LESSON 4

Objective

Simplify an expression by combining like terms.

Common Core State Standards

- **6.EE.3** Apply the properties of operations to generate equivalent expressions. *For example, apply the distributive property to the expression 3 (2 + x) to produce the equivalent expression 6 + 3x; apply the distributive property to the expression 24x + 18y to produce the equivalent expression 6 (4x + 3y); apply properties of operations to y + y + y to produce the equivalent expression 3y.*

Expressions and Equations

Combining Like Terms II

The students' concept of perimeter can be linked to algebra. In this lesson, the link to algebra is established by using various Algeblocks to represent the sides of an irregular shape (rather than providing students with actual dimensions). Students apply the definition of perimeter to generate an expression that can be simplified by combining like terms.

Try It! *Perform the Try It! activity on the next page.*

Talk About It

Discuss the Try It! activity.

- **Ask:** *There are no dimensions given in this problem. How can we refer to each of the pieces that make up the floor plan?*
- **Say:** *Assign a value to* x *and then find the perimeter of Sara's shop.*

Solve It

Reread the problem with students. Ask them for at least two methods they can use to find the perimeter of any given shape. Invite students to create other floor plans for Sara's shop using the same Algeblocks pieces. Is the perimeter the same?

More Ideas

For another way to teach about combining like terms—

- Have students build shapes using Algebra Tiles™. For each shape, students can find an expression for the perimeter and simplify the expression as necessary.

Formative Assessment

Have students try the following problem.

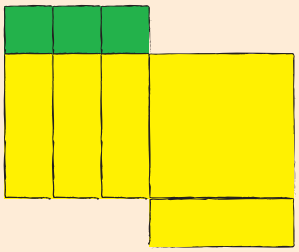
What is the perimeter of the figure shown here?

A. $3x + 6$

B. $4x + 3$

C. $4x + 6$

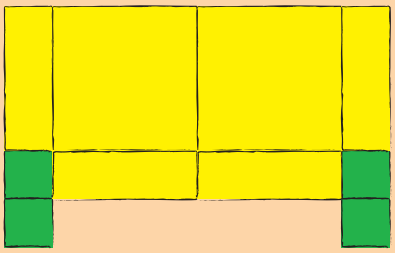
D. $4x + 10$



Try It! 15 minutes | Pairs

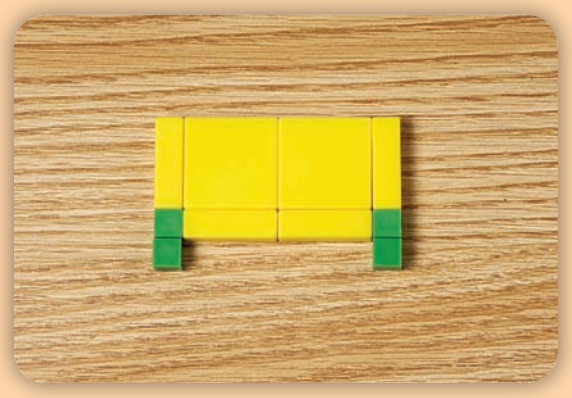
Here is a problem about combining like terms.

Here is the floor plan for Sara's bead shop. She has divided the space into a number of sections as shown. Now she wants to add a wallpaper border all around the walls near the ceiling. She needs to determine the perimeter of the shop so that she can buy enough wallpaper border. What is the perimeter of her shop?

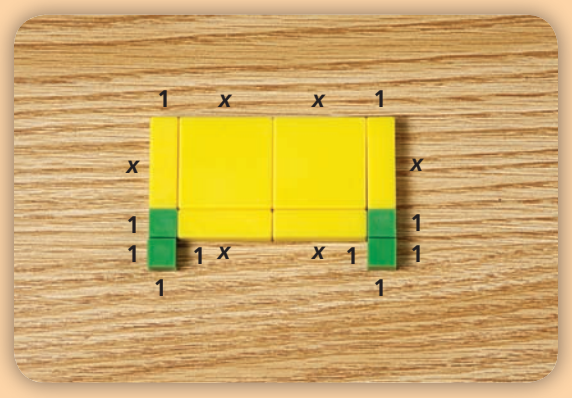


Introduce the problem. Then have students do the activity to solve the problem. Distribute Algeblocks to students.

