Unit 5: Quadratic Equations

Solutions to Quadratic Equations

Objectives:
E.1 To solve quadratic equations using the quadratic formula.
E.2 To solve quadratic equations having complex roots.
E.3 To solve word problems involving real world applications of quadratic equations.

Notes:

We may recall from earlier grades that a **Quadratic Equation** is an equation of the general form; **ax² +bx + c = 0**,   Where: a, b, and c are real numbers.

The solutions or **roots** of the equation can be found in several ways;

1. Factoring:

For Example: Solve: $2x^2 + 5x - 12 = 0$

(2x - 3)(x + 4) = 0	Factored
2x - 3 = 0, or x + 4 = 0	Set each factor = 0.
2x = 3, → x = ³/₂	Solve each factor for x.
or x + 4 = 0, → x = -4	
x = ³/₂ or x = -4	The solution.

2. Completing the square:

For Example: Solve: $2x^2 - 9x + 10 = 0$ w

$$x^2 + \frac{9}{2}x + 5 = 0$$ Divide each term by "a"

$$x^2 - \frac{9}{2}x + \left(\frac{9}{4}\right)^2 = -5 + \left(\frac{9}{4}\right)^2$$ Move the constant term across the = sign and add $\left(\frac{b}{2a}\right)^2$ to both sides.

$$\left(x - \frac{9}{4}\right)^2 = -5 + \frac{81}{16}$$ Factor the left hand side.

$$\left(x - \frac{9}{4}\right)^2 = \frac{1}{16}$$ Simplify the right hand side.

$$x - \frac{9}{4} = \pm\frac{1}{4}$$ Square root both sides.

$$x = \frac{9}{4} \pm \frac{1}{4}$$ Solve for x

$$x = \frac{5}{2} \ or \ x = 2$$

3. The **Quadratic Formula**: