Name _____ Date _____

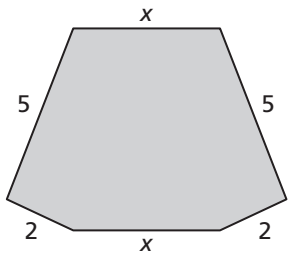
1.3 Solving Equations with Variables on Both Sides

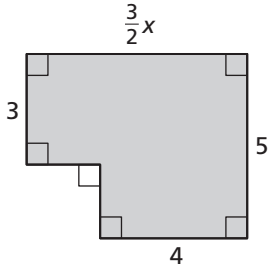
For use with Exploration 1.3

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

1 EXPLORATION: Perimeter

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.





2 EXPLORATION: Perimeter and Area

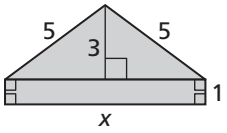
Work with a partner.

- 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.

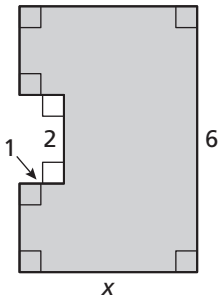
1.3 Solving Equations with Variables on Both Sides (continued)

2 EXPLORATION: Perimeter and Area (continued)

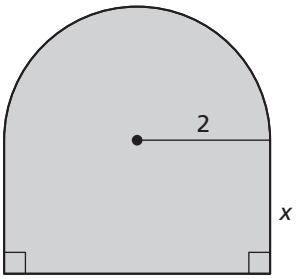
a.



b.



c.



Communicate Your Answer

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

4. Write three equations that have the variable x on both sides. The equations should be different from those you wrote in Explorations 1 and 2. Have your partner solve the equations.

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1.3 Notetaking with Vocabulary

For use after Lesson 1.3

In your own words, write the meaning of each vocabulary term.

identity

Core Concepts

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.

Notes:

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*.

Notes:

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1.3 Notetaking with Vocabulary (continued)

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.

Notes:

Extra Practice

In Exercises 1–10, solve the equation. Check your solution.

1. $12 - 3x = -6x$

2. $7 - 5z = 17 + 5z$

3. $3k + 45 = 8k + 25$

4. $\frac{3}{4}(48 - 16x) = 4(4 + 2x)$

5. $5q + 6 = 2q - 2 + q$

6. $8 + 6x - 10x = 16 - 8x$

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1.3 Notetaking with Vocabulary (continued)

7. $6a - 4 = 3a + 5$

8. $2(4b - 6) = 4(3b - 7)$

9. $8(2r - 3) - r = 3(3r + 2)$

10. $3x - 8(2x + 3) = -6(2x + 5)$

In Exercises 11–14, solve the equation. Determine whether the equation has *one solution*, *no solution*, or *infinitely many solutions*.

11. $6(4s + 12) = 8(3s - 14)$

12. $16f + 24 = 8(2f + 3)$

13. $\frac{1}{2}(10 + 12n) = \frac{1}{3}(15n + 15)$

14. $\frac{2}{3}(6j + 9) = 3j + 7$

15. The value of the surface area of a rectangular prism is equal to the value of the volume of the rectangular prism. Write and solve an equation to find the value of x.