

Explore 12-1

Algebra Lab The Distributive Property

MAIN IDEA

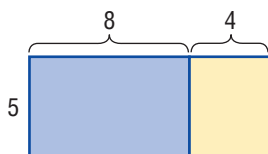
Model the Distributive Property.

To find the area of a rectangle, multiply the length and width. To find the area of a rectangle formed by two smaller rectangles, you can use either one of two methods.

ACTIVITY

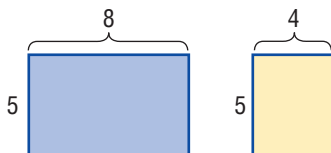
- 1 Find the area of the blue and yellow rectangles.

METHOD 1 Add the lengths. Then multiply.



$$\begin{aligned} 5(8 + 4) &= 5(12) && \text{Add.} \\ &= 60 && \text{Simplify.} \end{aligned}$$

METHOD 2 Find each area. Then add.



$$\begin{aligned} 5 \cdot 8 + 5 \cdot 4 &= 40 + 20 && \text{Multiply.} \\ &= 60 && \text{Simplify.} \end{aligned}$$

In Method 1, you found that $5(8 + 4) = 60$. In Method 2, you found that $5 \cdot 8 + 5 \cdot 4 = 60$. So, $5(8 + 4) = 5 \cdot 8 + 5 \cdot 4$.

✓ CHOOSE Your Method

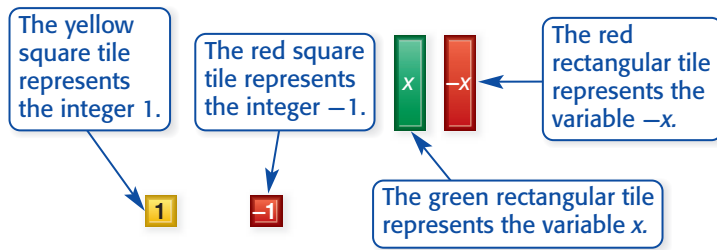
Draw a model showing that each equation is true.

- a. $2(4 + 6) = (2 \cdot 4) + (2 \cdot 6)$ b. $4(3 + 2) = (4 \cdot 3) + (4 \cdot 2)$
c. $7(10 + 8) = (7 \cdot 10) + (7 \cdot 8)$ d. $6(20 + 3) = (6 \cdot 20) + (6 \cdot 3)$

ANALYZE THE RESULTS

1. Refer to Check Your Progress c above. How could you use the Distributive Property to evaluate $7(18)$ mentally?
2. Use the Distributive Property to evaluate $9(33)$ mentally.

Activity 1 modeled the Distributive Property with numbers. You can also use algebra tiles to model the Distributive Property with variables. Refer to the set of algebra tiles below.



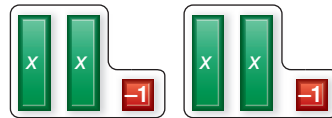
ACTIVITY

- 2 Use algebra tiles to tell whether the equation $2(2x - 1) = 4x - 2$ is *true* or *false*.

Study Tip

To model the expression $2x - 1$, rewrite as $2x + (-1)$. Then use one red square tile to represent the integer -1 .

Model the left side of the equation, $2(2x - 1)$.



There are two groups with $2x - 1$ in each group.

Rearrange the tiles.



No tiles were added or taken away from the original expression, $2(2x - 1)$. The equation $2(2x - 1) = 4x - 2$ is true.

ANALYZE THE RESULTS

Tell whether each statement is *true* or *false*. Justify your answer with tiles or a drawing.

- $3(x + 1) = 3x + 3$
- $4(x + 1) = 4x + 1$
- $3(2x - 1) = 6x - 2$
- $2(3x - 2) = 6x - 4$
- MAKE A CONJECTURE** Use what you learned in this lab to make a conjecture about the expressions $5(2x + 3)$ and $10x + 15$.
- REASONING** Use what you learned in this lab to rewrite the expressions below without parentheses.
 $2(x + 1)$ $6(x - 4)$ $3(5x + 6)$
- WRITING IN MATH** A friend decides that $4(x + 3) = 4x + 3$. How would you explain to your friend that $4(x + 3) = 4x + 12$? Include drawings in your explanation.