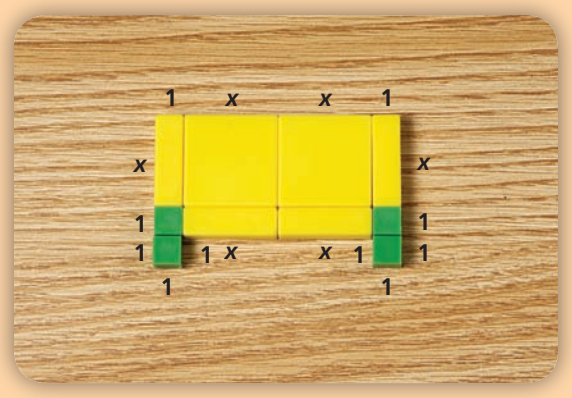
Materials
- Algeblocks® (x^2, x, and unit blocks)



1. Have students use the Algeblocks to build the irregular shape as shown.



2. Have students determine the dimensions of the figure by using x for the length of a yellow block and 1 for the end of a yellow block. The green block is 1 unit by 1 unit.



3. Have students combine like terms to determine the perimeter of the figure, $6x + 10$.

$P = 1 + 1 + x + x + 1 + 1 + 1 + 1 + x + 1 + x + x + 1 + x + 1 + 1$

$P = 6x + 10$

⚠ Look Out!

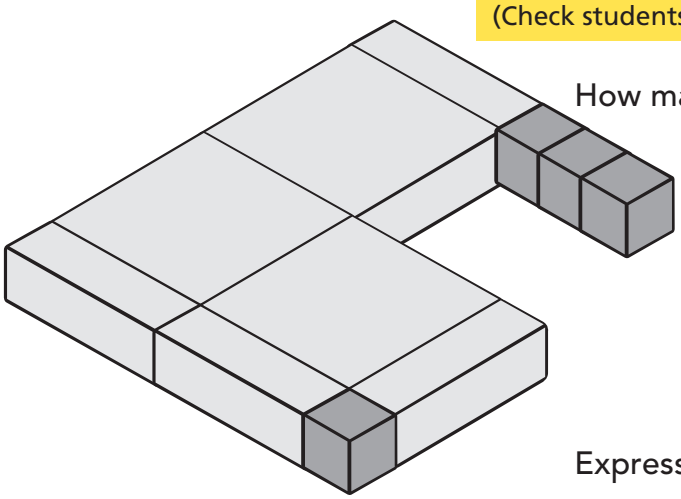
Students may be tempted to count the length of the x block as 3 units since it is close to 3 units long. Remind students as necessary that the x block represents x and not 3.

Answer Key

Use Algeblocks to model the irregular shape shown. Answer the questions. Write an expression for the perimeter of the shape in simplest form.

1.

(Check students' work.)



How many sides does the shape have? 8

What expressions represent the lengths of the sides?

(The side lengths are given starting with the side along the top of the shape and moving clockwise around the shape.)

Expression for perimeter: $2x + 2 + x + 3 + 1 + 3 + x + x + 1 + x + 1 + 2x + 1$; $8x + 12$

Using Algeblocks, build an irregular shape. Sketch the model. Write expressions for the lengths of each side. Write the expression for the perimeter of the shape.

2.

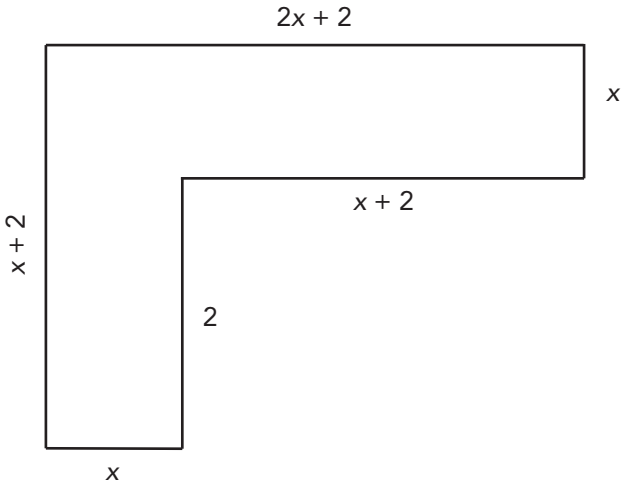
Check students' models; answers will vary depending on models.

Lengths of the sides:

Expression for perimeter:

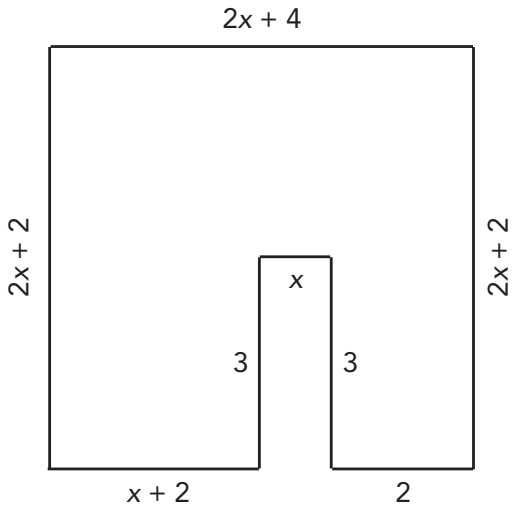
Write an expression for the perimeter of each shape.

