sailboat. The length of the longest side of the sail is 65 ft. The sail is to be 63 ft high. What is the length of the third side of the sail?

41. Suppose you leave your house and travel 13 mi due west. Then you travel 3 mi due south. How far are you from your house?

42. A wire is run between the tips of two poles. One pole is 23 ft taller than the other pole. The poles are 37 ft apart. How long does the wire need to be to reach between the two poles?

43. A 20-ft-long wire is used to support a television antenna. The wire is connected to the antenna 15 ft above the ground. How far away from the base of the tower will the other end of the wire be located?
Find the sum or difference. Write the answer in simplest form.

1. \( \frac{7}{10} + \frac{1}{10} \)  
2. \( \frac{11}{12} - \frac{5}{12} \)  
3. \( \frac{5}{8} + \frac{7}{8} \)  
4. \( \frac{19}{20} - \frac{4}{20} \)  
5. \( \frac{15}{22} + \frac{17}{22} \)  
6. \( \frac{7}{9} - \frac{4}{9} \)  
7. \( \frac{1}{4} + \frac{7}{8} \)  
8. \( \frac{9}{10} - \frac{3}{5} \)  
9. \( \frac{10}{11} - \frac{5}{6} \)  
10. \( \frac{2}{5} + \frac{3}{8} \)  
11. \( \frac{5}{7} - \frac{1}{4} \)  
12. \( \frac{7}{15} + \frac{11}{12} \)  

Evaluate the expression when \( x = \frac{5}{7} \) and \( y = \frac{3}{4} \):  
13. \( x + y \)  
14. \( y - x \)  
15. \( \frac{1}{6} + x + y \)  

Use mental math to solve the equation.  
16. \( \frac{8}{9} = \frac{5}{9} + x \)  
17. \( x + \frac{8}{15} = \frac{13}{15} \)  
18. \( \frac{17}{30} - x = \frac{5}{30} \)  

Evaluate the expression. Write the answer in simplest form.  
19. \( \frac{7}{8} - \frac{1}{2} + \frac{3}{4} \)  
20. \( \frac{4}{7} + \frac{1}{2} - \frac{3}{14} \)  
21. \( \frac{3}{4} - \frac{2}{5} + \frac{2}{3} \)  

22. Hex head bolts are sold in a variety of lengths. Two hex head bolt lengths are \( \frac{5}{8} \) inch and \( \frac{1}{2} \) inch. How much longer is the \( \frac{5}{8} \)-inch bolt than the \( \frac{1}{2} \)-inch bolt? 

23. You are estimating the total distance of a road trip by measuring the distance on a map. On the map, the legs of the trip measure \( \frac{7}{16} \) inch, \( \frac{5}{8} \) inch, and \( \frac{3}{4} \) inch, respectively. What is the total distance of the trip on the map? 

24. Find two fractions in simplest form with different denominators so that their difference is \( \frac{1}{4} \).

Answers

1. \( \frac{4}{7} \)  
2. \( \frac{1}{2} \)  
3. \( \frac{11}{12} \)  
4. \( \frac{3}{4} \)  
5. \( \frac{5}{11} \)  
6. \( \frac{1}{3} \)  
7. \( \frac{1}{8} \)  
8. \( \frac{3}{10} \)  
9. \( \frac{5}{6} \)  
10. \( \frac{31}{40} \)  
11. \( \frac{13}{28} \)  
12. \( \frac{23}{60} \)  
13. \( \frac{13}{28} \)  
14. \( \frac{1}{28} \)  
15. \( \frac{33}{84} \)  
16. \( \frac{1}{3} \)  
17. \( \frac{1}{3} \)  
18. \( \frac{2}{5} \)  
19. \( \frac{1}{8} \)  
20. \( \frac{6}{7} \)  
21. \( \frac{1}{66} \)  
22. The \( \frac{5}{8} \)-inch bolt is \( \frac{1}{8} \) inch longer than the \( \frac{1}{2} \)-inch bolt.  
23. On the map, the total distance of the trip is \( \frac{13}{16} \) inches. 
24. Sample Answer: \( \frac{11}{12} - \frac{2}{3} = \frac{1}{4} \)
Find the sum or difference. Write the answer in simplest form.

