LESSON 5

Objective

Use the Distributive Property to expand an algebraic expression.

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

Algebraic Equivalencies: Distributive Property

In previous grades, students have worked with the Distributive Property in multiplying numbers. Now they will learn to apply this property as they multiply a monomial by a binomial to find an equivalent algebraic expression.

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

Talk About It

Discuss the Try It! activity.

- **Ask:** *What is the Distributive Property? How can it be applied to this problem?*
- **Ask:** *What does it mean to "simplify" an expression?*
- **Ask:** *How do you know that both sides of the equation you wrote are equivalent?*

Solve It

Reread the problem with students. Review the formula for finding the area of a rectangle, if necessary. Ask them to use Algeblocks to represent the problem and its solution on the Quadrant Mat. Students should be able to refer to the visual model as a guide to writing the equivalent algebraic expression.

More Ideas

For other ways to teach about the Distributive Property—

- Extend the activity by having students insert numerical values for *x.* Have them exchange the variable Algeblocks® with unit blocks to determine a numerical answer.
- Have students grab a handful of *x* and unit blocks at random. Have them arrange these on the *x*-axis and *y*-axis of the mat as they please. They should then solve the multiplication problem they have formed and write the equation for the problem.

Formative Assessment

Have students try the following problem.

Which of the following is an example of the Distributive Property?

A. $4 + x = x + 4$
B. $3x + 2x + 1 = 5x + 1$
C. $(x + y) + 5 = x + (y + 5)$
D. $2(y + 3) = 2y + 6$

Try It! 30 minutes | Pairs

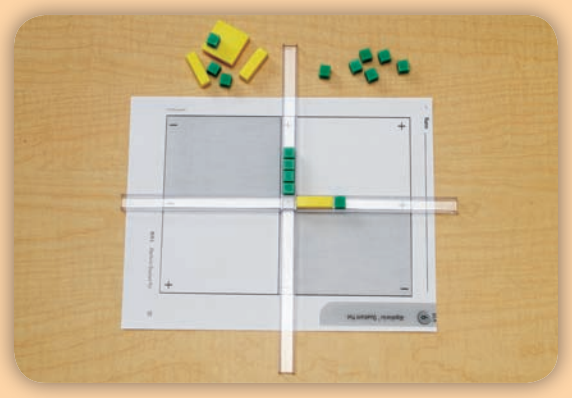
Here is a problem about using the Distributive Property.

Kelsey and Nick are trying to determine the area of their rectangular patio. Their father told them the width is 4 and the length is x + 1. What is the area of Kelsey and Nick's patio? Write an algebraic expression expressing the area.

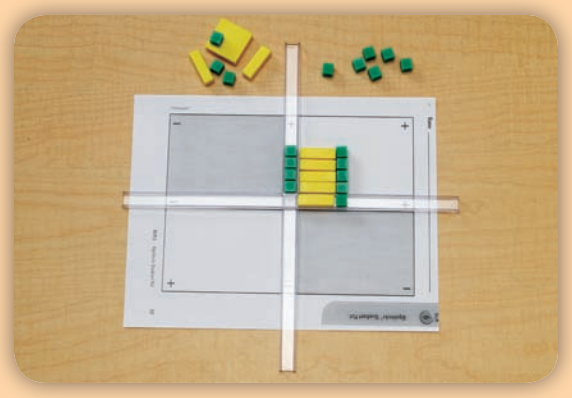
Introduce the problem. Then have students do the activity to solve the problem. Distribute Algeblocks, Factor Tracks, and mats to students.

Materials

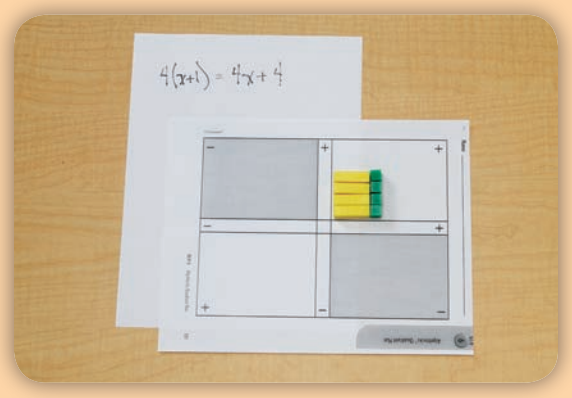
- Algeblocks® (*x* and unit blocks)
- Algeblocks Factor Track
- Algeblocks Quadrant Mat (BLM 7, 1 per pair)



1. Have students set up the algebraic expressions on their Quadrant Mat. Students should place the factors in the Factor Tracks.



