

Use the Distributive Property to simplify the expression.

$$1. 5(u - 5)$$

$$5u - 25$$

$$2. 17(2 + n)$$

$$34 + 17n$$

$$3. -5(e - 4)$$

$$-5e + 20$$

$$4. -3(t + 7)$$

$$-3t - 21$$

$$4v - 24$$

$$5. 4(v - 6)$$

$$4a + 20$$

$$6. 4(a + 5)$$

Simplify the expression.

1. $-1 + (-1) + (-1)$

2. $(10)(-10)(-10)(10)$

3. $-6 - (-6)$

Simplify the expression.

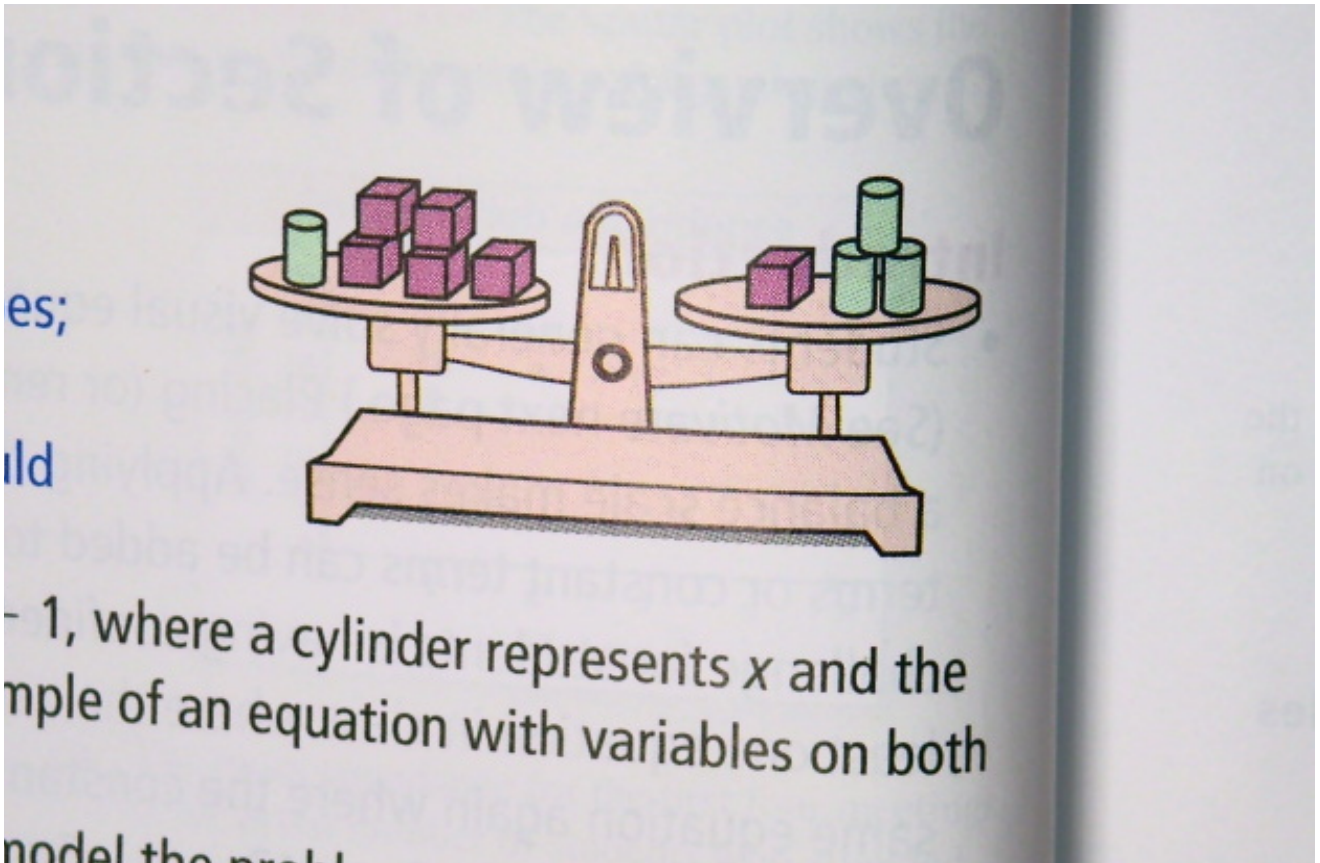
4. $\frac{300}{-3} \div \frac{300}{3}$

5. $4 + 4 - 4 + 4 - 4 + 4$

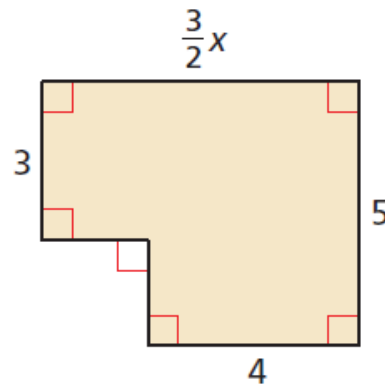
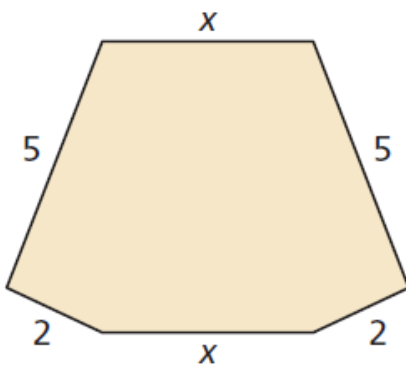
6. $2(10 - 2)(2 - 8)(6 - 2)(2 - 4)(2 - 2)$

Essential Question

How can you solve an equation that has variables on both sides?

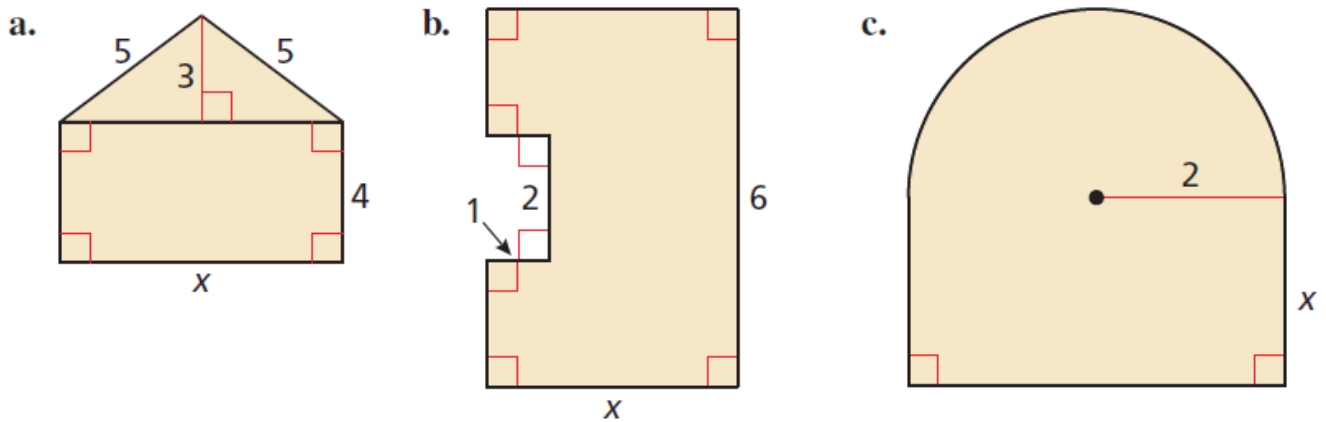


Work with a partner. The two polygons have the same perimeter. Use this information to write and solve an equation involving x . Explain the process you used to find the solution. Then find the perimeter of each polygon.



Work with a partner.

- Each figure has the unusual property that the value of its perimeter (in feet) is equal to the value of its area (in square feet). Use this information to write an equation for each figure.
- Solve each equation for x . Explain the process you used to find the solution.
- Find the perimeter and area of each figure.



 **Core Concept****Solving Equations with Variables on Both Sides**

To solve an equation with variables on both sides, simplify one or both sides of the equation, if necessary. Then use inverse operations to collect the variable terms on one side, collect the constant terms on the other side, and isolate the variable.