1. \( \frac{3}{7} + \frac{4}{7} \)
2. \( \frac{7}{12} - \frac{3}{12} \)
3. \( \frac{2}{8} + \frac{7}{8} \)
4. \( \frac{14}{15} - \frac{5}{15} \)
5. \( \frac{2}{5} + \frac{8}{15} \)
6. \( \frac{17}{9} - \frac{3}{18} \)
7. \( \frac{5}{6} + \frac{7}{24} \)
8. \( \frac{10}{17} - \frac{2}{3} \)
9. \( \frac{3}{7} + \frac{1}{2} \)
10. \( \frac{1}{4} - \frac{1}{3} \)
11. \( \frac{5}{12} + \frac{7}{15} \)
12. \( \frac{1}{9} - \frac{5}{6} \)

13. Describe and correct the error in finding the difference \( \frac{1}{6} - \frac{2}{3} \).

\[ \frac{1}{6} - \frac{2}{3} = \frac{1}{6} - \frac{4}{6} = \frac{7}{6} - \frac{4}{6} = \frac{3}{6} \]

Evaluate the expression when \( x = \frac{3}{8} \) and \( y = \frac{5}{6} \).

14. \( \frac{2}{3} + x \)
15. \( y - \frac{2}{3} \)
16. \( x + y \)

Complete the statement using \(<\), \(>, \) or \(=\).

17. \( \frac{2}{3} - \frac{1}{4} \) ___ 1
18. \( \frac{1}{6} + \frac{3}{8} \) ___ 10
19. \( \frac{1}{4} + \frac{3}{7} \) ___ 11

Evaluate the expression. Write the answer in simplest form.

20. \( \frac{1}{2} + \frac{2}{3} + \frac{4}{12} \)
21. \( \frac{9}{16} - \frac{1}{4} + \frac{3}{8} \)
22. \( \frac{5}{24} - \frac{3}{4} + \frac{7}{8} \)

23. A rye bread recipe calls for \( \frac{1}{6} \) cups bread flour and \( \frac{1}{2} \) cups rye flour. How many cups of flour do you need altogether?

24. The largest species of praying mantis grows to be about 6 inches long.
   The smallest species of praying mantis grows to be \( \frac{2}{3} \) inches long.
   How much longer is the largest species than the smallest species?

Answers

1. 8 2. 2 3. 4 4. 3 5. 7 6. 2 7. 12 8. 6 9. 9 10. 4 11. 10 12. 2 13. The mixed number \( \frac{1}{6} \) was renamed incorrectly.
   \( \frac{8}{6} - \frac{4}{6} = \frac{7}{6} - \frac{4}{6} = \frac{3}{6} = \frac{1}{2} \)
14. 10 15. 3 16. 12 17. > 18. <
19. < 20. 14 21. 10 22. 10 23. You need \( \frac{3}{2} \) cups of flour altogether.
24. The largest species is \( \frac{5}{2} \) inches longer than the smallest species.
Fractions: Multiplication

Find the product. Write the answer in simplest form.

1. \( \frac{1}{8} \times \frac{3}{7} \)  
2. \( \frac{4}{5} \times \frac{10}{11} \)  
3. \( \frac{6}{7} \times \frac{15}{16} \)
4. \( \frac{7}{10} \times \frac{25}{28} \)  
5. \( 12 \times \frac{3}{4} \)  
6. \( \frac{5}{6} \times 24 \)
7. \( 2\frac{2}{3} \times 1\frac{4}{5} \)  
8. \( 8\frac{1}{2} \times 1\frac{7}{9} \)  
9. \( 5\frac{3}{4} \times 10\frac{2}{3} \)

10. Find the area of the rectangle. 

11. Which two products have the same value?
   A. \( 1\frac{1}{3} \times \frac{2}{5} \)  
   B. \( 1\frac{2}{3} \times \frac{3}{5} \)  
   C. \( 1\frac{1}{4} \times 1\frac{1}{2} \)  
   D. \( \frac{4}{5} \times \frac{2}{3} \)

