Spring Colloquium Series

An exploration of triangular-square numbers

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Abstract: A *triangular-square* number is both a perfect square of the form m^2 and the sum of all integers from 1 to some value n. In my first year teaching, I assigned a homework problem about triangular-square numbers that turned out to be much harder than I had realized. The known solutions required material from later in the curriculum. Years later, Prof. Kobayashi and I became convinced that "morally" there should be a way for students to solve the problem using only the techniques they had been taught so far. That started us on a path of mathematical discovery, learning about Pell's Equation and continued fractions, while also drawing lots and lots of pictures of triangles and squares as we searched for a visual solution to the original problem. In this talk, I will give an overview of Pell's Equation and continued fractions, then show our visual solutions. The talk will be accessible to students at any level.

Keywords: number theory, triangular numbers, squares, continued fractions

Thursday, Apr. 12, 12:05 - 12:50pm in 3-1616