LESSON PLAN (Linda Bolin)

Lesson Title: Algebraic Expressions Using Distributive Property **Course**: Math 7 **Date**: December Lesson 3	
Utah State Core Content and Process Standards: 1.3d Problem solving, communication, connections, representation, reasoning	
Lesson Objective(s): Multiply algebraic expressions using the distributive property	
Enduring Understanding (Big Ideas): The distributive property can be used to simplify numerical and algebraic expressions involving multiplication over addition and subtraction	**Essential Questions**: • For what operations is the distributive property applicable? • How does the distributive property help us simplify numerical and algebraic expressions? • Where have we used the distributive property in the multiplication algorithm?
Skill Focus: Apply the distributive property to numerical and algebraic expressions	**Vocabulary Focus**: Distributive property, algorithm, rows, columns, dimensions, simplifying an expression
Materials: Team Boards, rags and markers for each team, AlgeBlocks, Modeling The Distributive Property With An Algebraic Expression	
Assessment (Traditional/Authentic): journal examples, performance, discussion, observation	
Ways to Gain/Maintain Attention (Primacy): contest, sketching, manipulatives	
Written Assignment: class examples for distributive property, Modeling The Distributive Property With An Algebraic Expression, journal page Two-Column Notes on Distributive Property.	

Content Chunks

Post vocabulary on the board and refer to these as you teach this lesson

Starter:

Tell what property each example shows:

1. $a(b \cdot c) = (a \cdot b)c$

2. $1 \cdot x = x$

3. $a = a + 0$

Lesson Segment 1: Where have you used the distributive property before? (In the multiplication algorithm)

Mental Math Computation Contest

Give each group of 4 a Team Board (small white board, wipe off rag and dry erase marker). Tell them they will be working some multiplication problems without a calculator in a contest. They must work the problem mentally, then record their answer on their Team Board

Use roles with the Team Boards so one person is the scribe, two are the coaches and another is the encourager. They should rotate the roles with each problem in this activity. Divide the class in half to form Team A and Team B. Team A will work the problems in Column A. Team B will work the problems in column B.

Write the first problem from both A and B problem on the board, and say, "Go". Each small group works to find the answer. As soon as a small group has the answer, they raise their team board to face the teacher. The first four groups to raise their boards earn a point for their whole team. The team earning the most points after all the problems have been worked wins.

	A	B	
1.	**15 x 6**	**6(10) + 6(5)**	**90**
2.	**74 x 5**	**5(70) + 5(4)**	**370**
3.	**142 x 3**	**3(100) + 3(40) + 3(2)**	**426**

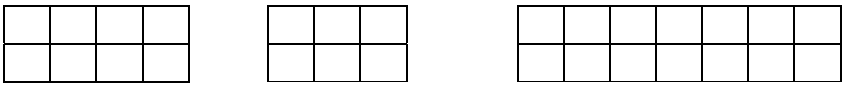
Q. How are these problems similar? How are they different? Discuss

Tell students they have been using an important property even though they may not have realized it all these years. Help them see that 74 is 70 + 4, and 142 is 100 + 40 + 2. The distributive allows us to multiply a group of numbers by a common factor by distributing that factor.

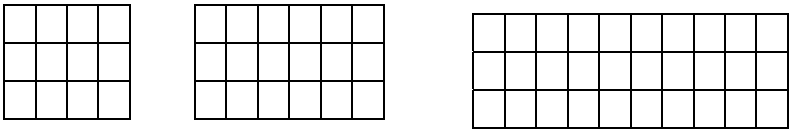
Lesson Segment 2: How does the distributive property help us simplify numerical and algebraic expressions?

Use the Algeblocks unit pieces (green) or the green colors in the Color Tiles to model the numerical expressions on the following page. These models use area to apply multiplication. Have the students build, sketch and represent the models symbolically as shown in the examples. These sketches can be put on the back of the investigation worksheet (attached).