12. \( \frac{3}{4}^x \)  
13. \( \frac{5}{7} \cdot \frac{1}{y} \)  
14. \( \frac{18}{25} \cdot \frac{3}{x} \)

15. Choose the product that best estimates \( 5\frac{2}{5} \times 4\frac{1}{5} \).
   A. \( 5 \times 4 \)  
   B. \( 6 \times 4 \)  
   C. \( 6 \times 5 \)  
   D. \( 5 \times 5 \)

16. \( \frac{a}{4} \cdot 3 = \frac{3}{4} \)  
17. \( \frac{2}{5} \cdot b = \frac{12}{5} \)  
18. \( 8 \cdot \frac{6}{c} = \frac{48}{13} \)

19. A deer mouse is \( 7\frac{1}{4} \) inches long, including its tail. If the tail is one-half its total body length, how long is the tail?

20. A mirror is \( 13\frac{1}{2} \) inches wide and \( 21\frac{1}{4} \) inches long. What is the area of the mirror?

Answers

1. \( \frac{3}{36} \)  
2. \( \frac{8}{11} \)  
3. \( \frac{45}{36} \)  
4. \( \frac{5}{8} \)  
5. \( 9 \)  
6. \( 20 \)
7. \( 4\frac{4}{5} \)  
8. \( 15\frac{1}{9} \)  
9. \( 61\frac{1}{3} \)  
10. The area of the rectangle is \( \frac{1}{16} \) square inch.  
11. A and D
12. 3  
13. \( \frac{1}{14} \)  
14. \( \frac{27}{80} \)  
15. B
16. 1  
17. 6  
18. 13
19. The deer mouse’s tail is \( 3\frac{5}{8} \) inches long.
20. The area of the mirror is \( 286\frac{7}{8} \) square inches.
Write the reciprocal of the number.

1. \( \frac{1}{5} \)  
2. 2  
3. \( 1\frac{4}{5} \)  
4. \( 3\frac{6}{11} \)

Find the quotient. Then check your answer.

5. \( \frac{2}{9} \div \frac{1}{3} \)  
6. \( \frac{3}{4} \div \frac{5}{8} \)  
7. \( \frac{4}{9} \div \frac{9}{20} \)

8. \( \frac{2}{3} \div \frac{5}{18} \)  
9. \( \frac{9}{14} \div 7 \)  
10. \( 9 \div \frac{4}{3} \)

11. \( 6\frac{3}{4} \div 5\frac{1}{2} \)  
12. \( \frac{2}{5} \div 8 \)  
13. \( 4\frac{1}{6} \div 3\frac{2}{5} \)

14. Describe and correct the error in finding the quotient \( \frac{4}{5} \div 3\frac{2}{3} \).

\[
\frac{4}{5} \div 3\frac{2}{3} = \frac{4}{5} \div \frac{11}{3} = \frac{4}{5} \times \frac{3}{11} = \frac{12}{55} = \frac{4}{3}
\]

Evaluate the expression when \( x = \frac{3}{5} \) and \( y = 8 \).

15. \( x \div y \)  
16. \( y \div x \)  
17. \( \frac{1}{3} \div x \)

Complete the statement using \(<\), \(>\), or \(=\).

18. \( \frac{1}{2} \div \frac{2}{5} \ ? \ 1 \)  
19. \( \frac{7}{8} \div \frac{1}{9} \ ? \ 1 \)  
20. \( \frac{2}{5} \div \frac{2}{4} \ ? \ 1 \)

Use mental math to solve the equation.

21. \( \frac{5}{a} \div 3 = \frac{5}{3} \)  
22. \( \frac{b}{4} \div \frac{1}{8} = 6 \)  
23. \( \frac{2}{3} \div c = \frac{4}{3} \)

24. You are cutting fabric for placemats that are to be \( 14\frac{1}{4} \) inches wide. If you have a piece of fabric that is \( 114 \) inches long, how many placemats can you cut from the fabric?

