Quadratic Equations
Worksheet to Accompany Videotape #6
Solving Quadratic Equations by Completing the Square

Steps

1. Move the constant term to the right of the equal sign
   
   Example
   
   \[ 2x^2 - 12x + 17 = 0 \]
   
   1. \[ 2x^2 - 12x = -17 \]

2. Divide each term by the coefficient of \( x^2 \)

   2. \[ x^2 - 6x = -\frac{17}{2} \]

3. Take \( \frac{1}{2} \) of the coefficient of \( x \) and then square it

   3. \( \frac{1}{2}(-6) = -3 \)
   \[ (-3)^2 = 9 \]

4. Add that square to both sides of the equation

   4. \[ x^2 - 6x + 9 = -\frac{17}{2} + 9 \]

5. Combine the terms on the right side of the equation

   5. \[ x^2 - 6x + 9 = \frac{1}{2} \]

6. Factor the left side of the equation

   6. \[ (x - 3)^2 = \frac{1}{2} \]

7. Take the square root of both sides of the equation

   7. \[ x - 3 = \pm \frac{\sqrt{1}}{\sqrt{2}} \]

8. Simplify the radical

   8. \[ x - 3 = \pm \frac{\sqrt{2}}{2} \]

9. Solve for \( x \)

Solve for \( x \) by completing the square:

1. \[ x^2 - 4x + 1 = 0 \]
2. \[ x^2 - 6x + 4 = 0 \]
3. \[ 2y^2 = y - 4 \]
4. \[ 9z^2 - 12z - 1 = 0 \]
5. \[ 4x^2 + 4x = 3 \]
6. \[ x^2 + 6 = 2x \]

Solutions:

1. \( \frac{2}{3} \pm \frac{3}{\sqrt{5}} \)
2. \( 2 \pm \sqrt{5} \)
3. No real solutions or \( \frac{4}{13} \pm \sqrt{5} \)
4. No real solutions or \( \frac{3}{2} \pm \sqrt{5} \)
5. \( \frac{2}{3} \pm \frac{\sqrt{5}}{2} \)
6. \( \frac{1}{2} \pm \sqrt{5} \)

Answers: