4-1

NAME _____ DATE _____ PERIOD _____

Study Guide

Student Edition Pages 140–145

↳ can be written as a fraction

Multiplying Rational Numbers

Use the following rules to multiply two rational numbers and to simplify expressions.

	Rules	Examples
Rational Numbers with Different Signs (−)	The product of two rational numbers having different signs is negative.	$5(-2.5) = -12.5$ $-6(4.8) = -28.8$ $0.4(-1.5x) = -0.6x$
Rational Numbers with the Same Sign (+)	The product of two rational numbers having the same sign is positive.	$(-4.2)(-8) = 33.6$ $12(3.2) = 38.4$ $(3w)(2.1y) = 6.3wy$
Fractions	To multiply fractions, multiply the numerators and multiply the denominators.	$-\frac{3}{5} \cdot \frac{1}{4} = -\frac{3}{20}$ $-\frac{1}{2} \cdot \left(-2\frac{1}{3}\right) = -\frac{1}{2} \cdot \left(-\frac{7}{3}\right)$ $= \frac{7}{6}$ or $1\frac{1}{6}$

Find each product.

1. $3.8(-4)$
2. $-6(-1.2)$
3. $6(6.1)$
4. $-0.5(-5.2)$
5. $(-8.4) \cdot 0 \rightarrow 0$
6. $-2.4 \cdot (10.5)$
7. $\frac{1}{7} \cdot \frac{2}{3}$
8. $\frac{-2}{1} \cdot \left(-\frac{2}{5}\right) \rightarrow \frac{2 \cdot 2}{1 \cdot 5} \rightarrow \frac{+4}{5}$
9. $-\frac{2}{3} \cdot \frac{2}{9}$
10. $-\frac{5}{3} \cdot \left(-\frac{2}{7}\right) \rightarrow \frac{5 \cdot 2}{3 \cdot 7} \rightarrow \frac{+10}{21}$
11. $0 \cdot \left(-\frac{1}{5}\right) \rightarrow 0$
12. $\frac{1}{3}\left(-1\frac{1}{4}\right) \rightarrow \frac{1}{3} \cdot \left(-\frac{5}{4}\right) \rightarrow \frac{-5}{12}$ ($-1\frac{1}{4} = -\frac{5}{4}$)

Simplify each expression.

13. $3(1.4a)$
14. $-0.6x(-3y)$
15. $\frac{1}{4} \cdot \left(-\frac{1}{2}b\right)$

$(-0.6)(-3) \cdot x \cdot y$

$0.6 \times 3 = 1.8xy$

$1.8xy$

4-1

NAME _____ DATE _____ PERIOD _____

Practice

Student Edition Pages 140–145

Multiplying Rational Numbers

Find each product.

1. $3.9 \cdot (-3)$
2. $-6(-5.4)$
3. $4 \cdot (-7.3)$
4. $-2.6(1.5)$
5. $(-4.4)(-0.5)$
6. $-3.7 \cdot 2$
7. $(-8.3)(-1)$
8. $-2.5(2.8)$
9. $-3 \cdot (-6.3)$
10. $-\frac{1}{4}\left(-\frac{3}{5}\right)$
11. $-5 \cdot \frac{2}{3}$
12. $\frac{5}{6}\left(\frac{7}{9}\right)$
13. $-\frac{6}{7} \cdot \frac{1}{3}$
14. $-\frac{3}{8}(-3)$
15. $\frac{2}{5}\left(-\frac{8}{9}\right)$
16. $6\frac{3}{4}\left(\frac{1}{6}\right)$
17. $-\frac{2}{3} \cdot \left(-4\frac{1}{2}\right)$
18. $1\frac{4}{5}\left(-\frac{3}{7}\right)$

Simplify each expression.

19. $4(-2.3z)$
20. $-5.5x(-0.8)$
21. $-4.2r(1.5s)$
22. $6\left(\frac{1}{7}t\right)$
23. $-\frac{1}{3} \cdot \frac{4}{5}g$
24. $\frac{2}{9}h\left(-\frac{1}{2}\right)$
25. $\left(\frac{1}{4}a\right)\left(\frac{5}{8}b\right)$
26. $\frac{5}{6}m\left(-\frac{1}{3}n\right)$
27. $3x\left(\frac{4}{9}y\right)$

4-2

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Study Guide

Student Edition Pages 146–151

Counting Outcomes

Jeremy has three sweatshirts and two pairs of jeans. One way to find the number of different outfits is to draw a tree diagram, as shown below.

Sweatshirts	Jeans
blue red hooded	blue black

Sweatshirt	Jeans	Outcome
blue	blue	blue, blue
	black	blue, black
red	blue	red, blue
	black	red, black
hooded	blue	hooded, blue
	black	hooded, black

Since there are six outcomes, there are six outfits possible.

The **Fundamental Counting Principle** can also be used to count outcomes. It states that if an event M can occur in m ways and is followed by event N that can occur in n ways, then the event M followed by event N can occur in $m \times n$ ways.

3 sweatshirts × 2 jeans = 3 × 2 or 6 outfits

Find the number of possible outcomes by drawing a tree diagram.

