Title: Completing the Square

Objectives: Students will learn understand the action of completing the square and will learn the proper technique of this procedure.

Materials: Paper, pencil, dry erase board and markers, and worksheets.

Introduction: (Engage and Explore) Begin the class by putting two quadratic problems on the board one that can be easily factored, (students have already mastered this technique) and one that is not. Allow the students to attempt to factor them. After a few minutes, explain to the students that they have just learned why it is necessary to learn more than one method for solving the quadratic equation.

Procedures: Start with a very simple problem such as \( x^2 = 9 \). Remind the students that they must simply take the square root of both sides. Now put an equation such as \((x - 4)^2 = 9\) on the board. Explain how to take the square root and set up two separate equations and solve. Next show how you can use this method to solve for an equation that has a squared polynomial such as \( x^2 + 4x + 4 = 0 \). Once students seem to be comfortable doing this, solve regular quadratics on the board by completing the square.

Adaptations: After doing several examples, allow students to come to the board in groups of 3 or more and let them practice doing a problem on the board. Check each student’s work on the board to assure that they understand the process. After all students return to their seats, hand out a worksheet and allow them to work in pairs.

Discussion Questions: Show students a quadratic equation that involves fractions. Ask them if they think completing the square will be the best way to solve it.

Assessment/Evaluation: Students will be graded on the worksheets and will test over the concept at a later date.

Extensions: For students that have mastered the concept quickly and finished their homework, ask them to try to find a formula to solve for all quadratic equations using completing the square on \( ax^2 + bx + c = 0 \).

Links: This website allows students to solve quadratic equations by changing a, b and c. The students like using it to check their answers.
http://www.math.com/students/calculators/source/quadratic.htm
Vocabulary: completing the square

Academic Standards:

111.32.d.(2) The student understands there is more than one way to solve a quadratic equation and solves them using appropriate methods.

111.32.b. (1) The student understands that a function represents a dependence of one quantity on another and can be described in a variety of ways.

Time of Lesson: 1- 50 minute lesson