

I Still Don't See Why My Way Doesn't Work

My eighth-grade basic math class had been reviewing the year's work in preparation for the final exam. We had taken several practice tests, each covering various parts of the material. One student, Glen, who had begun the year slowly but picked up interest and made greater progress during the second semester, had made several errors on the test section covering multiplication of fractions. I went over the relevant rules with the whole class and we did some additional problems. All the students, including Glen, seemed to understand the rules and used them well.

After class Glen came up to me and said, "I understand the rules you gave in class really well, but what I don't understand is why my way doesn't work."

"What way are you using?" I asked.

"Well, with a problem like $6\frac{3}{4} \times 5\frac{1}{3}$, I multiply 6×5 to get 30, then $\frac{3}{4} \times \frac{1}{3}$ to get $\frac{3}{12}$, so my answer would be $30\frac{1}{4}$. But that's wrong and I don't see why."

"Why did you do the problem that way?"

"Because in addition and subtraction you do the wholes and the fractions separately. I figured you could do the same with multiplication."

Glen seemed to be genuinely confounded by this inconsistency and wanted to talk about it, so I invited him to drop by at lunch or after school. As he left for his next class, I wondered if he would show up. He did, and I began by writing the same problem on the board, $6\frac{3}{4} \times 5\frac{1}{3}$. "What does this mean?" I asked.

"I don't know . . . $6\frac{3}{4} \times 5\frac{1}{3}$. . . What else?"

"Okay. Does that mean the same as 6×5 plus $\frac{3}{4} \times \frac{1}{3}$?"

"I don't know . . . Why not?"

"When you separate them the way you did, you end up multiplying the 6 by just the 5. Shouldn't the 6 be multiplied by the $\frac{1}{3}$ as well?"

We began to write down the problem now, multiplying 6×5 , $6 \times \frac{1}{3}$, $5 \times \frac{3}{4}$, and $\frac{3}{4} \times \frac{1}{3}$. "Now add all these answers. What do you get?"

"It reduces to . . . $32\frac{48}{12}$. . . 36."

"Now let's see what happens when we try the method we used in class. Change both mixed numbers to improper fractions and then multiply numerators and then denominators. What do you get?"

" $\frac{27}{4} \times \frac{16}{3}$, if I cross cancel it's 9×4 . That's 36." He seemed somewhat surprised that the two methods produced the same answer.

He started to leave the classroom but suddenly turned and said, "But wait a minute. I still don't see why my way doesn't work."

I told him it was because he only multiplied the whole numbers by themselves and not by the fraction part as well. "You need to do both, as we did when we worked the problems out separately," I added lamely, knowing that I hadn't really answered his question.

"Oh, I see," Glen said with a lack of conviction. I told him to think it over and see me again if he still had questions.

Suggested Reading

Janvier, C. 1990. "Contextualization and Mathematics for All." In *Teaching and Learning Mathematics in the 1990s*, edited by T. J. Cooney and C. R. Hirsch, 133-193. Reston, VA: The National Council of Teachers of Mathematics.