UNIT 3 • MODELING AND ANALYZING QUADRATIC FUNCTIONS
Lesson 1: Creating and Solving Quadratic Equations in One Variable

Instruction

Prerequisite Skills

This lesson requires the use of the following skills:

- multiplying polynomials (A–APR.1)

- writing quadratic equations in standard form (A–CED.1★)

Introduction

A trinomial of the form $x^2 + bx + \left(\dfrac{b}{2}\right)^2$ can be written as the square of a binomial, $\left(x + \dfrac{b}{2}\right)^2$, and is called a **perfect square trinomial**. We can solve quadratic equations by transforming the quadratic expression into a perfect square trinomial and taking square roots to solve.

Key Concepts

- A **quadratic expression** has the form $ax^2 + bx + c$.

- When the binomial $(x + a)$ is squared, the resulting perfect square trinomial is $x^2 + 2ax + a^2$.

- When the binomial $(ax + b)$ is squared, the resulting perfect square trinomial is $a^2x^2 + 2abx + b^2$.

Completing the Square to Solve Quadratic Equations of the Form $ax^2 + bx + c = 0$
1. Make sure the equation is in standard form, $ax^2 + bx + c = 0$.
2. Subtract c from both sides of the equation.
3. If a is not equal to 1, divide each term by a to get a leading coefficient of 1.
4. Add the square of one-half of b to both sides to complete the square.
5. Express the perfect square trinomial as the square of a binomial.
6. Solve by taking the square root of both sides of the equation.

Common Errors/Misconceptions

- neglecting to subtract the c term from both sides of the equation

- not isolating x after squaring both sides

- forgetting that, when taking the square root, both the positive and negative roots must be considered ($\pm$)