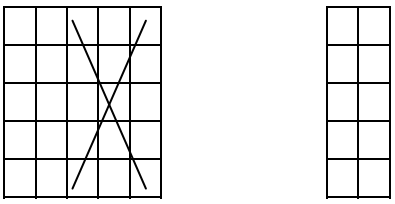
Examples of the distributive property using an area model

1) 

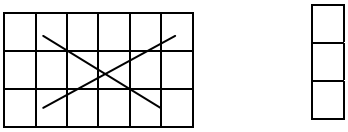
$2 \times 4 + 2 \times 3 = 2(4 + 3)$
$= 2(7)$
$= 14$

2) 

$3 \times 4 + 3 \times 6 = 3(4 + 6)$
$= 3(10)$
$= 30$

3) 

$5 \times 5 - 5 \times 3 = 5(5 - 3)$
$= 5(2)$
$= 10$

4) 

$3 \times 6 - 3 \times 5 = 3(6 - 5)$
$= 3(1)$
$= 3$

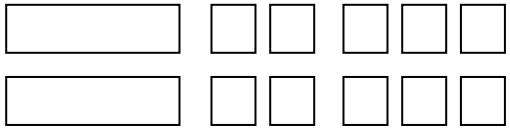
To use the distributive property with algebraic expressions, use the unit and the x piece from AlgeBlocks to model. Sketch and represent the distributive property with variables (see the attached investigation-Modeling The Distributive Property With an Algebraic Expression)

Lesson Segment 3: Summarizing

Work with students to complete their journal titled "The Distributive Property" (attached). They will be using the two-column notes and filling in blanks for the examples of the distributive property. Have them record as you are discussing each example on the journal page. Refer to the lesson activities.
Assign additional text practice as needed.

Modeling the Distributive Property With An Algebraic Expression **Name** _____

Use the AlgeBlocks to form rectangles. The number outside the parentheses below tells how many rows for the width. The algebraic expression inside the parentheses indicates the length of each row. Sketch the rectangles and use the distributive property to write an expression for the total number of blocks. Here is an example:

2(x +5)  = 2x + 10

1. 5(x + 1)

2. 3(x + 3)

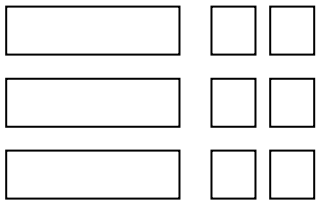
3. 4(x +2)

4. 2(2x + 4)

5. 3(3x + 2)

6. 5(2x + 2)

Next, use the total pieces to form a rectangle. Use the distributive property to write an expression for the area. Here is an example:

3x + 6  = 3(x + 2)

7. 10x + 5

8. 2x + 8

9. 7x + 14

Use the distributive property to simplify each expression below without the blocks.

10. 4(x + 6)

11. 2(3x + 5)

12) 2(x – 6)

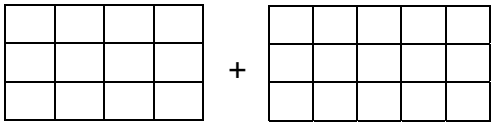
13) 3(x – 4)

The Distributive Property

1. $4(5) + 4(10) = 4(5 + 10)$
   $20 + 40 = 4(15)$
   ___ = ___

2. $3(10 - 4) = 3 \cdot 10 - 3 \cdot 4$
   $3(6) = 30 - 12$
   ___ = ___

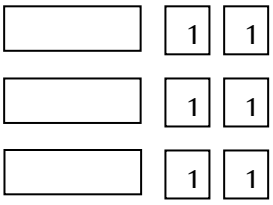
3. $\begin{array}{r} 37 \\ \times\ 5 \\ \hline 35 \\ 150 \\ \hline \end{array}$ = 5 (30 + 7)
   150 + 35
   ____ = ____

4. 

