A TEACHER REFLECTS

Understanding How to Write Mathematical Arguments

In Lesson 5, determining whether the rule students wrote for predicting the increase for any perfect square would work for the negative square root was challenging for some of my students. It was as if the patterns activity previously had distracted them because they had a difficult time understanding the square root sign. Some could instantly follow the logic and "see" that the square root of 100 could be negative or positive. Others looked at me as if they had just been introduced to college trigonometry. For these students, it was "back to the drawing board." I started them over with the explanation of multiplying signed numbers. They told me the rules, and we continued from there.

Students thought that Dan's Mathematical Argument in Lesson 6 made sense and could quickly compute the squares. When they were asked to find counterexamples, it didn't dawn on them to check negative numbers or fractions. Once I suggested it to one or two students, others tried more challenging examples.

When I asked students to share their methods, they struggled with showing fractional representation on the overhead. I had to model one problem so they understood what I was asking them to do. I asked for a volunteer to give me a fraction and Brenda gave me $\frac{1}{4}$. I then asked the class what to do to square it. Many hands shot up and Jackie told us to multiply 1 times 1 for the numerator and 4 times 4 to get the denominator. When I asked them which was larger—$\frac{1}{4}$ or $\frac{1}{16}$—many picked $\frac{1}{16}$. We voted and the class was split—half insisted that $\frac{1}{16}$ was larger. I introduced the pizza problem—would you rather have $\frac{1}{4}$ or $\frac{1}{16}$ of the pizza? Which piece is larger? The concept began to catch on, and the students visualized and modeled $\frac{1}{4}$ as larger than $\frac{1}{16}$. When they created their own examples, most students opted to use fraction segments of a square (instead of the traditional circle). Once students were moving freely on finding counterexamples and special cases, few struggled with revising Dan's Mathematical Argument.