3.



$6x + 8$

4.



$8x + 18$

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Answer Key

Challenge! Write a description of how to find the perimeter of an irregular shape when the lengths of the sides are expressions that contain variable and constant terms. Use an example.

Challenge: (Sample) Add all of the like variable terms together and add the constant terms together.

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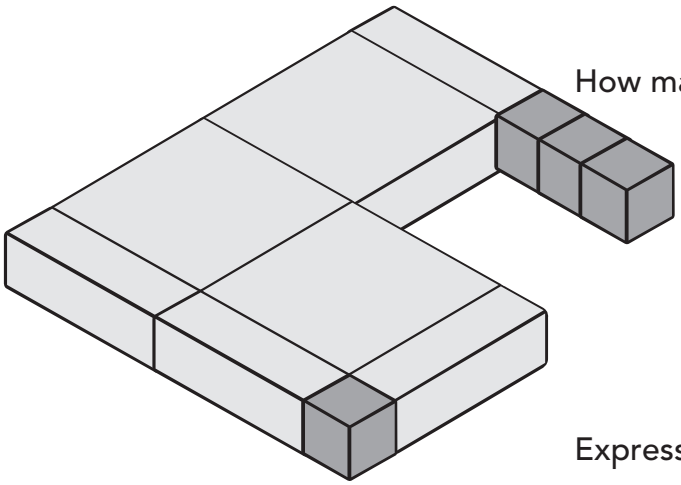
Name _____

Use Algeblocks to model the irregular shape shown. Answer the questions. Write an expression for the perimeter of the shape in simplest form.

1.



How many sides does the shape have?_____

What expressions represent the lengths of the sides?

_____

_____

_____

Expression for perimeter: _____

Using Algeblocks, build an irregular shape. Sketch the model. Write expressions for the lengths of each side. Write the expression for the perimeter of the shape.

2.

Lengths of the sides:

_____

_____

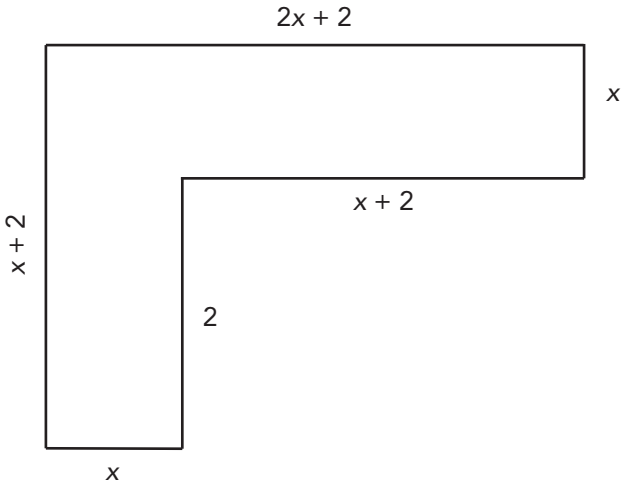
_____

Expression for perimeter:

_____

Write an expression for the perimeter of each shape.

3.



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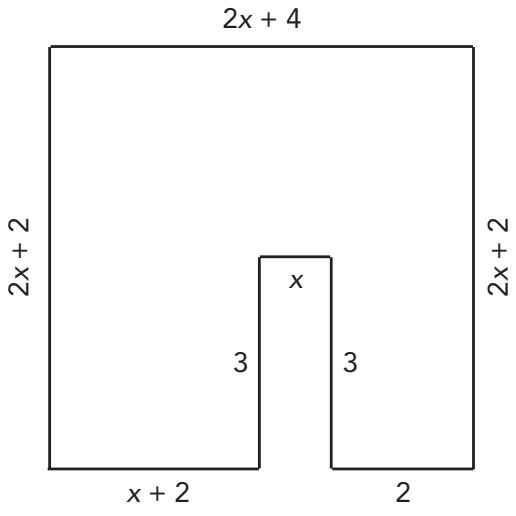
4.



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Name _____

Challenge! Write a description of how to find the perimeter of an irregular shape when the lengths of the sides are expressions that contain variable and constant terms. Use an example.

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