25. The largest and smallest sea urchins on record measured about \( 4\frac{1}{4} \) feet and \( \frac{1}{50} \) foot long, respectively. How many times larger is the largest sea urchin?

**Answers**

1. 5  
2. \( \frac{1}{2} \)  
3. \( \frac{5}{9} \)  
4. \( \frac{11}{39} \)  
5. \( \frac{2}{3} \)  
6. \( 1\frac{1}{5} \)  
7. \( \frac{80}{81} \)  
8. \( \frac{5}{7} \)  
9. \( \frac{9}{98} \)  
10. \( \frac{13}{14} \)  
11. \( \frac{5}{22} \)  
12. \( \frac{17}{40} \)  
13. \( \frac{13}{102} \)  
14. When rewriting the division problem as a multiplication problem, the reciprocal of the dividend was used instead of the reciprocal of the divisor.

\[
\frac{4}{5} \div \frac{2}{3} = \frac{4}{5} \times \frac{3}{2} = \frac{3}{1} = \frac{3}{1} = \frac{12}{35}
\]

15. \( \frac{3}{40} \)  
16. \( 13\frac{1}{3} \)  
17. \( 2\frac{3}{5} \)  
18. >  
19. >  
20. <

21. 1  
22. 3  
23. \( \frac{1}{2} \)

24. You can cut 8 placemats from the fabric.

25. The largest sea urchin is about \( 62\frac{3}{2} \) times larger than the smallest sea urchin.
Answers

Practice 1-1
1. 1.7 + x 2.3p 3.10 - m 4.7 - n
2. 2q 6.m + 3 7.8 divided by a 8.10 less than s
9. 13 more than x 10.2 more than the product of a and b
11.8 - n 12.4 + n 13.2n 14.3 + n 15.10 + n/2
16.n - 12 17.c = 24.95s 18.r = 30t 19.m = 0.10d
20.n = 48 - g 21.c = 8p 22.c = 32.95p
   t = number of tickets, c = total cost;
   h = number of hours, d = distance;
   n = number of hours, p = total pay;
   c = change, a = total cost;
   d = number of days, t = length;
   r = miles traveled, t = miles remaining
23. c = 3.50t 24.d = 55h 25.p = 5h 26.a = 10 - c
27. t = 0.45d 28.r = 500 - t

Practice 1-2
1. 52 2.2 3.38 4.4 5.18.9 6.87 7.25 8.7 9.2
10.1 11.7 12.13.14.5 15.2 16.6 17.26
25.26 26.5 27.55 28.56 29.72 30.60 31.40 32.2
33.11 34.4 35.131 36.141 37.33 38.16 39.22
40.12 41.2 42.1 43.56 44.43.95 45.4 63.34 46.24
47.2.25 48.0 49.99 50.5 51.6

Practice 2-3
1. -16 2.5t 3.8t 4.6 - 32 5.5 - 48 6.196 7.48 8.6
9.4 10.120 11.49 12.-243 13.-4 14.2 - 15.15
16. -125 17.4 18.112 19.4 20. -32 21.49
22. -200 23. -20 24.256 25.-11 26.32 27.0
28.-4 29.7 30.16 31.2 32.93 33.64 34.120
35.-7 36.3 37.64 38.-15 39.-5 40.-15 41.4
42.72 43.-27 44.-1019 45.-15 46.-4 47.108
48.256

Practice 2-4
1. 2a + x 2. -40 + 5b 3. -4x + 28 4. -15c + 21
5. -7.5a - 12.5 6. -3k + 12 7. -9 + 12d 8.4h - 2/3
9. 19.2c - 126 10.10.5x - 28 11.4x + 28
12. -5a + 10 13.8 - 10d 14. -2k + 22 15. -2h - 5
16. -8c + 32 17. -4 + 2b 18.6x - 18 19.8r + 32
20. -5b + 25 21.3f + 6 22.1 + 25 23.d - 21
24.1 + 8x 25.2h + 4 26.8 + 2y 27. -n - 2
28.3w + 12 29.1d2 - 2 30.-2d + 6 31.5x + 12
32.6a + 4 33.3r - 15 34.-b + 20 35.2k + 6
36.68 + 1.6 37.6b - 18 38.6a - 4 39.x - 2
40.2a + 7 41.9 + 10c 42.1 + 2a 43.15x + 60
44.2m + 2 45.8a - 9 46.2x - 15 47.3t - 36
48. -18 - 6k 49.5(x + 6) 50.2(y - 8)
51.-15(x - 5) 52. -32/3 53.-84(w - w)
54.(x + 9)(7 - x)

