Applying the Distributive Property to Simplify Expressions

STRAND: Patterns, Functions and Algebra

STRAND CONCEPT: Algebraic Expressions

SOL 7.11, 8.14a

Remediation Plan Summary

Students model and discover the distributive property to ***simplify expressions***.

Note: The problems in the lesson are designed to help students understand and correctly apply the distributive property, not to evaluate algebraic expressions.

Common Errors and Misconceptions

Students sometimes multiply the first number in the parentheses and then add the second addend.

Materials

Grids for Introductory Activity
Copies of the blank grid sheet
Copies of the Let's Distribute handout
Lesson Reflection exit ticket
Scissors

Introductory Activity

Display the attached sheet showing a 3 x 9 grid and a 5 x 9 grid. Ask students how they can determine the area of each grid. (Multiply the width by the height: 3 • 9 = 27; 5 • 9 = 45) Next, cut out the grids, and display them placed side by side, touching. Ask students how they can determine the area of this larger, combined grid. After students have had time to respond, talk about the two methods.

- Add the areas of the two, uncombined grids: (3 • 9) + (5 • 9) = 27 + 45 = 72
- Multiply the total width by the height: 9 • (3 + 5) = 9 • 8 = 72.

Plan for Instruction

1. Explain that the method of finding the area of the two smaller grids and then adding them together is an example of the *distributive property.* Explain that the distributive property lets you distribute or break apart numbers so they are easier to work with.

2. Write this problem on the board: $4 \cdot 23 = x$. Ask students to solve this problem without writing it down. Allow students to share how they solved the problem and write down what they tell you for the class to see. Have students look at the different methods and see if anyone distributed either of the numbers. If a student doesn't suggest it, share that the distributive property allows us to write this problem as follows:
   $4 \cdot (a + b) = 4 \cdot a + 4 \cdot b$. In other words, we can break apart the 23 into the sum of

two smaller numbers, for example, $20 + 3$. Then, we multiply the 4 and 20 and the 4 and 3 and then add the two products. Other students might suggest breaking the 4 into $2+2$ and multiply each by 23 and then add the two products. Try a few more examples similar to this one.

3. Give each student a sheet of grid paper, and have students outline two rectangles on the grid: one of the rectangles should be 20 x 4, and the other should be 3 x 4. Have students write the area of each rectangle inside it and then cut out the two rectangles. Have the students place the rectangles side by side, touching, so that the combined width is 23.

4. Explain again that breaking the 23 into 20 + 3 is an example of using the distributive property. Ask students whether there are other ways to spread out 23. Let students share their ideas.

5. Have students model the following problems on grid paper, using the distributive property:
   $5 \cdot 18$
   [Possible model: $5 \cdot 18 = 5 \cdot (10 + 8) = 5 \cdot 10 + 5 \cdot 8 = 50 + 40 = 90$]
   $7 \cdot 24$
   [Possible model: $7 \cdot 24 = 7 \cdot (20 + 4) = 7 \cdot 20 + 7 \cdot 4 = 140 + 28 = 168$]
   $6 \cdot 27$
   [Possible model: $6 \cdot 27 = 6 \cdot (25 + 2) = 6 \cdot 25 + 6 \cdot 2 = 150 + 12 = 162$]
   Have students share and discuss their models with a partner and then discuss them as a class.

6. Finish the lesson by asking students how the distributive property helped you use solve problems and use mental math today.

7. Allow students to practice applying the distributive property to simplify algebraic expressions by completing the Let's Distribute handout. Another option is to cut the boxes into cards and have students find the correct match. Then have the student who doesn't match explain what the error was.

Pulling It All Together (Reflection)

Have students complete the Exit Slip: Lesson Reflection.

Note: The following pages are intended for classroom use for students as a visual aid to learning.

