

DAY 4: Noticing Patterns for Multiplying Binomials

Materials

Copies: 4.1 Create & Solve Multiplying Binomials
4.2 Gallery Walk Observations
4.3 Practice with Tiles and “Sections”
Ticket Out the Door Day 4

Supplies: Algebra Tiles (1 set per pair)

Objective

Students will create their own multiplication of binomials problem, use an area model to expand it and then compare with other students’ to notice how the problems all make 4 “sections”. They will then practice marking the sections on pictures or with tiles.

Student Talk Strategy

Inside-Outside Circle for solving problems written by classmates
Three-way Interview for describing patterns at conclusion of Gallery Walk

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

5minutes: Students design and solve a problem

Pass out activity sheet 4.1 and algebra tiles to each student. Tell each student they have 5 minutes to create their own multiplication of binomials problem. To do this, they need to pick a number between 1 and 4 to go in front of each x and a number between 1 and 6 to go on each blank constant line. They need to record the problem in the

problem ellipse, build the area model with the tiles, draw a picture and then write the equation. You will want to check to make sure their tiles/pictures are correct.

15 minutes: Inside-outside circle to solve each others' problems

Put the desks into two circles (or 2 rectangles) with an outside set of desks facing the middle and the inside set facing the outside desks (there should be a desk facing each desk so that partners can be looking at each other). The students need to take their algebra tiles, a pencil and activity sheet 4.1 as they go. When the class is set and students are each facing a partner, have the older student begin by sharing *just the problem* with their partner; the partner should record the problem in one of the blank places on the back side of 4.1. Note: it will be easier to have the student cover their work and just show their partner the problem to copy down. Then, the younger partner shares his/her problem for the older student to record on their sheet. Then, the students solve each other's problems and explain their solutions to each other. After about 5 minutes, have the outside circle rotate to the right and repeat the process so the students are now all solving a second problem. Rotate this one more time, so that all students have now solved three problems. Note: if you are running short on time, one or two rotations will suffice!

10 minutes: Gallery Walk

Have each student lay out the problem they created (with the area model drawn or tiles showing) on their desk. Pass out activity sheet 4.2. Explain to the students that they will have 5 minutes to walk around the class (up and down each row or around groups, depending upon the set up of your room- be explicit in how you want them to move). They are to look at the *picture or tiles* for each problem and try to notice what is the same about which blocks are always used in the solution. After the 5 minute walk, give them 2 minutes to silently record their observations. Then use Three-way Interview to have them interview a partner and select a few students to share what their partner observed. Note: see the next 5 minute section for the "goal" of the observation.

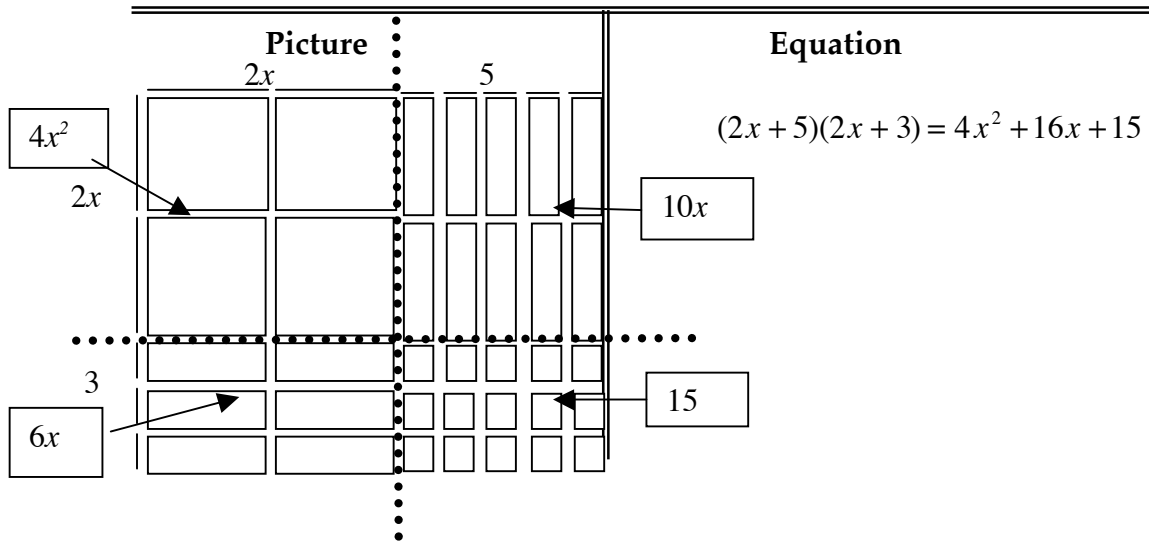
5 minutes: Making sure students see the "4 sections"

If was not clearly stated by the students, use this time to show students the 4 sections each solution has. To do this, put up some student problems and pictures and DRAW lines to spilt the picture into the 4 sections: x "squares", vertical x 's, horizontal x 's and ones. Next to each section, record the TOTAL of that pile of blocks. See picture below for an example.

Ex.

Problem

$$(2x+5)(2x+3)$$



15 minutes: Pair practice solving and marking off the 4 sections.

Pass out activity sheet 4.3. Have the students solve the four problems and then draw lines to mark off the 4 sections of blocks. Also, ask them to write the total value of each section alongside the picture. Note: at this point, if the students are comfortable, they can go straight to the picture and not use tiles. During this time, circulate to make sure students are marking off sections correctly. Ask questions, such as “what is the area of an x by x square?” Allow students 10 minutes to work independently and then 5 minutes to work with a partner.

10 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).