   3 (4 + 5) = 3 • __ + 3 • __
   3(9) = ___ + ___
   ____ = ____

5. $6(x + 2) = 6\_\_ + 6 \cdot \_\_$
   $= 6x + 12$
   $6x + \_\_ = 6x + \_\_$

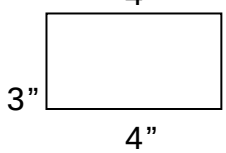
AlgeBlocks modeling Distributive Property

6. 

   $3x + 6$ ***or***

   3(__ + __)

7. Perimeter and Distributive Property



$P = 2l + 2w$
$P = 2 \times 4 + 2 \times 3$
$P =$ ___

$P = 2(l + w)$
$P = 2$ (__ + __)
$P =$ ___

The examples on the left all show ways to apply the _____ property.

The distributive property is a property of _____.
(an operation)

The distributive property of multiplication is true over these two operations:

_____
_____

The distributive property says all the terms inside the parentheses should be multiplied by the common factor located on the _____ of the parentheses.

The distributive property also says that two terms which are outside parentheses that are multiplied by a common _____ may be combined inside _____. The common _____ is positioned _____ the parentheses just in front or behind the parentheses.

Below are **my examples** for using the distributive property:

Numerical expressions:

__ • __ + __ • __ = __( )

__(–) = __ • __ – __ • __

Algebraic expressions:

__ • __ + __ • __ = __( )

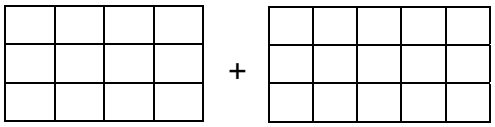
__(–) = __ • __ – __ • __

Teacher journal page for Distributive Property

1. $4(5) + 4(10) = 4(5 + 10)$
   $20 + 40 = 4(15)$
   _60__ = _60__

2. $3(10 - 4) = 3 \cdot 10 - 3 \cdot 4$
   $3\,(6) = 30 - 12$
   _18_ = _18_

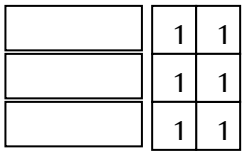
3. $\begin{array}{r} 37 \\ \times\ 5 \\ \hline 35 \\ 150 \\ \hline 185 \end{array}$ = 5 (30 + 7)
   150 + 35
   185 = 185

4.  +

   3 (4 + 5) = 3 • _4_ + 3 • _5_
   3(9) = _12_ + _15_
   _27_ = _27_

5. $6(x + 2) = 6\_\_ + 6 \bullet \_\_$
   $= 6x + 12$
   $6x + \_\_\_ = 6x + \_\_\_$

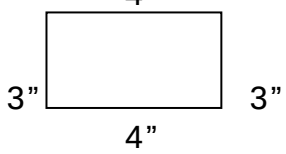
Algeblocks modeling Distributive Property

6. 

   $3x + 6$ ***or***

   3(_x_ + _2_)

7. Perimeter and Distributive Property

   $P = 2l + 2w$
   $P = 2 \times 4 + 2 \times 3$
   $P = \_\_\_$

   $P = 2(l + w)$
   $P = 2 (\_\_ + \_\_)$
   $P = \_\_\_$

The examples on the left all show ways to apply the _distributive_ property.

The distributive property is a property of _multiplication_ (an operation)

The distributive property of multiplication is true over these two operations:
__addition___
__subtraction__

The distributive property says all the terms inside the parentheses should be multiplied by the common factor located on the _outside__ of the parentheses.

The distributive property also says that two terms which are outside parentheses that are multiplied by a common _factor_ may be combined inside parentheses. The common _factor_ is positioned _outside_ the parentheses just in front or behind the parentheses.

Below are **my examples** for using the distributive property:

Numerical expressions:

__ • __ + __ • __ = __( )

__(–) = __ • __ – __ • __

Algebraic expressions:

__ • __ + __ • __ = __( )

__(–) = __ • __ – __ • __