1. sandwich with one condiment

see notes

Menu Item	Condiment
hamburger cheeseburger hot dog	ketchup mustard pickle onion

2. computer with one peripheral

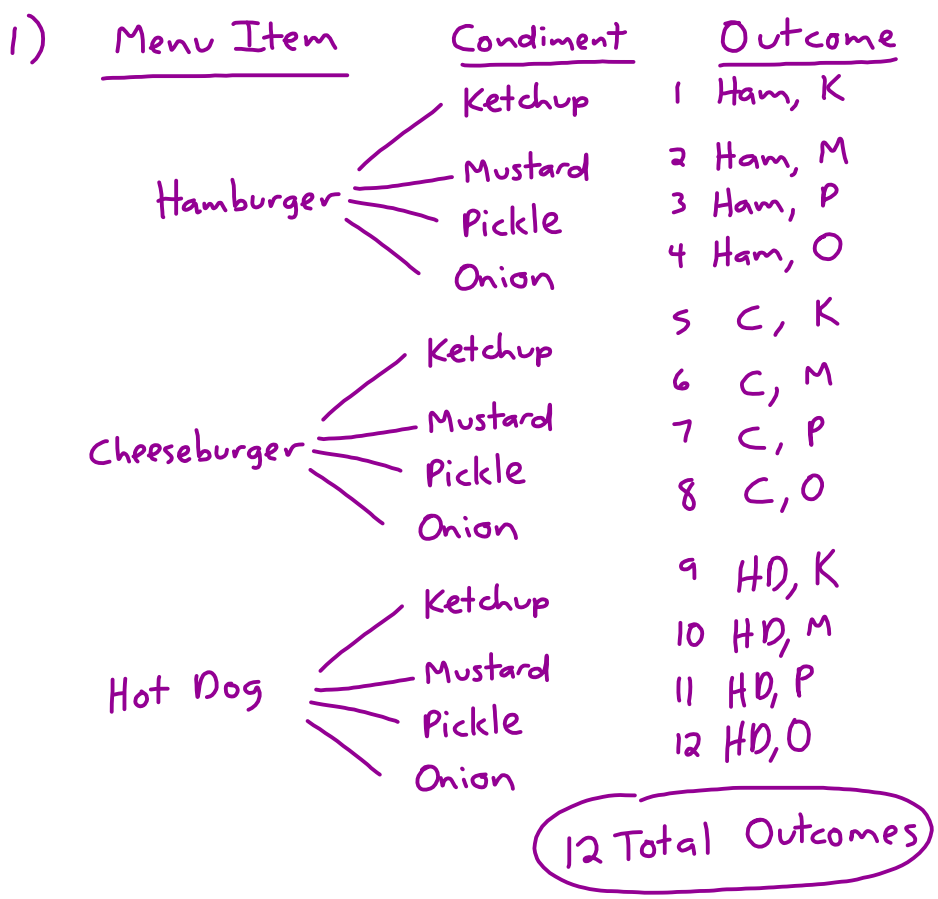
Computer	Peripheral
desk model laptop	DVD drive CD-Rom drive floppy disk drive

Find the number of possible outcomes by using the Fundamental Counting Principle.

3. A certain game includes cards with 3 different pictures, 4 colors, and 6 numbers. Find the number of cards in the game.

4. Find the number of possible ways of answering a true-false question followed by a multiple choice question with 4 choices.

5. Suppose you can order sweaters from a catalog in 8 sizes, 3 colors, and 2 delivery methods. Find the number of possible sweater orders.



4-2

NAME _____ DATE _____ PERIOD _____

Practice

Student Edition Pages 146–151

Counting Outcomes

Determine whether each is an outcome or a sample space for the given experiment.

1. (H, T, H); tossing a coin three times outcome
2. (green, black); choosing one marble from a box of green and black marbles outcome
3. (green, green), (green, black), (black, green), (black, black); choosing two marbles, one at a time, from a box of several green and several black marbles
4. (3, 1, 4, 5); rolling a number cube four times
5. (1, 2, 3, 4, 5, 6); rolling a number cube once sample space
6. (red, black); choosing two cards from a standard deck
7. (dime, penny); choosing two coins from a bag of dimes, nickels, and pennies
8. (dime, nickel, penny); choosing one coin from a bag of dimes, nickels, and pennies

Find the number of possible outcomes by drawing a tree diagram.

9. Suppose you can have granola or wheat flakes for cereal with a choice of strawberries, bananas, peaches, or blackberries.

10. Suppose you can travel by car, train, or bus to meet a friend. You can leave either in the morning or the afternoon.

Find the number of possible outcomes by using the Fundamental Counting Principle.

11. Suppose you toss a coin five times.
12. Suppose you can make an outfit from six sweaters, four pairs of jeans, and two pairs of shoes.

4-3

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Study Guide

Student Edition Pages 154–159

Dividing Rational Numbers

Use the following rules to divide rational numbers or fractions.

Rule or Property		Examples
Dividing Rational Numbers	The quotient of two numbers having different signs is negative. The quotient of two numbers having the same sign is positive.	$-4.8 \div 6 = -0.8$ $4.8 \div (-6) = -0.8$ $2.8 \div (0.4) = 7$ $-2.8 \div (-0.4) = 7$
Multiplicative Inverse Property	For every number $\frac{a}{b}$, where $a, b \neq 0$, there is exactly one number $\frac{b}{a}$ such that $\frac{a}{b} \cdot \frac{b}{a} = 1$.	$-\frac{3}{4}$ and $-\frac{4}{3}$ are multiplicative inverses.
Dividing Fractions	$\frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \cdot \frac{d}{c}$, where $b, c, d \neq 0$	$\frac{2}{5} \div \frac{3}{4} = \frac{2}{5} \cdot \frac{4}{3}$ or $\frac{8}{15}$ $\frac{3}{4} \div (-6) = \frac{3}{4} \cdot \left(-\frac{1}{6}\right)$ $= -\frac{3}{24}$ or $-\frac{1}{8}$

Find each quotient.

