

# DAY 2: Multiplying Polynomials & The Factor Game

## Materials

Copies: 2.1 Multiplying Polynomials with an Area Model  
2.2 Monomial Factor Game  
Ticket out the Door Day 2

Supplies: Algebra Tiles- 1 set of *positive tiles* per pair of students  
Paperclips- 2 per group of 4  
2-color counters- about 15 per group of 4

## Objective

Students will use an area model with Algebra Tiles to multiply monomials, binomials and polynomials. Students will play the factor game to improve efficiency in multiplying monomials.

## Student Talk Strategy

Three-way Interview for Factor Game

## 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.

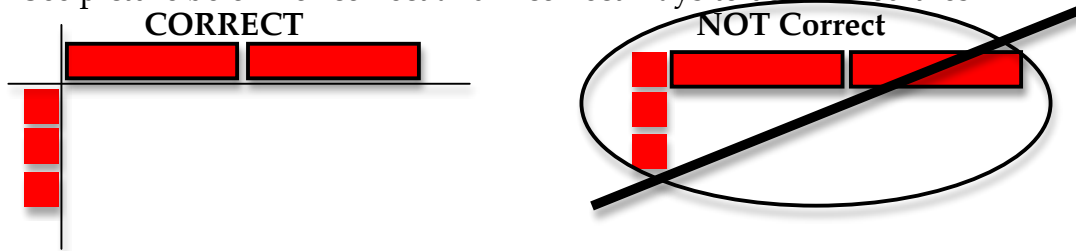
## Activity Notes

### **35 minutes: Multiplying polynomials with an area model**

Begin today with a quick review problem. Write  $2 \cdot 4$  on the board and ask the students to draw an area model to show how to simplify this problem. Have the students share their solution with an elbow partner and then call on a student to show the class. Make sure the class has a rectangle that is 2 by 4 or 4 by 2 and that the area is 8 square units. Explain to the class that they will be doing the same thing today, but with Algebra Tiles.

Let them know that they will be using the RED tiles to represent the height and base of the rectangle and BLUE to fill in the area.

Pass out the algebra tiles and activity sheet 2.1 to each pair of students. Direct the students' attention to the problem for #1. Have them chorale response to tell you what the dimensions, or base and height of their rectangle will be. (Answer should be 3 and  $2x$ ). Ask them to take out RED tiles to represent 3 and  $2x$ . Have the class lay these tiles out so that they form part of the perimeter. Note: It is CRUCIAL that the perimeter tiles only touch at the very edge. You can train your class to set this up this way; you can have them draw lines to represent the base and height (see example in the correct picture below) or you can use string or a pencil, etc. to mark the edge of the rectangle. See picture below for correct and incorrect ways to use the red tiles.



Once all pairs have the red tiles set up correctly, ask them to “fill in the puzzle”, meaning that they need to figure out which BLUE tiles fit perfectly to fill in the area of their rectangle. It's okay if they don't know right away. If they try to fill it with ones, ask them if it lines up perfectly. After about a minute, have a student come up to show how they used  $6x$  tiles to fill in the area. Then have the class record a picture (in black and white) and the equation, as shown below.

1.

Problem	
$3 \cdot 2x$	
Picture	Equation
	$3 \cdot 2x = 6x$

Repeat the same process for the next 2 problems, allowing the students 1 minute to build their base and height, followed by checking that all have it layed out correctly, and then 1 minute to fill the rectangle, followed by someone sharing. If the class is doing well at this point, set the timer for 10 minutes and have the pairs work through the rest of the page together. Use the last 5 minutes to purposefully select students to present their work.

### 20 minutes: Monomial Factor Game

Pass out activity sheet 2.2. Put up the game board on go over the rules for the game, while modeling.

- 1) The object of the game is to be the first team to get 4 in a row, vertically, horizontally or diagonally.
- 2) Each team/person selects one color of tiles to represent them on the game board.
- 3) The first team or player to go chooses two factors from the bottom of the board and calls out the product. The team or player will place a paperclip on each of the factors at the bottom of the page and then place their color tile on the game board in the appropriate box. If the product shows up twice on the game board, the team or player must choose which one they want. Note: Students can use their Algebra tiles and the area model to find the products if needed.
- 4) The next team or player now must choose **one** (and only one) of the paperclips to move to another factor and call out the product. They then place their color tile in the appropriate box.

Note: Both paperclips may be placed on the same factor (e.g.,  $5x \bullet 5x = 25x^2$ ).

Teams should quickly realize that they must not only think about how to get 4 in a row for themselves, but also be careful to block the other team and avoid leaving the discs on factors that the other team needs to complete their 4 in a row.

Play one whole class game. To do this, divide the class into 2 groups and select a representative for each group (who will tell you where to place the paperclips). Give each team a maximum of 45 seconds to decide.

After the whole class game, have students form groups of 4 and have a representative from each group come up to get the 2-color tiles or chips and 2 paperclips. Have 2 students form a team to play against the other 2 students. Have the two students in each team take turns deciding where to move the paperclip by using Report to a partner to first explain their thoughts and then to decide on the move. The groups can continue play until 5 minutes are left in the class session.

### **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).