

Problem of the Week: Elbert's Equation

Elbert is studying properties of exponents in his algebra class. His teacher challenged the class to write an algebraic equation that used exponent properties and had at least four different answers.

Elbert did even better - he used absolute value and two basic exponent properties that involve equaling 1 to make an equation that had six different answers! Can you solve Elbert's equation and find all six answers?

$$|2x^2 + 3x - 1| (3x^2 - 13x + 4) = 1$$

	Novice	Apprentice	Practitioner	Expert
Problem Solving				
Interpretation	exhibits understanding of only one or two of the concepts involved - see the Practitioner column	doesn't understand one of the concepts involved - see the Practitioner column (for example, gets quadratic equations but can't solve them) doesn't find all six solutions	understands how to use exponent properties of 0 and 1 to generate equations from original equation understands how to solve quadratic equation using some algebraic method understands absolute value	not possible since no Extra question
Strategy	has no ideas that will lead them toward a successful solution	picks an incorrect strategy, or relies on luck to get the right answer uses Guess and Check, either for entire solution or to solve an equation	picks a sound strategy—success achieved through skill, not luck uses algebraic techniques to completely solve the problem	uses two separate strategies or an unusual or sophisticated strategy
Accuracy	work contains many errors	work is mostly accurate, with a few errors	work is accurate and contains no arithmetic mistakes	generally not possible - can't be more accurate than Practitioner
Communication				
Completeness	has written nothing that tells you how they found their answer	doesn't explain where equations and expressions came from shows work but doesn't explain it, OR explains what they did without showing any of the actual work	explains all of the steps taken to solve the problem states any equations and formulas used explains where most of those equations came from	adds in useful extensions and further explanation of some of the ideas involved the additions are helpful, not just "I'll say more to get more credit"
Clarity	explanation is very difficult to read and follow	explanation isn't entirely unclear, but would be hard for another student to follow explanation is long and is written entirely in one paragraph explanation contains many spelling and typing errors	explains all of the steps in such a way that another student would understand makes an effort to check their formatting, spelling, and typing (a few errors are fine as long as they don't make it hard to read)	formats things exceptionally clearly answer is very readable and appealing