2. Have students build a rectangle with the correct Algeblocks. **Say:** *Check your work to be sure that you have filled in the space with the correct blocks.* Review the value of the different Algeblocks, if necessary.



3. Have students remove the Factor Track and read the solution to the problem from the mat. They should then write out the equation: $4(x + 1) = 4x + 4$. **Ask:** *How did you use the Distributive Property to show that the left side of your equation is equivalent to the right side?*

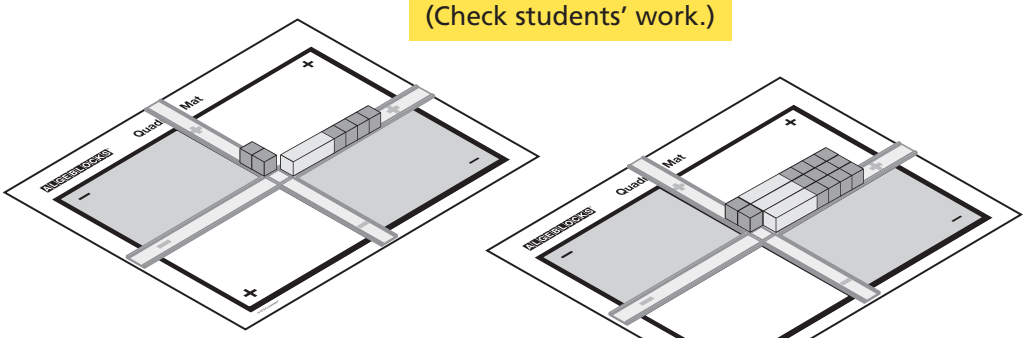
⚠ Look Out!

Some students may find it confusing that the answer to the question is not a number. Explain that this is because there is no assigned value for *x*. Give students a numeric value for *x* and have them solve the problem again.

Answer Key

Use Algeblocks, an Algeblocks Quadrant Mat, and a Factor Track to model the expression shown. Write the factors and their product.

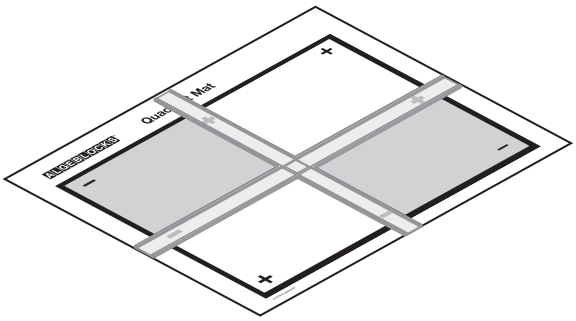
1. (Check students' work.)



2(x + 4) = 2x + 8

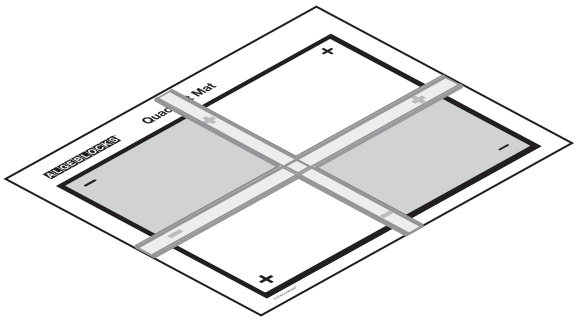
Using Algeblocks, an Algeblocks Quadrant Mat, and a Factor Track, model each pair of factors and their product. Sketch the model. Write each product.

2. 2(y + 3)



2y + 6

3. 2(2y + 1)



4y + 2

Find each product using the Distributive Property.