25|-80.0 → -3.2

1. $-8 \div 2.5$
2. $-1.6 \div (-2)$
3. $3.6 \div 0.6$

$\frac{-0.6}{0}$ = "undefined"

4. $5.5 \div (-5.5)$ $\frac{5.5}{-5.5} = -1$
5. $0 \div -0.6$ 0
6. $-18.7 \div 5.5$ see notes
7. $-42 \div (-0.5)$
8. $0 \div \frac{2}{7}$ 0
9. $-\frac{4}{5} \div \frac{4}{5}$
10. $\frac{1}{7} \div \frac{2}{5}$ $\frac{1}{7} \times \frac{5}{2} \rightarrow \frac{5}{14}$
11. $-\frac{2}{5} \div \frac{1}{2}$
12. $\frac{1}{9} \div (-4)$
13. $-\frac{3}{8} \div \frac{11}{8}$
14. $-\frac{3}{7} \div \left(-\frac{7}{3}\right)$
15. $\frac{3}{4} \div \frac{1}{5}$

6) $-18.7 \div 5.5 = -3.4$

$55\overline{)-187}$

-34

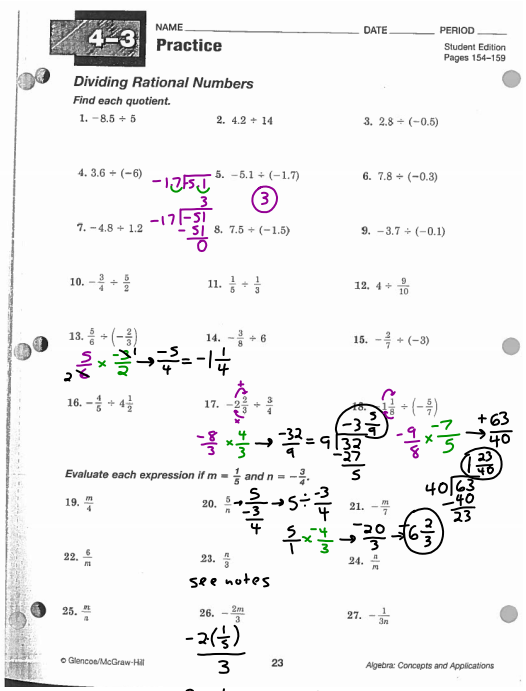
$55\overline{)-187.00}$

$165\downarrow$

220

220

0



4-3 Practice

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Student Edition Pages 154–159

Dividing Rational Numbers

Find each quotient.

1. $-8.5 \div 5$
2. $4.2 \div 14$
3. $2.8 \div (-0.5)$
4. $3.6 \div (-6)$
5. $-5.1 \div (-1.7)$ — $-17\overline{)51}$ → 3
6. $7.8 \div (-0.3)$
7. $-4.8 \div 1.2$ — $-17\overline{)-51}$, -51, 0
8. $7.5 \div (-1.5)$
9. $-3.7 \div (-0.1)$
10. $-\frac{3}{4} \div \frac{5}{2}$
11. $\frac{1}{6} \div \frac{1}{3}$
12. $4 \div \frac{9}{10}$
13. $\frac{5}{6} \div \left(-\frac{2}{3}\right)$ → $\frac{5}{2} \times \frac{-3}{2} \rightarrow \frac{-5}{4} = -1\frac{1}{4}$
14. $-\frac{3}{8} \div 6$
15. $-\frac{2}{7} \div (-3)$
16. $-\frac{4}{5} \div 4\frac{1}{2}$
17. $-2\frac{2}{3} \div \frac{3}{4}$ → $\frac{-8}{3} \times \frac{4}{3} \rightarrow \frac{-32}{9} = 9\overline{)-32}$, -27, 5
18. $1\frac{1}{8} \div \left(-\frac{5}{7}\right)$ → $\frac{-9}{8} \times \frac{-7}{5} \rightarrow \frac{+63}{40}$, $1\frac{23}{40}$

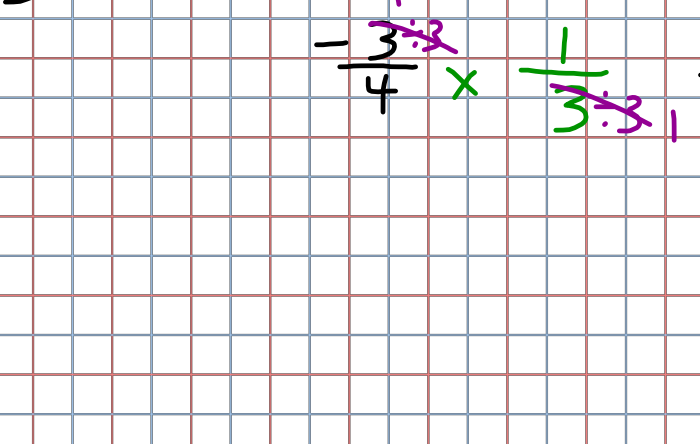
Evaluate each expression if $m = \frac{1}{8}$ and $n = -\frac{3}{4}$.

19. $\frac{m}{4}$
20. $\frac{5}{n}$ → $5 \div \frac{-3}{4}$ → $\frac{5}{1} \times \frac{-4}{3} \rightarrow \frac{-20}{3} \rightarrow -6\frac{2}{3}$
21. $-\frac{m}{7}$ — $40\overline{)63}$, -40, 23
22. $\frac{6}{m}$
23. $\frac{n}{3}$ — see notes
24. $\frac{n}{m}$
25. $\frac{m}{n}$
26. $-\frac{2m}{3}$ → $\frac{-2\left(\frac{1}{5}\right)}{3}$ → $\frac{-2}{1} \cdot \frac{1}{5} \rightarrow \frac{-2}{5}$, 3 → $-\frac{2}{5} \div 3$, $-\frac{2}{5} \div \frac{3}{1}$, $-\frac{2}{5} \times \frac{1}{3}$, $\frac{-2}{15}$
27. $-\frac{1}{3n}$

23) $\frac{n}{3}$ $n=-\frac{3}{4}$

$\frac{\left(\frac{-3}{4}\right)}{3} \rightarrow \frac{-3}{4} \div \frac{3}{1}$

$\frac{-3}{4} \times \frac{1}{3} \rightarrow \frac{-1}{4}$



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4-4 **Study Guide**

Student Edition Pages 160–164

Solving Multiplication and Division Equations

Use the following rules to solve algebraic equations.