Practice 3-1
1.1 2.2 3.2 4.1 5.3 6.-10
7.3.50 + 2.50r = 16.5 roses
8.210m + .55) = 10,000; .45 min
9.6.5 + 1.5h = 11.3h 10.3.94 + 0.21n = 1.18; 5 oz
11.24.95 + 5.95x = 50; 4 pair 12.4.5 13.-17 14.4
22.-9.5 23.168 24.-3 25.9 26.-5 27.-21
28.-69 29.3.1 30.-55 31.13 32.-22
33. a. Subt. Prop. of Eq.
b. Simplify.
c. Mult. Prop. of Eq.
d. Simplify.
34. a. Subt. Prop. of Eq.
b. Simplify.
c. Mult. Prop. of Eq.
d. Simplify.
35. a. Add Prop. of Eq.
b. Simplify.
c. Div. Prop. of Eq.
d. Simplify.

Practice 3-2
1.-9.6 2.6.9 3.288 4.-3 5.-11 6.-9 7.5
8.-11 9.4 10.3 11.-5 12.2 13.-5 14.3 15.7
16.23 17.-6 18.21 19.-8 20.5 21.10 22.-1
23.-2 24.-5 25.44 26.3 27.4 28.9 29.5
30.-15 31.31 32.-27 33.-2 34.12 35.3 36.-11
37.24 38.49 39.-10 40.3/2 41.-12 42.2 43.-7/5
44.2 45.24 46.2n + 3(400 - n) = 1050; 150 student
tickets, 250 adult tickets 47. w + 2w + w + 2w = 30; 10 ft
48.3/4 + 2/3 = 1100; $1500 49.5/m = 125; 175 lb
50.29.95 + 0.10m = 99.95; 700 min

Practice 3-3
1.7 2.9 3.-15 4.3 5.identity 6.5 7.no solution
8.13 9.7 10.no solution 11.4 12.8 13.identity
14.no solution 15.2 16.-9 17.identity 18.18 19.7
20.identity 21.identity 22.identity 23.no solution
24.3 25.2 26.1 27.-2 28.no solution 29.10
30.identity 31.-15/2 32.-3 33.4
34.40d = 60 + 20d, 3 days 35.4v = 21 + 2.50v;
14 videos 36.100 + c = 5c; 25 candles 37.1 38.20
39.0.5
Answers (continued)

Practice 3-4
1. $7.50/h  2. $0.75/b  3. 287 bagels/d  4. 680 cal/h
5. $0.56/oz  6. $0.54/oz  7. no; 168 ≠ 180  8. yes; 90 = 90
9. yes; 72 = 72  10. yes; 16 = 16  11. no; -24 ≠ -25.6
12. 3  13. 3.5  14. 26.4  15. 2  16. 2.5  17. 15  18. 16
19. 21  20. 22.5  21. 9  22. 15  23. 96  24. 3  25. 4.5
26. 40  27. 18  28. 2  29. 7.2  30. 4.8  31. 3  32. 4.5
33. 11.25  34. 30.25  35. 3  36. 10  37. 7  38. 2.75
39. -6  40. -5  41. 5.75  42. 52.5 min  43. 182 mi
44. $4.1\frac{2}{3} beats  45. $0.10/mi

