

## ***Using a Square to Complete the Algebra Student: Exploring Algebraic and Geometric Connections in the Quadratic Formula***

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### **Abstract**

Recommendations and standards from various stakeholders in the mathematical preparation of teachers, such as *The Mathematical Education of Teachers* ([http://www.cbmsweb.org/MET\\_Document/chapter\\_2.htm](http://www.cbmsweb.org/MET_Document/chapter_2.htm)) and *Beyond Crossroads* (<http://beyondcrossroads.matyc.org/doc/CH6.html>), call for courses that emphasize connections within topics in mathematics, especially those that are most familiar to pre-service teachers. However, these recommendations are applicable for any student taking an algebra course at a post-secondary institution, including developmental algebra courses. One familiar topic to students who take an algebra course in college or who will teach an algebra course in high school is the quadratic formula. Algebra students often see the derivation of the quadratic formula based on the method of completing the square using algebraic procedures. However, the history of mathematics indicates that these procedures originated from geometric concepts. Presenting both algebraic and geometric representations as the quadratic formula is derived helps pre-service mathematics teachers and algebra students, in general, visualize concepts and make sense of algebraic procedures. It also sets up a natural extension for students to make meaning of the quadratic formula itself by connecting its algebraic symbolism to a geometric representation.