Rule or Property		Examples
Division Property of Equality	For any numbers a, b, and c, with $c \neq 0$, if $a = b$, then $\frac{a}{c} = \frac{b}{c}$.	$4x = -24$ $\frac{4x}{4} = \frac{-24}{4}$ $x = 6$
Multiplication Property of Equality	For any numbers a, b, and c, if $a = b$, then $ac = bc$.	$\frac{1}{4}x = 12$ $4 \cdot \frac{1}{4}x = 4 \cdot 12$ $x = 48$

Solve each equation.

1. $8y = 48$ → $y = 6$
2. $-6x = 42$ → $x = -7$
3. $3.6 = 12n$ → $x = 0.3$ (0.3 / 12|3.6)
4. $1.5 = -3w$
5. $0 = -0.6y$
6. $18 = 0.5x$
7. $-6 = -8y$
8. $\frac{4}{7}n = \frac{1}{1} \cdot \frac{4}{7}$ → $n = \frac{4}{7}$
9. $\frac{1}{5}x = \frac{10}{1} \cdot \frac{5}{1}$ → $x = 50$
10. $\frac{3}{4}y = 12$
11. $-\frac{3}{5}y = -\frac{8}{1} \cdot \frac{5}{3}$ → $y = 5$
12. $4 = -\frac{1}{2}x$
13. $8 = \frac{x}{-2} \cdot \frac{-2}{1}$ → $-16 = x$ → $x = -16$
14. $-\frac{4}{5}n = -\frac{1}{4}$
15. $\frac{1}{2} = -\frac{5}{8}x$
16. $1.2y = 9$
17. $-4x = 12.8$
18. $-\frac{n}{3} = \frac{1}{3}$

4-4

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Practice

Student Edition Pages 160–164

Solving Multiplication and Division Equations

Solve each equation.

1. $7p = -42$
2. $-3z = 27$
3. $-8q = -56$
4. $-28 = 2a$
5. $5f = 40$
6. $-9g = 18$
7. $-48 = -12r$
8. $4 = 0.8w$
9. $-2.4t = 6$
10. $0 = 5.3k$
11. $-1.6s = -8$
12. $2.5d = -11$
13. $\frac{m}{9} = 2$
14. $-8 = \frac{y}{4}$
15. $\frac{2}{5}s = 18$
16. $-2 = -\frac{8}{3}b$
17. $-\frac{c}{6} = 6$
18. $-\frac{v}{12} = -5$
19. $\frac{1}{8}d = -1$
20. $4 = \frac{4}{5}x$
21. $-\frac{7}{6}r = 28$
22. $\frac{9}{10}z = -9$
23. $-\frac{b}{18} = 2$
24. $-\frac{3}{7}n = -21$

4-5

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Study Guide

Student Edition Pages 165–170

Solving Multi-Step Equations

Some equations require more than one step to solve. To solve a problem that has more than one step, the best strategy is to undo the operations in reverse order. Always check your solution.

Example 1: Solve $3x - 8 = 31$.

$3x - 8 = 31$
$3x - 8 + 8 = 31 + 8$
$3x = 39$
$\frac{3x}{3} = \frac{39}{3}$
$x = 13$

Check: $3x - 8 = 31$
$3(13) - 8 \stackrel{?}{=} 31$
$39 - 8 \stackrel{?}{=} 31$
$31 = 31$ ✓

PEMDAS
start S

Example 2: Solve $\frac{x}{4} + 6 = 12$.

$\frac{x}{4} + 6 = 12$
$\frac{x}{4} + 6 - 6 = 12 - 6$
$\frac{x}{4} = 6$
$4 \cdot \frac{x}{4} = 4 \cdot 6$
$x = 24$

Check: $\frac{x}{4} + 6 = 12$
$\frac{24}{4} + 6 \stackrel{?}{=} 12$
$6 + 6 \stackrel{?}{=} 12$
$12 = 12$ ✓

Solve each equation. Check your solution.

1. $6y + 4 = 50$ $-4 = -4$ $\frac{6y}{6} = \frac{54}{6}$ $y = 9$
2. $-8x - 2 = 38$
3. $-15 = -12n + 9$
4. $-2m + 6 = 22$
5. $-4y - 8 = 30$
6. $-1.5x + 6 = -54$
7. $8.2y + 4 = 65.5$
8. $-1.5 = 3w + 6$ see notes
9. $-8 = -2.5x + 5$
10. $\frac{x}{2} + 7 = 9$
11. $\frac{x}{3} - 12 = -2$
12. $\frac{x}{-6} - 12 = 2$ see notes
13. $3x + 7 = 7$
14. $-8 = 1.5y + 4$
15. $\frac{y}{2} + 2 = 25$