Practice 3-6
1. 60(r - 1.5) = 40; freight train: 4.5 h, passenger train: 3 h
2. 10(r + 1.5) = 25; 2.5 h
3. r + 10 = 3r; Leah: 5 km/h, May: 15 km/h
4. 24 = 2(w + 4) + 2w; width: 4 in., length: 8 in.
5. 48 = 2(2w + 2w; width: 8 in.; length: 16 in.
6. 60r + 50r = 330; 1:00 P.M.
7. 3r = \frac{1}{2}(4); \frac{2}{3} h or 40 min
8. 3r + 2t = 4; \frac{4}{5} h or 48 min
9. 90r = 100; (r - 3); 9:00 A.M.
10. 200; (r + 1) = 250r; 1000 mi
11. x + x + 1 + x + 2 = 126; 41, 42, 43
12. x + x + 2 + x + 4 + x + 6 = 216; 51, 53, 55, 57
13. 84 = 2(w + 8) + 2w; 17 in.
14. x + 2x - 8 + 2x - 8 = 74; 18 in.

Practice 3-9
1. 37  2. 24  3. 60  4. 39  5. 17  6. 32  7. 30.0  8. 43.6
9. 35.0  10. 41.2  11. 11.3  12. 17.7  13. 19.0  14. 24.7
15. 924 16. 48.8  17. 30.7  18. 19.8
19. yes; 20^2 + 21^2 = 29^2  20. yes; 16^2 + 30^2 = 34^2
21. no; 24^2 + 60^2 ≠ 66^2  22. no; 14^2 + 18^2 ≠ 23^2
23. no; 10^2 + 24^2 ≠ 28^2  24. yes; 45^2 + 28^2 = 53^2
25. yes; \left(\frac{4}{3}\right)^2 + \left(\frac{3}{3}\right)^2 = 1^2
26. no; \left(\frac{2}{3}\right)^2 + \left(\frac{1}{3}\right)^2 ≠ \left(\frac{4}{3}\right)^2
27. no; 3.5^2 + 4.4^2 ≠ 5.5^2  28. no; 10.5^2 + 11.3^2 ≠ 13.8^2
29. yes; 3.3^2 + 5.6^2 = 6.5^2  30. yes; 24^2 + 70^2 = 74^2
31. yes; 4.2^2 + 5.6^2 = 7.0^2  32. yes; 5.2^2 + 3.9^2 = 6.5^2
33. yes; 2.1^2 + 2.8^2 = 3.5^2  34. no; 4.8^2 + 5.4^2 ≠ 7.5^2
35. no; 6.7^2 + 4.3^2 ≠ 7.5^2
36. yes; \left(\frac{1}{18}\right)^2 + \left(\frac{1}{16}\right)^2 ≠ \left(\frac{1}{9}\right)^2
37. yes; \left(\frac{1}{2}\right)^2 + \left(\frac{6}{3}\right)^2 = \left(\frac{13}{10}\right)^2
38. no; \left(\frac{1}{3}\right)^2 + \left(\frac{1}{4}\right)^2 ≠ \left(\frac{1}{3}\right)^2
39. 7 ft  40. 16 ft
41. 13.3 mi  42. 43.6 ft  43. 13.2 ft

Practice 3-7
1. 25% decrease  2. 150% increase  3. 50% decrease
4. 200% increase  5. 6% decrease  6. 40% increase
7. 63% decrease  8. 75% increase  9. 14% increase
10. 31% increase  11. 150% increase  12. 20% decrease
13. 50% increase  14. 10% decrease  15. 13% decrease
16. 50% increase  17. 20% decrease  18. 11% decrease
19. 22% increase  20. 18% increase  21. 30% increase
22. 11% decrease  23. 300% increase  24. 66% increase
25. 310% increase  26. 13% decrease  27. 45% increase
28. 0.5 cm; 16.7%  29. 0.05 cm; 10%  30. 0.5 cm; 8.3%
31. 0.5 in.; 3.1%  32. 0.005 g; 0.01%  33. 0.05 cm; 5.6%
34. 71.25 cm^2; 89.25 cm^2  35. 11.25 in.^2; 19.25 in.^2
36. 86.25 m^2; 106.25 m^2  37. 5831.88 in.^3; 6668.13 in.^3
38. 3171.88 cm^3; 3871.13 cm^3  39. 39.38 m^3; 86.63 m^3