Solve $10 - 4x = -9x$. Check your solution.

$$+4x + 4x$$

$$10 = -9x + 4x$$

$$\frac{10}{-5} = \frac{-5x}{-5}$$

$$x = -2$$

Solve

$$3(3x - 4) = \frac{1}{4}(32x + 56)$$

$$\begin{array}{r} 9x - 12 = 8x + 14 \\ - 8x \qquad - 8x \end{array}$$

$$\begin{array}{r} x - 12 = 14 \\ + 12 \qquad + 12 \end{array}$$

$$\boxed{x = 26}$$

Solve the equation. Check your solution.

1. $-2x = 3x + 10$

$+2x + 2x$

$0 = 5x + 10$
 $-10 \quad -10$

$\frac{-10}{2.5} = \frac{5x}{5}$

$-2 = x$

3.

$\frac{1}{2}(6h - 4) = -5h + 1$

$3h - 2 = -5h + 1$

$-\frac{3}{4}(8n + 12) = 3(n - 3)$

$-6n - 9 = 3n - 9$

$-3n \quad -3n$

$-9n - 9 = -9$

$+9 \quad +9$

$-9n = 0$

$\frac{-9}{-9} = \frac{0}{-9}$

$n = 0$

 **Core Concept****Special Solutions of Linear Equations**

Equations do not always have one solution. An equation that is true for all values of the variable is an **identity** and has *infinitely many solutions*. An equation that is not true for any value of the variable has *no solution*.

Solve each equation.

a. $3(5x + 2) = 15x$

$$\begin{array}{r} 15x + 6 = 15x \\ -15x \quad -15x \end{array}$$

$$6 = 0$$

No solution.

b. $-2(4y + 1) = -8y - 2$

$$-8y - 2 = -8y - 2$$

∞ many
solutions

Identity

Solve the equation.

4. $4(1 - p) = -4p + 4$

$4 - 4p = -4p + 4$
 Infinitely many solutions

5. $-m = \frac{5}{6}(6m - 10)$

$5m = 5m - \frac{50}{6}$
 $-5m - 5m$
 $0 = -\frac{50}{6}$ No sol..

6. $10k + 7 = -3 - 10k$

$-10k \quad -10k$
 $7 = -3 - 20k$
 $+3 \quad +3$
 $10 = -20k$
 $\frac{10}{-20} \quad \frac{-20k}{-20}$

$k = 0.5$

7. $3(2a - 2) = 2(3a - 3)$

$6a - 6 = 6a - 6$
 infinitely many

Concept Summary

Steps for Solving Linear Equations

Here are several steps you can use to solve a linear equation. Depending on the equation, you may not need to use some steps.

Step 1 Use the Distributive Property to remove any grouping symbols.

Step 2 Simplify the expression on each side of the equation.

Step 3 Collect the variable terms on one side of the equation and the constant terms on the other side.

Step 4 Isolate the variable.

Step 5 Check your solution.

A boat leaves New Orleans and travels upstream on the Mississippi River for 4 hours. The return trip takes only 2.8 hours because the boat travels 3 miles per hour faster downstream due to the current. How far does the boat travel upstream?

28 miles

Upstream = Downstream 4 hours

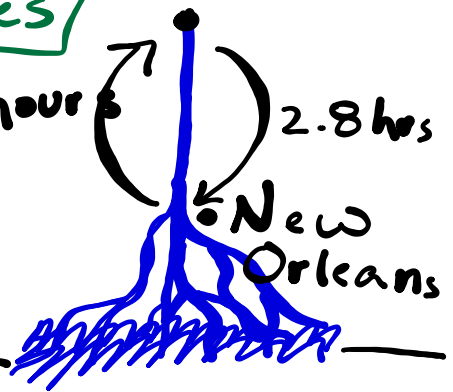
$$x \cdot 4 = (x + 3) 2.8$$

$$4x = 2.8x + 8.4$$

$$\begin{array}{r} -2.8x \\ \hline 1.2x = 8.4 \end{array}$$

$$\frac{1.2x}{1.2} = \frac{8.4}{1.2}$$

$$x = 7$$



8. A boat travels upstream on the Mississippi River for 3.5 hours. The return trip only takes 2.5 hours because the boat travels 2 miles per hour faster downstream due to the current. How far does the boat travel upstream?

- **I Used to Think ... But Now I Know:** Take time for students to reflect on their current understanding of solving equations.

- **Exit Ticket:** Solve $6 - 2x = 4x - 9$.