8) $-1.5 = 3w + 6$

$+^{-}6.0 = +^{-}6$

$-7.5 = 3w$

$\frac{-7.5}{3} = \frac{3w}{3}$

$-2.5 = w$

$w = -2.5$

6.0
+1.5
7.5

3 | -7.5
-6
15
-15
0

P
E
M
D
A
S
Start

12) $\frac{x}{-6} + 12 = 2$

$+12 = +12$

$\frac{x}{-6} = +14$

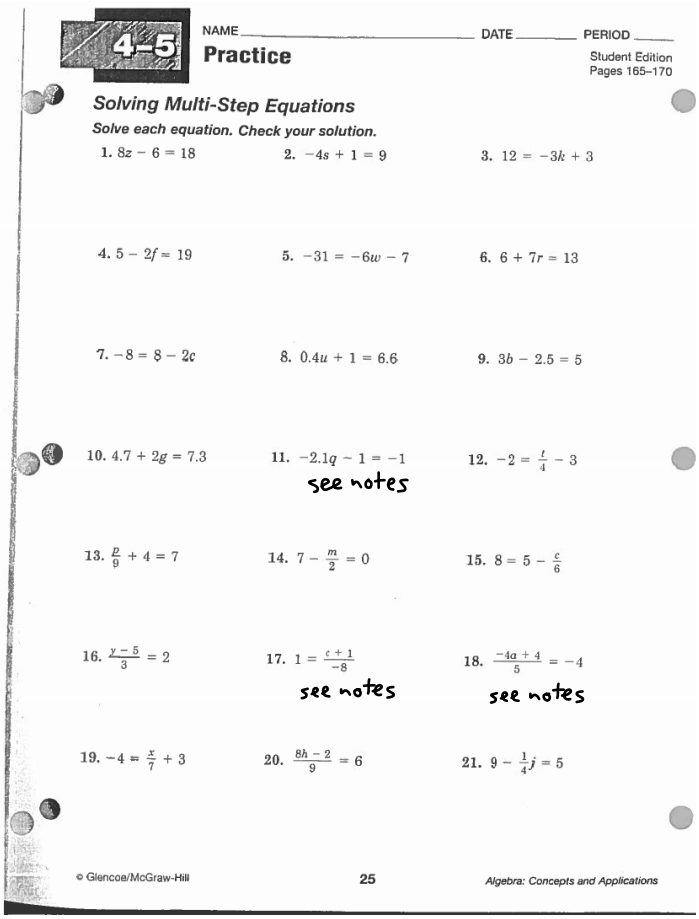
$\frac{1}{1} \cdot \frac{x}{-6} = \frac{+14}{1} \cdot \frac{-6}{1}$

$\frac{1 \cdot x}{1 \cdot 1} = \frac{x}{1} = x$

$x = -84$

14
×6
84

P
E
M
D
A
S
Start



4-5 Practice

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Student Edition Pages 165–170

Solving Multi-Step Equations

Solve each equation. Check your solution.

1. $8z - 6 = 18$
2. $-4s + 1 = 9$
3. $12 = -3k + 3$
4. $5 - 2f = 19$
5. $-31 = -6w - 7$
6. $6 + 7r = 13$
7. $-8 = 8 - 2c$
8. $0.4u + 1 = 6.6$
9. $3b - 2.5 = 5$
10. $4.7 + 2g = 7.3$
11. $-2.1q - 1 = -1$ see notes
12. $-2 = \frac{t}{4} - 3$
13. $\frac{p}{9} + 4 = 7$
14. $7 - \frac{m}{2} = 0$
15. $8 = 5 - \frac{c}{6}$
16. $\frac{y-5}{3} = 2$
17. $1 = \frac{c+1}{-8}$ see notes
18. $\frac{-4a+4}{5} = -4$ see notes
19. $-4 = \frac{x}{7} + 3$
20. $\frac{8h-2}{9} = 6$
21. $9 - \frac{1}{4}j = 5$

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11) $-2.1q - 1 = -1$

$+1 \quad +1$

$\frac{-2.1q}{-2.1} = \frac{0}{-2.1}$

$q = 0$

P E M D A S

start

$\frac{-2.1}{0}$ → "undefined"

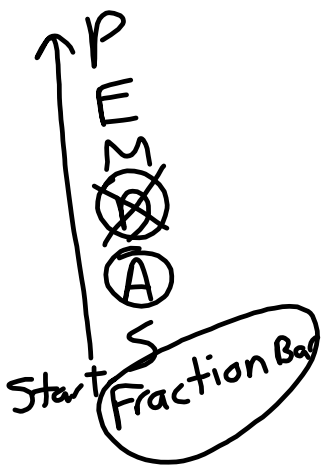
17) $\frac{-8}{1} \cdot \frac{(1)}{1} = \frac{c+1}{-8} \cdot \frac{-8}{1}$

$-8 = c+1$

$+1 \quad = \quad +1$

$-9 = c$

$c = -9$



18) $\frac{5}{1} \cdot \frac{-4A+4}{5} = \frac{(-4)\cdot 5}{1}$

$-4A+4 = -20$

$+-4 \quad = +-4$

$\frac{-4A}{-4} = \frac{-24}{-4}$

$A = +6$

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4-6 Study Guide

Student Edition Pages 171–175

Variables on Both Sides

Some equations contain variables on both sides and require more than one step to solve. To solve these equations, first use the Addition or Subtraction Property of Equality to write an equivalent equation that has all of the variables on one side. Then solve and check.

Example 1: Solve $2x - 6 = x + 4$.

$2x - 6 = x + 4$
$2x - 6 - x = x + 4 - x$
$x - 6 = 4$
$x - 6 + 6 = 4 + 6$
$x = 10$

Check: $2x - 6 = x + 4$
$2(10) - 6 \stackrel{?}{=} 10 + 4$
$20 - 6 \stackrel{?}{=} 14$
$14 = 14$ ✓

Example 2: Solve $\frac{1}{4}x - 12 = \frac{3}{4}x$.

