

Solve Linear Equations with Rational Coefficients

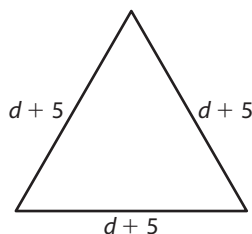
Name: _____

Prerequisite: Solve Problems with Expressions

Study the example problem showing how to write equivalent expressions. Then solve problems 1–10.

Example

The lengths of the sides of an equilateral triangle are shown. Write two different expressions for the perimeter of the triangle.



Expression 1

Find the sum of the side lengths.

$$(d + 5) + (d + 5) + (d + 5)$$

Expression 2

Multiply the side length by 3.

$$3(d + 5)$$

- 1 Simplify Expression 1.

- 2 Simplify Expression 2.

- 3 What do you notice about the simplified expressions in problems 1 and 2?

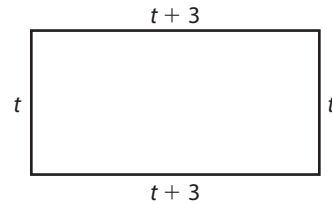
- 4 Jessica rewrites Expression 1 as $d + d + d + 5 + 5 + 5$. Why might she have done this?

- 5 Is Jessica's expression equivalent to Expression 2? Explain how you know.



Solve.

- 6 The lengths of the sides of a rectangle are shown. Write two equivalent expressions for the perimeter of the rectangle.



- 7 Write two different expressions that are equivalent to $12 - 16x$. Use factoring to write one of the expressions.

- 8 Describe how to determine whether $18 - 3(2p + 4) - 3p$ is equivalent to $3(2 - 3p)$. Are the expressions equivalent?

- 9 Tran says that $-\frac{1}{4}x - 7 + \frac{9}{4}x + 2x$ is equivalent to $4x - 7$. How can substituting any value for x help you determine whether Tran is correct? Is Tran correct? Use substitution to justify your answer.

- 10 The perimeter of a square can be represented by the expression $8x - 10 + 8x - 10$. Write an expression to represent the length of one side of the square.

Show your work.

Solution: _____

Solve Equations with Rational Coefficients

Study the example showing how to solve an equation with rational coefficients. Then solve problems 1–6.

Example

Solve the equation: $4n = \frac{1}{2}(2n - 12)$.

$$4n = \frac{1}{2}(2n - 12)$$

$$4n = n - 6$$

Step 1: Use the distributive property.

$$4n - n = n - 6 - n$$

Step 2: Subtract n from both sides.

$$3n = -6$$

Step 3: Simplify.

$$\frac{3n}{3} = \frac{-6}{3}$$

Step 4: Divide both sides by 3.

$$n = -2$$

Step 5: Simplify.

- 1** Check the solution to the example problem by replacing n in the original equation with -2 and evaluating both sides. What true statement do you get?

- 2** Suppose that you first want to eliminate the fraction in the example equation. What would your first step be? Is -2 still the solution when you start by eliminating the fraction first? Explain.

- 3** Trey solved the equation $\frac{1}{4}(8x + 16) = 4x$, as shown at the right. Describe the error that he made. Then solve the problem.

$$\frac{1}{4}(8x + 16) = 4x$$

$$2x + 16 = 4x$$

$$\frac{16}{2} = \frac{2x}{2}$$

$$8 = x$$



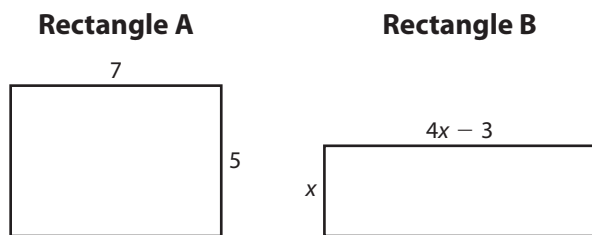
Solve.

- 4 Describe the first step you would use to solve the equation $20 = 7y + 2 - y$. Is that the only possible first step?

- 5 Solve the equation in two different ways: $6p = 0.6(5p + 15)$.
Show your work.

Solution: _____

- 6 The two rectangles shown below have the same perimeter. Write and solve an equation to find the value of x . Then find the measures of the length and width of Rectangle B. All measurements are in inches.



Equation: _____

$x =$ _____

Length of Rectangle B: _____

Width of Rectangle B: _____

Solve Linear Equations with Rational Coefficients

Solve the problems.

- 1 Claire wants to solve the equation $-\frac{1}{4}(x - 1) = \frac{2}{3}x + 2$.

Which step would not be an appropriate first step for Claire to take to solve for x ?

- A Multiply both sides by -4 .
- B Use the distributive property to distribute $-\frac{1}{4}$.
- C Add 1 to both sides.
- D Multiply both sides by $\frac{3}{2}$.

What techniques can you use to simplify the equation?



- 2 Solve the equation for x : $3x - 5 = \frac{1}{2}x + 2x$.

Show your work.

What operations can you use to simplify both sides of the equation?



Solution: _____

- 3 In the equation below, for what value of c does $x = 4$?

$$\frac{1}{2}(2x + 4) = 3x - c$$

- A -6
- B -3
- C 3
- D 6

How can you check your answer?



Jenn chose **C** as the correct answer. How did she get that answer?

Solve.

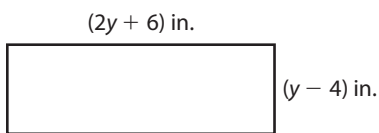
4 Choose Yes or No to tell whether the equation has the given solution.

- a. $2x + 4 = 3x - 2; x = 6$ Yes No
- b. $\frac{1}{4}x + 3 = \frac{3}{4}x + 1; x = 8$ Yes No
- c. $3x - 5 = 0.5x; x = 2$ Yes No
- d. $\frac{2}{3}(3x + 6) = 3x - 4; x = 8$ Yes No

How can you use substitution to solve this problem?



5 The width of this rectangle is $\frac{1}{3}$ of the length. Find the length and the width of the rectangle.



What equation can you write to solve the problem?



Show your work.

Solution: _____