4. 2(x + 5)

2x + 10

5. 2(3y + 4)

6y + 8

6. 4(y + 1)

4y + 4

7. 2(4x + 1)

8x + 2

8. 5(x + 10)

5x + 50

9. 2(2y + 5)

4y + 10

Answer Key

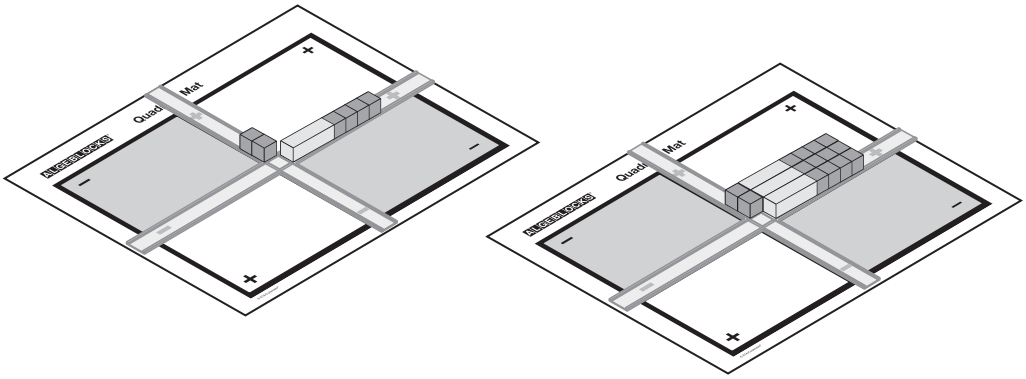
Challenge! Will the Distributive Property work with subtraction? Use $3(x - 1)$ as an example. Explain.

Challenge: (Sample) yes; you can still distribute subtraction over multiplication. Multiply the number on the outside of the parentheses, 3, by each of the terms on the inside of the parentheses, the x and the 1. $3(x - 1) = 3x - 3$

Name _____

Use Algeblocks, an Algeblocks Quadrant Mat, and a Factor Track to model the expression shown. Write the factors and their product.

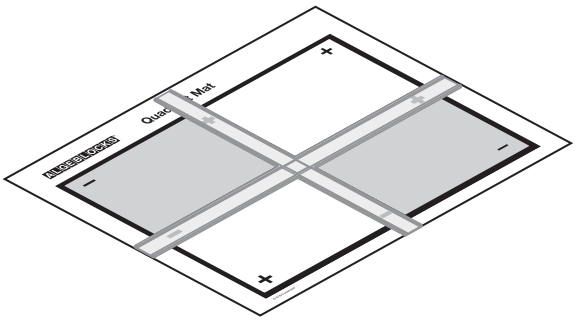
1.



_____ = _____

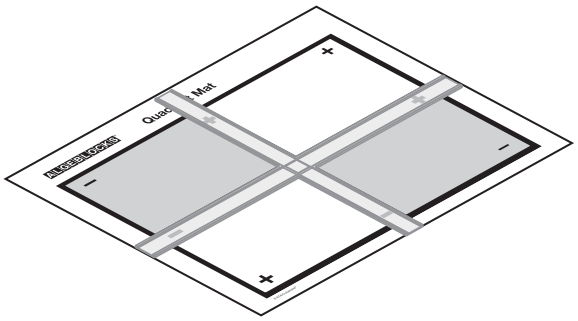
Using Algeblocks, an Algeblocks Quadrant Mat, and a Factor Track, model each pair of factors and their product. Sketch the model. Write each product.

2. $2(y + 3)$



_____

3. $2(2y + 1)$



_____

Find each product using the Distributive Property.

4. $2(x + 5)$

_____

5. $2(3y + 4)$

_____

6. $4(y + 1)$

_____

7. $2(4x + 1)$

_____

8. $5(x + 10)$

_____

9. $2(2y + 5)$

_____

Name _____

Challenge! Will the Distributive Property work with subtraction? Use $3(x - 1)$ as an example. Explain.

BLM 7

Algeblocks® Quadrant Mat

Name _____