$\frac{1}{4}x - 12 = \frac{3}{4}x$
$\frac{1}{4}x - 12 - \frac{1}{4}x = \frac{3}{4}x - \frac{1}{4}x$
$-12 = \frac{1}{2}x$
$2 \cdot (-12) = 2 \cdot \frac{1}{2}x$
$-24 = x$

Check: $\frac{1}{4}x - 12 = \frac{3}{4}x$
$\frac{1}{4}(-24) - 12 \stackrel{?}{=} \frac{3}{4}(-24)$
$-6 - 12 \stackrel{?}{=} -18$
$-18 = -18$ ✓

Solve each equation. Check your solution.

1. $6m + 40 = 1m$ → $-6m = -6m$; $-40 = -5m$; $-5 = -5$; $m = 8$
2. $-5y - 2 = y + 10$
3. $-15n = -12n + 9$
4. $-4y + 6 = -3y + 12$
5. $6y - 8 = 6y - 6 - 2$ — see notes
6. $-15x + 8 = -15x - 7$
7. $4.2y + 4.4 = 3.1y$ — see notes
8. $w = 3.8w - 7$ — see notes
9. $-8 - m = -3.5m + 5$ — see notes
10. $\frac{1}{5}x + 12 = \frac{2}{5}x$
11. $\frac{1}{3}x - 8 = -\frac{1}{3}x$
12. $\frac{3}{7}x - 14 = -\frac{5}{7}x + 2$ — see notes

5) $6y + -8 = 6y + -6 + -2$

$-6y \quad = -6y$

$0y + -8 = 0y + -6 + -2$

$-8 = -8$

or

$6y + -8 = 6y + -6 + -2$

$+8 \quad = \quad +8$

$6y = 6y + +2 + -2$

$6y = 6y$

$y = y$

"All real numbers"

$x \in \mathbb{R}$

$2 \neq 5$

$\emptyset$

"No solution"

7) $4.2y + 4.4 = +3.1y$

$+-4.2y \quad = +-4.2y$

$4.4 = -1.1y$

$-1.1 \quad -1.1$

$-4 = y$

$y = -4$

$-1.1\overline{)4.4}$

$-11\overline{)44}$ $\quad 4$

$4.2 - 3.1 = 1.1$

8) $1w = 3.8w + -7$

$+-3.8w \quad = +-3.8w$

$-2.8w =$

$-2.8 \quad -2.8$

$w = +2.5$

$3.8 - 1.0 = 2.8$

$\frac{-7}{-2.8}$

$-28\overline{)-70}$

$-28\overline{)-70}$

$\frac{-70 \div 7}{-28 \div 7} = \frac{-10 \div 2}{-4 \div 2}$

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

$= +2\frac{1}{2}$

$= +2.5$

9) $-8 + m = -3.5m + 5$

$+8 \quad = \quad +8$

$-1m = -3.5m + 13$

$+3.5m = +3.5m$

$2.5m = 13$

$+2.5 \quad +2.5$

$m = 5.2$

$3.5 - 1.0 = 2.5$

$2.5\overline{)13.0}$ → $2.5\overline{)130.00}$ → 5.2, 125, 50

12) $\frac{3}{7}x + 14 = -\frac{5}{7}x + 2$

$+14 \quad = \quad +14$

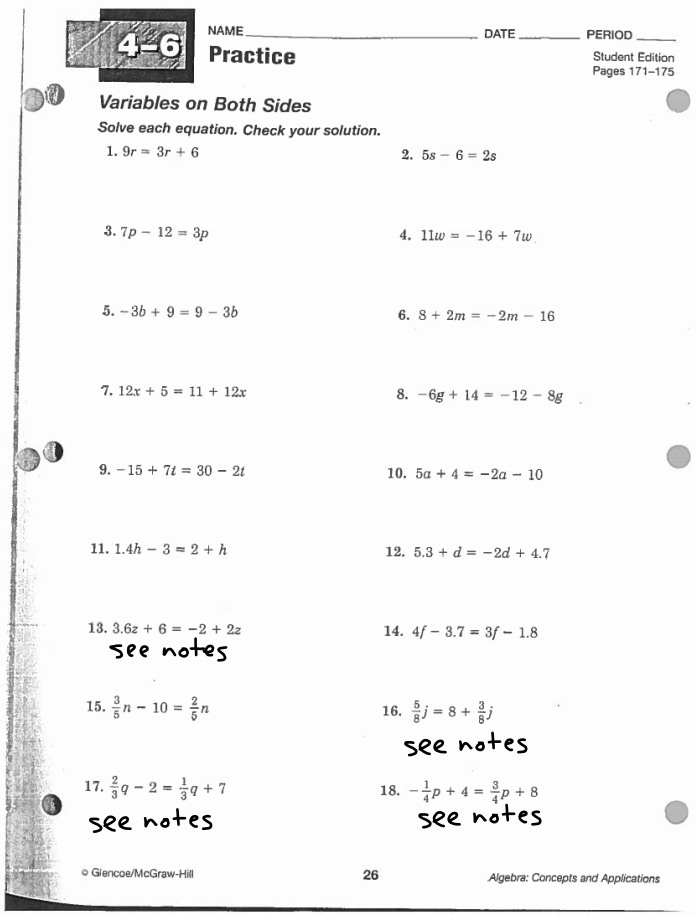
$\frac{3}{7}x = -\frac{5}{7}x + 16$

$+\frac{5}{7}x \quad = +\frac{5}{7}x$

$\frac{8}{7}x = 16$

$\frac{7}{8} \cdot \frac{8}{7}x = 16 \cdot \frac{7}{8}$

$x = 14$



4-6 Practice

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Variables on Both Sides

Solve each equation. Check your solution.

