DAY 1: Area & Expressions

Materials

Copies: 1.1 Area and Multiplication of 1-digit Numbers
1.2 What's the Expression?
Ticket out the Door Day 1

Supplies: Graph Paper- 1 sheet per student
Algebra Tiles- 1 set of *positive tiles* per pair of students
Word Wall Cards: Dimensions/Factors, Area/Product, Base and height

Objective

Students will use an area model on graph paper to multiply whole numbers. Students will learn the value of Algebra Tiles and name expressions represented by the tiles as well as represent and simplify expressions using the tiles.

Student Talk Strategy

Pair-share during introduction of Algebra Tiles
Roundtable for learning the value of Algebra Tiles

Academic Language Use

Height- For this unit, height will refer to the vertical distance of a rectangle. The teacher will define this when introducing activity sheet 1.1 and model throughout.

Base – For this unit, base will refer to the distance across or the horizontal distance of a rectangle. The teacher will define this when introducing activity sheet 1.1 and model throughout.

Area- The number of squares it takes to cover a rectangle. The teacher will introduce and model this by having the students count squares on graph paper.

Dimensions- In this unit, the two numbers being multiplied, the factors, will be used to represent the dimensions, or the base and height of a rectangle. This term will be introduced and modeled by the teacher throughout.

Factors- In this unit, the two numbers being multiplied, the length and width of the rectangle, will be called factors. This will be modeled by the teacher throughout.

Product- In this unit, the answer to the multiplication problem, also the same as the area of the rectangle, will be referred to as the product. This will be modeled by the teacher throughout.

Activity Notes

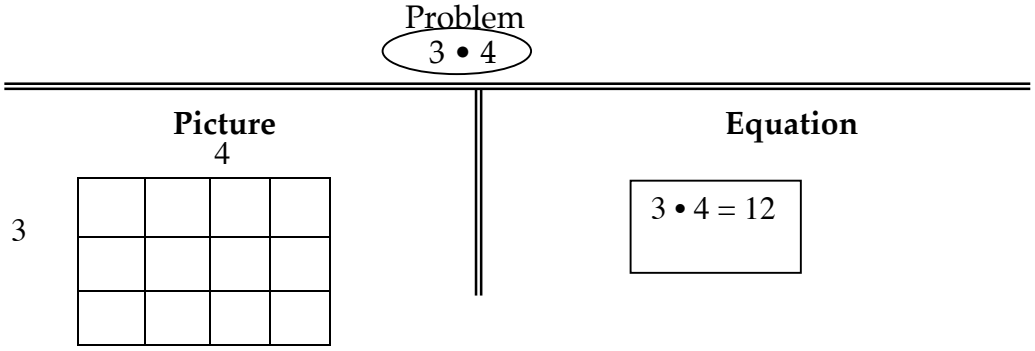
5 minutes: Introduction

Introduce yourself and the objectives for this 9-day intervention unit. Explain some guiding principles you would like to have established for this unit. Some examples may include the following: 1) the students will be active learners, using manipulatives, drawing and talking with each other and the class; 2) error is a great way to learn and you will reward students who take risks and have consequences for those who would

show any form of disrespect to a classmate; 3) it is important that the students *understand* the math and not just memorize or do it without being able to explain.

