LESSON 2:
Solving Quadratic Equations by
Extracting Square Roots

Finding the root of a quadratic equation can be done by extracting the square root of the form \( ax^2 \pm c = 0 \).

Square Root Property

If \( x^2 = a \), and \( a \) is an integer, then \( x = \pm \sqrt{a} \)

It is important to remember that we can only use this property if the numerical coefficient of the variable \( x \) is 1.

**Example 1:** Solve for the roots of the following quadratic equations by extracting the root.

(a) \( x^2 = 36 \)  
(b) \( w^2 - 49 = 0 \)  
(c) \( y^2 - 5 = 0 \)

(d) \( t^2 = 50 \)  
(e) \( r^2 + 100 = 0 \)  
(f) \( (x - 9)^2 = 64 \)

**Solution:**

(a) \( x^2 = 36 \)  
\( x = \pm 6 \)

(b) \( w^2 - 9 = 0 \)  
\( w^2 = 9 \)  
\( w = \pm 3 \)

(c) \( y^2 - 5 = 0 \)  
\( y^2 = 5 \)  
\( y = \pm \sqrt{5} \)

(d) \( t^2 = 50 \)  
\( t = \pm \sqrt{50} \)  
\( t = \pm 5\sqrt{2} \)

(e) \( r^2 + 100 = 0 \)  
\( r^2 = -100 \)  
\( r = \pm 10i \)

(f) \( (x - 9)^2 = 64 \)  
\( x - 9 = \pm \sqrt{64} \)  
\( x - 9 = \pm 8 \)  
\( x = 9 \pm 8 \)  
\( x_1 = 9 + 8 = 17 \)  
\( x_2 = 9 - 8 = 1 \)
A. Solve for the roots of the following quadratic equations by extracting the roots.

1. \( x^2 = 121 \)
2. \( 4x^2 - 3 = 9 \)
3. \( 5x^2 - 100 = 0 \)
4. \( 4x^2 - 100 = 0 \)
5. \( m^2 + 12 = 48 \)

B. Use the square root property to solve for the roots of the following quadratic equations.

1. \( (x + 4)^2 = 36 \)
2. \( (x + 1)^2 = 14 \)
3. \( 4(x - 5)^2 = 20 \)
4. \( 3(x - 3)^2 = 27 \)
5. \( 2(3x + 1)^2 - 8 = 0 \)

Worksheet Link:
http://www.kutasoftware.com/FreeWorksheets/Alg1Worksheets/Solving%20Quadratic%20Roots.pdf