First, I looked at the first equation to solve this problem. This equation was a x b = a. Either a was 0 or b was 1. Looking at the third equation, I saw it was e + f = e, so that meant two things: f was 0; which meant that that zero was already taken, so b in the first equation would have to equal 1. On the side I wrote out the integers 0-9 and crossed a number out whenever it was taken, or assigned to a particular symbol. At this point only 0 and 1 were crossed out. Then I looked at the second equation. It was in the format c x c + d = e, which, simplified, was c^2 + d = e. Since the greatest value e could be was a 9, and they were all whole numbers, and 0 and 1 were already taken, c could only be 2. That made things easier. The equation was now 4 + d = e. D could have been 3, 4 or 5, and the e could have been 7, 8 or 9. Skipping the third equation and fourth equations for now, I started on the fifth equation. It was e / i + i = j. Since all of the numbers had to be whole numbers and 2 was already taken, then e must be 9 and i must be 3. Therefore, j was 6. With only 4, 5, 7, and 8 left, g in the fourth equation must be 8 and the h had to be 4. D in the second equation therefore had to be 5. The only number left was 7, so the a in the first equation, which could have been anything, must be 7.

REFLECTION: I looked at this problem for a long time and was thoroughly stumped until my dad showed me the first equation and explained the possibilities. We did them together in exactly the same order as I explained in my long answer. The a in the first equation confused me a little, but when i got down to just 7 left I saw the logic that a must be 7. I liked this equation and thought it was pretty fun, and I enjoyed the logic twist that it was given. When I had figured it all out, I saw the common sense in it and I thought it was a pretty clever problem.

Scoring Rubric

A **problem-specific rubric,** to help in assessing student solutions, is available in the Teacher Support Materials on the Problem page when you are logged in as a teacher. As shown above, we consider each category separately when evaluating the students' work, thereby providing more focused information regarding the strengths and weaknesses in the work.

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