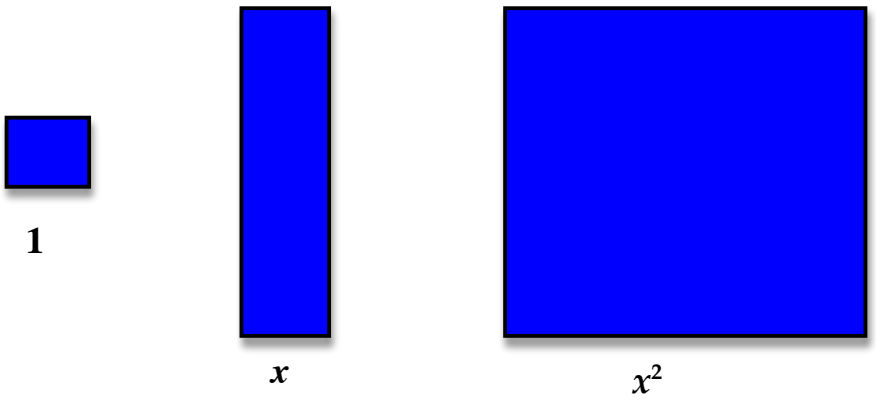
20 minutes: Area on graph paper
Pass out activity sheet 1.1 and a sheet of graph paper to each student. Direct their attention to problem #1. Tell them that, for this unit, you are going to define multiplication as the dimensions (or base and height) of a rectangle and the answer, or product, as the area. Put up the word Dimensions/Factors along with a picture/visual. Also put up the words Base (with a picture showing the distance across a rectangle) and Height (with a picture showing the vertical distance of a rectangle). Ask them what the factors, or numbers they are multiplying, are. They should say 3 and 4. Tell them that 3 will represent the height and 4 will represent the base. Draw the dimensions on graph paper on the Elmo and have them draw the same on their graph paper. Then have the students draw the remainder of the perimeter of the rectangle. Tell them that you will be referring to the answer, or the product, as the area of the rectangle- the number of squares it takes to cover the rectangle. Ask them to count the squares and record this as the product. Now add to the word wall with Area/Product and a picture of the rectangle with the squares showing.

1.



Repeat this process for #2. Then have the students work on problems 3-6 on their own. During this time, circulate to ensure students are completing the sheet correctly. Note that it does not matter which number is the base and which is the height as a result of the commutative property of multiplication. Have students compare final pictures and equations with their elbow partner at the end of the 15 minutes.

15 minutes: Learning the value of Algebra Tiles
Pass out the algebra tiles and allow students a few minutes of exploration time. Students need nothing out at this time. Ask them what they think they are used for. (Hopefully a few of the students will have used them before.) Let them know that each one is "worth" something and we are going to assign them a particular value. Explain that we assign values based upon area and the sign. Show the class the small blue square and explain that is measures 1 inch by 1 inch and so we call it +1. Now put up the blue rectangle and ask the students to predict what this is called. They should see it has a dimension of 1 and the other dimension is in between 3 and 4, so let them know we'll call the length "x". Lastly, bring out the large blue square. Again, have the students use the other tiles to "discover" what this tile is- they should see it has a length and width of x, so we call it x^2.



Put the students in groups of 4-6. Use Roundtable (student talk strategy) for the next part of the activity. Have the student with the longest hair begin by making any amount they wish using their tiles. This person will lay out some tiles and the rest of the group will then figure out how much the pile is worth and say the amount. The person who picked those tiles will count to verify. The groups will repeat the same activity, with the person on the right going next and making a different amount with their blocks. Continue this for 5 minutes. Then bring the class back together. Put up blocks to represent #1 from activity sheet 1.2 on the Elmo. Ask the students how much it is; give them 30 seconds to think silently and then have them tell their neighbor. Use random selection to have a student share. Repeat this process with for #2. While you need to encourage all correct answers, push the students to use the simplest method to explain their answer. If you get a response of $x^2 + 2x + 4 + 2x$, ask students "How many x's are there in all?" Explain to the class you would like them to combine any tiles that are the same before they name the expressions (so you want a final answer of $x^2 + 4x + 4$. Pass out activity sheet 1.2. Give the class 5 minutes to complete problems 3-8.

15 minutes: Representing and simplifying expressions
Direct the students' attention to part 2 of activity sheet 1.2. Explain to the class that they now need to take out the tiles to represent the expression, combine any of the "same" tiles and record the simplified expression. Work through number 1 as a class and then give the class 8 minutes to complete the final problems. Circulate to ensure the students are working correctly. Note: There is a place for students to draw a picture, but this is not necessary if they are working well with the tiles (or it can be an option for those who prefer drawing to the tiles).

5 minutes: Ticket out the Door
Pass out the Ticket out the Door and collect it as soon as each student finishes (so that you can discuss mistakes with students as they turn it in).

Teacher Note: For this unit, we will be using only the positive algebra tiles to multiply and then use the generic rectangles to multiply with negative coefficients. The "red" algebra tiles will be used to represent the perimeter in future days, so make sure the students understand their use.