DAY 5: Generic Rectangles

Materials

Copies: 5.1 Generic Rectangles- I
Ticket Out the Door Day 5
3.2 Monomials Factor Game

Supplies: Algebra Tiles (1 set per person/pair)
Colored Pencils (Optional)
Word Wall word: Generic Rectangle
Paperclips- 2 per group of 4
2-color counters- 2 per group of 4

Objectives
Students will play the monomial factor game to increase efficiency in multiplying monomials. Students will apply their understanding of how the area model creates 4 "sections" to begin to use generic rectangles to multiply binomials.

Student Talk Strategy
Think-Pair-Share for 5.1 #5

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.
Generic Rectangle- This word refers to a rectangle NOT drawn to scale which can be divided into smaller rectangles and used to assist in performing polynomial multiplication.

Activity Notes

20 minutes: Playing the Monomial Factor Game with Integers

Put the students in groups of 4 and pass out the 3.2 Monomial Factor Game, paper clips and 2 color-counters to each pair. Have the group of 4 split into 2 groups of 2 to represent the two teams. Give the groups 20 minutes to play the game. The goal of the game is for students to memorize these facts. If the class does not do well in groups, you can play as a class or play with part of the class who struggles on their own.

35 minutes: Learning to multiply binomials with generic rectangles

Pass out activity sheet 5.1. Direct the students to problem #1. Ask the students to draw the "picture" of the area model to solve the problem (or, if needed, have the use their tiles to build the area model). Use random selection to call on a student to come up to the Elmo and draw the lines to show the 4 "sections". Have this person also record the total for each section. Then, in the new section below, "generic rectangle", show the students how they can do this problem without drawing all the tiles. To do this, ask them if they could use their tiles to show how to multiply $(58x + 95)(29x + 47)$? Would they have enough tiles? Explain that they are going to draw "generic" boxes to do the same problem without drawing each tile. Add the word Generic Rectangle to the word wall along with a picture of one. Draw a rectangle and divide into 4 sections. Label the dimensions, breaking the factors into x's and ones (see below for example of #1). Then show the students how to find the product of each "box" by multiplying the base and height of each small box, applying the rules for multiplying monomials they just practiced. Once complete, use random selection to call on students to explain what you just did. Ask the following questions: "How did I know which number to write where?" "How did I get $6x^2$?" "Where did the number 8 come from?"
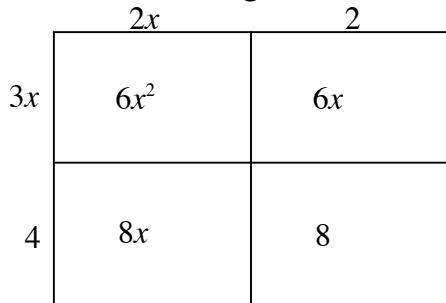
1.

Problem

$$(3x + 4)(2x + 2)$$

Picture

2x 2

$6x^2$

6x

3x

8x

4

8
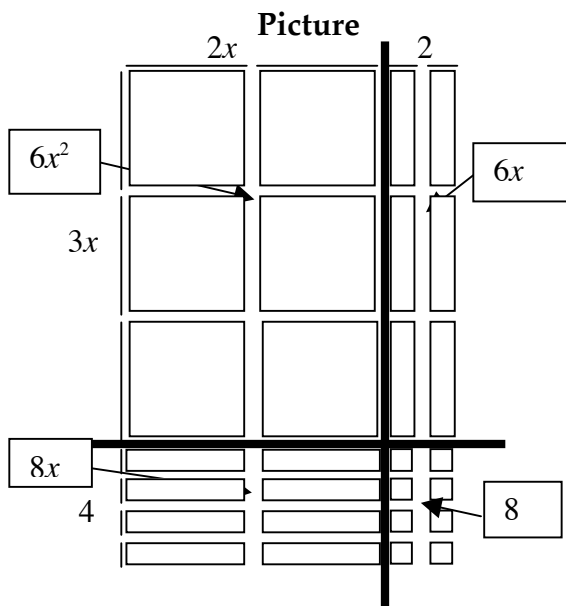
Equation

$$34 \bullet 22 = 748$$

Generic Rectangle

	2x	2
3x	$6x^2$	6x
4	8x	8

Total: $6x^2 +$ <u>8x</u> $+ 6x + 8$

Equation: $(3x + 4)(2x + 2) = 6x^2 + 14x + 8$

Follow the same process for problems #2-4.

Direct the students' attention to problem #5. Work through this problem together, without using the tiles or picture (go right to generic rectangle). To do this, draw the 4 boxes and ask the students to help you complete it. Try the following questions, using Think-Pair-Share: "Where do I write the 4x and the 1?" "Where do I write the 4x and the 1?" "What two numbers do I multiply in this box?" "What is the product of 1 and 4x? Why?"

Give the students 3 minutes to try #6 with a partner. Stop them after 1 minute to check that they have written the dimensions correctly (note that it does not matter which factor is base and which is height).   If the majority of the students are doing this well, give them about 10 minutes to try problems 7-10 and then come back together and have volunteers show and explain their work.

5 minutes: Ticket out the Door and the multiplication chart
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).