1. $9r = 3r + 6$
2. $5s - 6 = 2s$
3. $7p - 12 = 3p$
4. $11w = -16 + 7w$
5. $-3b + 9 = 9 - 3b$
6. $8 + 2m = -2m - 16$
7. $12x + 5 = 11 + 12x$
8. $-6g + 14 = -12 - 8g$
9. $-15 + 7t = 30 - 2t$
10. $5a + 4 = -2a - 10$
11. $1.4h - 3 = 2 + h$
12. $5.3 + d = -2d + 4.7$
13. $3.6z + 6 = -2 + 2z$ see notes
14. $4f - 3.7 = 3f - 1.8$
15. $\frac{3}{5}n - 10 = \frac{2}{5}n$
16. $\frac{5}{8}j = 8 + \frac{3}{8}j$ see notes
17. $\frac{2}{3}q - 2 = \frac{1}{3}q + 7$ see notes
18. $-\frac{1}{4}p + 4 = \frac{3}{4}p + 8$ see notes

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13) $3.6z + 6 = -2 + 2z$

$+ -3.6z \quad = \quad + -3.6z$

$6 = -2 + -1.6z$

$+2 \quad = \quad +2$

$8 = -1.6z$

$-1.6 \quad\quad -1.6$

$5 = z$

$z = 5$

$-1.6\overline{)8.0}$

$-16\overline{)80.00}$

-80

0

$3.6 - 2.0 = 1.6$

16) $\frac{5}{8} \cdot j = 8 + \frac{3}{8} \cdot j$

$-\frac{3}{8} \cdot j \quad = \quad -\frac{3}{8} \cdot j$

$\frac{8}{5} \cdot \left(\frac{5}{8} \cdot j\right) = \frac{8}{1} \cdot \frac{8}{1}$

$j = 32$

17) $\frac{2}{3} \cdot q - 2 = \frac{1}{3} \cdot q + 7$

$+2 \quad = \quad +2$

$\frac{2}{3} \cdot q = \frac{1}{3} \cdot q + 9$

$-\frac{1}{3} \cdot q \quad = -\frac{1}{3} \cdot q$

$\frac{3}{1} \cdot \left(\frac{1}{3} \cdot q\right) = \frac{9}{1} \cdot \frac{3}{1}$

$q = 27$

18) $-\frac{1}{4}p + 4 = \frac{3}{4}p + 8$

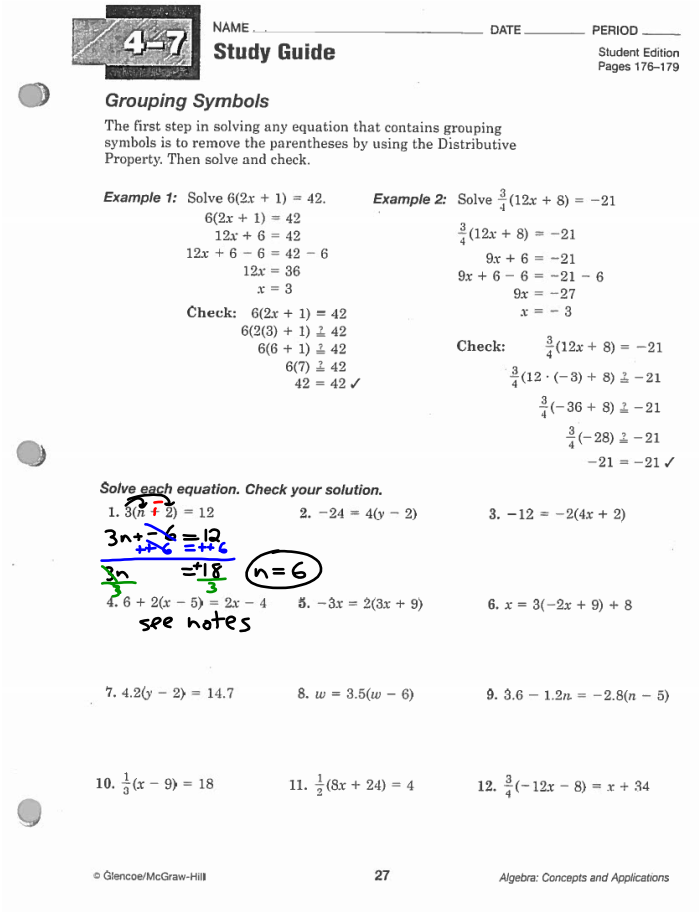
$+\frac{1}{4}p \quad = +\frac{1}{4}p$

$+4 = 1p + 8$

$+-8 = \quad +-8$

$-4 = p$

$p = -4$



4–7 Study Guide

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Student Edition Pages 176–179

Grouping Symbols

The first step in solving any equation that contains grouping symbols is to remove the parentheses by using the Distributive Property. Then solve and check.

Example 1: Solve $6(2x + 1) = 42$.

$6(2x + 1) = 42$
$12x + 6 = 42$
$12x + 6 - 6 = 42 - 6$
$12x = 36$
$x = 3$

Check: $6(2x + 1) = 42$
$6(2(3) + 1) \stackrel{?}{=} 42$
$6(6 + 1) \stackrel{?}{=} 42$
$6(7) \stackrel{?}{=} 42$
$42 = 42$ ✓

Example 2: Solve $\frac{3}{4}(12x + 8) = -21$

$\frac{3}{4}(12x + 8) = -21$
$9x + 6 = -21$
$9x + 6 - 6 = -21 - 6$
$9x = -27$
$x = -3$

Check: $\frac{3}{4}(12x + 8) = -21$
$\frac{3}{4}(12 \cdot (-3) + 8) \stackrel{?}{=} -21$
$\frac{3}{4}(-36 + 8) \stackrel{?}{=} -21$
$\frac{3}{4}(-28) \stackrel{?}{=} -21$
$-21 = -21$ ✓

Solve each equation. Check your solution.

