LESSON TITLE: Using Algebra Tiles to Explore the Distributive Property

MATERIALS:
Overhead projector, overhead algebra tiles, class set of algebra tiles, colored pencils, copies of algebra tile boards, and copies of “Using Algebra Tiles to Explore the Distributive Property” worksheets.

LESSON OVERVIEW:
The students will be able to model the distributive property through the use of Algebra Tiles.

OBJECTIVES:
- The students will be able to demonstrate the distributive property through the use of algebra tiles, by modeling it on their desks.
- The students will be able to use the distributive property to simplify algebraic expressions.

NYS KEY STANDARDS:
CONTENT STRAND:
8.A.5: Use physical models to perform operations with polynomials
8.A.6: Multiply monomials

PROCESS STRAND:
8.PS.7: Understand that there is no one right way to solve mathematical problems but that different methods have advantages and disadvantages
8.PS.11: Work in collaboration with others to solve problems
8.PS.14: Determine information required to solve the problem
8.RP.1: Recognize that mathematical ideas can be supported by a variety of strategies
8.CM.3: Organize and accurately label work
8.CM.4: Share organized mathematical ideas through the manipulation of objects

NCTM STANDARDS:
CONTENT STRAND:
Algebra: Relate and compare different forms of representation for a relationship

PROCESS STRAND:
Problem Solving: Apply and adapt a variety of appropriate strategies to solve problems
Communication: Communicate their mathematical thinking coherently and clearly to peers, teachers, and others
Representation: Create and use representations to organize, record, model, and communicate mathematical ideas

ANTICIPATORY SET:
Since the students are already familiar with the algebra tiles because they used them in the “Combining Like Terms” activity, on a blank sheet of paper, ask the students to write down what each tile and color represent.
DEVELOPMENTAL ACTIVITY:
1. Put the students in pairs.
2. Pass out the algebra tiles, colored pencils, algebra tile boards, and the “Using Algebra Tiles to Explore the Distributive Property” worksheets. Each pair of students should receive four colored pencils (red, blue, green, and yellow).
3. Review with the students what each tile and color represent. As you go over this, tell the students to color in the appropriate colors on the top of their worksheets.
4. Tell the students the large red square represents $-x^2$, the large blue square represents $x^2$, the red rectangle represents $-x$, the green rectangle represents $x$, the small red square represents $-1$, and the small yellow square represents 1.
5. As the students are coloring in the proper colors on their worksheets, place the overhead algebra tiles on the projector in the same order they are in on the worksheet so the students can color them in properly.
6. Since the students already know how to use the distributive property without algebra tiles, ask them what is done. They should say that the number on the outside of the parenthesis gets multiplied by everything on the inside of the parenthesis.
7. Tell the students to look at the example on the worksheet $[2(x+3)]$. Since it is already modeled with algebra tiles tell the students to form the same model on their desks with their algebra tile board and algebra tiles. Do the same on the overhead.
8. Explain to the students that the 2, which is on the outside of the parenthesis is modeled by the two small yellow squares on the left side of the board.
9. Also, explain to the students that $x+3$, which is inside the parenthesis is modeled by the one green rectangle and 3 small squares on the top of the board.
10. Now, ask if the students know how to get the tiles on the inside of the board. The students should say that 2 times $x$ is $2x$ and 2 times 3 is 6 so there must be 2 green rectangles and 6 small yellow squares.
11. In order to write the final expression, tell the students to count up what is on the inside of the board. In this example there are 2 $x$’s and 6 one’s so the expression is $2x+6$.
12. Tell the students to color in the example according to the tiles on the overhead and at their desks.

GUIDED PRACTICE:
13. Tell the students to look at problem #1 on the worksheet $[2(x+4)]$.
14. As you model #1 for the students on the overhead, they should be modeling it on their desks using the board and algebra tiles.
15. Ask the students what goes on the left side of the board. They should say 2 small yellow squares. Place the 2 small yellow squares on the left side of the board.
16. Ask the students what goes on the top of the board. They should say 1 green rectangle and 4 small yellow squares. Place 1 green rectangle and 4 small yellow squares on the top of the board.
17. Now ask the students what algebra tiles go on the inside of the board. They should say 2 green rectangles and 8 small yellow squares. Place 2 green rectangles and 8 small yellow squares.
18. Now tell the students to draw the representation of the algebra tile model on their worksheet, using the appropriate colors with colored pencils.

19. When the students finish, ask them what the final expression is. They should see that there are 2 green rectangles and 8 small yellow squares so the final expression is 2x+8.

**INDEPENDENT PRACTICE:**

20. Tell the students to work on #2 - #8 with their partners.

**ASSESSMENT:**

Ask the students to make up their own problem; similar to the distributive problems they worked on in class. Tell them to switch with their partner and evaluate.

**CLOSURE:**

Ask the students if they have any questions on the class work they did today. Before the students leave, their ticket out the door is to turn in the problem that they were given from their partner. They will get the work back tomorrow.
Using Algebra Tiles to Explore the Distributive Property

The Distributive Property combines multiplication with addition or subtraction.

Example: $2(x + 3)$

Model each of the following problems to simplify the expression:

1. $2(x + 4)$

2. $3(-x + 2)$

3. $2(2x + 1)$
4. \(3(x - 1)\)  

EXPRESSION:

5. \(4(x - 2)\)  

EXPRESSION:

6. \(-2(3x + 1)\)  

EXPRESSION:

7. \(2(-x + 1)\)  

EXPRESSION:

8. \(x(2x - 3)\)  

EXPRESSION:
Using Algebra Tiles to Explore the Distributive Property

The Distributive Property combines multiplication with addition or subtraction.

Example: $2(x + 3)$

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<th>EXPRESSION: $2x + 6$</th>
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Model each of the following problems to simplify the expression:

1. $2(x + 4)$

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<th>EXPRESSION: $2x + 8$</th>
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2. $3(-x + 2)$

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<th>EXPRESSION: $-3x + 6$</th>
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3. $2(2x + 1)$

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<th>EXPRESSION: $4x + 2$</th>
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4. $3(x - 1)$  
   EXPRESSION: $3x - 3$

5. $4(x - 2)$  
   EXPRESSION: $4x - 8$

6. $-2(3x + 1)$  
   EXPRESSION: $-6x - 2$

7. $2(-x + 1)$  
   EXPRESSION: $-2x + 2$

8. $x(2x - 3)$  
   EXPRESSION: $2x^2 - 3x$