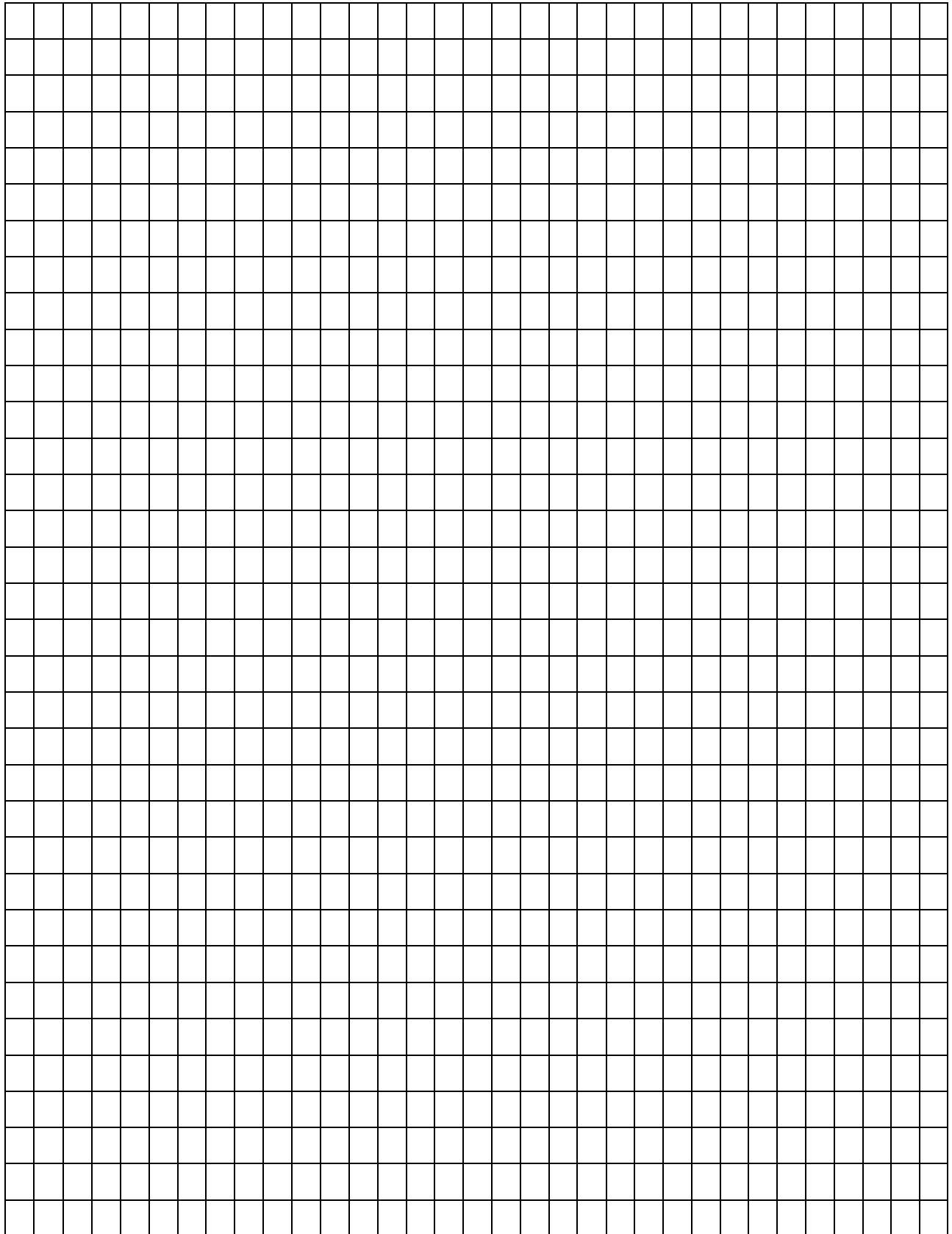Virginia Department of Education 2018

Grids for Introductory Activity

3

9

5

9

Name: _____

Let's Distribute

Circle the correct application of the distributive property in simplifying the expression.

$2(3x+4)$	$2(3x)+4=6x+4$	$2(3x)+2(4)=6x+8$
$5(x-3)$	$5(x)-5(3)=5x-15$	$5(x)-5(-3)=5x+15$
$(3x+1)4$	$(3x)4+(1)4=12x+4$	$(4x)4=16x$
$-2(2x+3)$	$-2(2x)+2(3)=-4x+6$	$-2(2x)+(-2)3=-4x-6$
$\dfrac{1}{3}(6x+3)$	$\dfrac{1}{3}(6x)+(3)=2x+3$	$\dfrac{1}{3}(6x)+\dfrac{1}{3}(3)=2x+1$

Name:

Exit Slip: Lesson Reflection

Describe in writing two different ways that they could solve the problem $9 \cdot 57 = x$. You may include drawings in your explanation if it helps you.

Write an algebraic expression that includes the distributive property and then simplify the expression.