1. $3(n + 2) = 12$ — $3n + 6 = 12$, $-6 \quad -6$, $\frac{3n}{3} = \frac{6}{3}$, $n = 6$
2. $-24 = 4(y - 2)$
3. $-12 = -2(4x + 2)$
4. $6 + 2(x - 5) = 2x - 4$ — see notes
5. $-3x = 2(3x + 9)$
6. $x = 3(-2x + 9) + 8$
7. $4.2(y - 2) = 14.7$
8. $w = 3.5(w - 6)$
9. $3.6 - 1.2n = -2.8(n - 5)$
10. $\frac{1}{3}(x - 9) = 18$
11. $\frac{1}{2}(8x + 24) = 4$
12. $\frac{3}{4}(-12x - 8) = x + 34$

4) $6 + 2(x + -5) = 2x + -4$

$+6 + 2x + -10 = 2x + -4$

$-4 + 2x = 2x + -4$

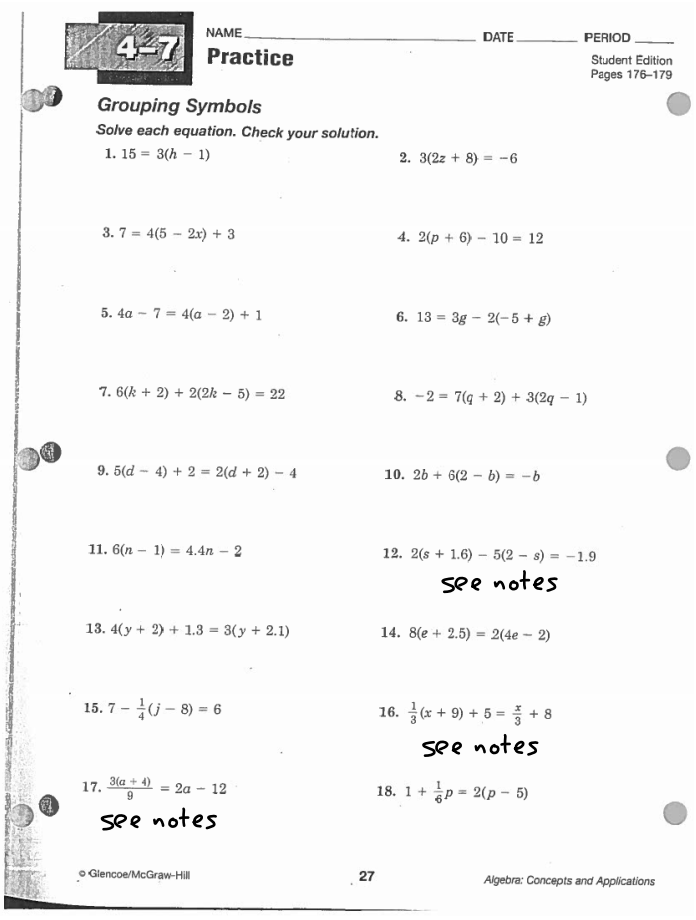
$+4 \quad\quad = \quad\quad +4$

$\frac{2x}{2} = \frac{2x}{2}$

$x = x$

All real numbers

$x \in \mathbb{R}$



4-7 Practice

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Grouping Symbols

Solve each equation. Check your solution.

1. $15 = 3(h - 1)$
2. $3(2z + 8) = -6$
3. $7 = 4(5 - 2x) + 3$
4. $2(p + 6) - 10 = 12$
5. $4a - 7 = 4(a - 2) + 1$
6. $13 = 3g - 2(-5 + g)$
7. $6(k + 2) + 2(2k - 5) = 22$
8. $-2 = 7(q + 2) + 3(2q - 1)$
9. $5(d - 4) + 2 = 2(d + 2) - 4$
10. $2b + 6(2 - b) = -b$
11. $6(n - 1) = 4.4n - 2$
12. $2(s + 1.6) - 5(2 - s) = -1.9$ see notes
13. $4(y + 2) + 1.3 = 3(y + 2.1)$
14. $8(e + 2.5) = 2(4e - 2)$
15. $7 - \frac{1}{4}(j - 8) = 6$
16. $\frac{1}{3}(x + 9) + 5 = \frac{x}{3} + 8$ see notes
17. $\frac{3(a + 4)}{9} = 2a - 12$ see notes
18. $1 + \frac{1}{6}p = 2(p - 5)$

12) $2(x+1.6) + -5(2+-x) = -1.9$

$2x + 3.2 + -10 + 5x = -1.9$

$10.0 - 3.2 = 6.8$

$7x + -6.8 = -1.9$

$+6.8 \quad +6.8$

$\frac{7x}{7} = \frac{4.9}{7}$

$x = 0.7$

$7\overline{)4.9}$ $\quad 6.8 - 1.9 = 4.9$

16) $\frac{1}{3}(x+9) + 5 = \frac{x}{3} + 8$

$\frac{1}{3}x + \frac{9}{3} + 5 = \frac{1x}{3} + 8$

$\frac{1}{3}x + 3 + 5 = \frac{1}{3}x + 8$

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

Identity

All real numbers

17) $\frac{9}{1} \cdot \frac{3(A+4)}{9} = \frac{(2A+-12)}{1} \cdot \frac{9}{1}$

$3(A+4) = (2A+-12)\cdot 9$

$+3A+12 = 18A+-108$

$+-18A \quad = +-18A$

$-15A+12 = -108$

$+-12 \quad = \quad +-12$

$\frac{-15A}{-15} = \frac{-120}{-15}$

$A = 8$

PEMDAS
Fraction Bar

$15 \times 4 = 60$, $60 \times 2 = 120$, so 8