

3.3 Completing the Square (Day 2)

OBJ: To solve for a quadratic equation by completing the square.

1. Solve $x^2 = 81$ $x = \pm 9$
 $x = ?$ (X)

Solve each equation. On #2 and #3, factor the perfect square trinomial.

2. $\sqrt{(x-7)^2} = \sqrt{81}$
 $\frac{x-7}{+7 \quad +7} = \frac{\pm 9}{\pm 9}$
 $x = 7 \pm 9$
 $x = 7+9 \quad x = 7-9$
 $x = 16 \quad x = -2$

3. $x^2 + 6x + 9 = 1$ (perfect square trinomial)
 $\frac{x \cdot x \quad 3 \cdot 3}{(x+3)(x+3)} = 1$
 $\sqrt{(x+3)^2} = \sqrt{1}$
 $\frac{x+3}{-3 \quad -3} = \frac{\pm 1}{\pm 1}$
 $x = -3 \pm 1$
 $x = -3+1 \quad x = -3-1$
 $x = -2 \quad x = -4$

4. $x^2 - 12x + 36 = 49$ (perfect square trinomial)
 $\frac{x \cdot x \quad -6 \cdot -6}{(x-6)(x-6)} = 49$
 $\sqrt{(x-6)^2} = \sqrt{49}$
 $\frac{x-6}{+6 \quad +6} = \frac{\pm 7}{\pm 7}$
 $x = 6 \pm 7$
 $x = 6+7 \quad x = 6-7$
 $x = 13 \quad x = -1$

Complete the following squares using this concept:

5. $x^2 + \left(\frac{4}{2}\right)x + \underline{\quad}$

6. $x^2 + \left(\frac{6}{2}\right)x + \underline{\quad}$
 $\left(\frac{6}{2}\right)^2 \quad \left(\frac{6}{2}\right)^2$

7. $x^2 + \left(\frac{-8}{2}\right)x + \underline{\quad}$

Completing the Square: Add $\left(\frac{b}{2}\right)^2$ to each side of the equal sign.

Solve the equations by completing the square.

8. $x^2 - 8x - 5 = 0$
 $\frac{x^2 - 8x + 16}{+5 \quad +5} = 0 + 16$
 $\frac{x \cdot x \quad -4 \cdot -4}{(x-4)(x-4)} = 21$
 $\sqrt{(x-4)^2} = \sqrt{21}$
 $\frac{x-4}{+4 \quad +4} = \frac{\pm \sqrt{21}}{\pm \sqrt{21}}$
 $x = 4 \pm \sqrt{21}$

9. $x^2 + 12x + 9 = 0$
 $\frac{x^2 + 12x + 36}{-9 \quad -9} = 0 - 9$
 $\frac{x \cdot x \quad 6 \cdot 6}{(x+6)(x+6)} = 27$
 $\sqrt{(x+6)^2} = \sqrt{27}$
 $\frac{x+6}{-6 \quad -6} = \frac{\pm 3\sqrt{3}}{\pm 3\sqrt{3}}$
 $x = -6 \pm 3\sqrt{3}$

10. $x^2 - 10x - 11 = 0$
 $\frac{x^2 - 10x + 25}{+11 \quad +11} = 0 + 25$
 $\frac{x \cdot x \quad -5 \cdot -5}{(x-5)(x-5)} = 36$
 $\sqrt{(x-5)^2} = \sqrt{36}$
 $\frac{x-5}{+5 \quad +5} = \frac{\pm 6}{\pm 6}$
 $x = 5 \pm 6$
 $x = 5+6 \quad x = 5-6$
 $x = 11 \quad x = -1$

Solve each equation.

1. $3x^2 = 75$

2. $x^2 - 50 = 0$

3. $2x^2 = 14$

Solve each equation of the perfect square trinomial.

4. $x^2 + 8x + 16 = 25$

5. $x^2 - 10x + 25 = 144$

6. $x^2 - 14x + 49 = 100$

Complete the square.

7. $x^2 + 22x +$

8. $x^2 - 30x +$

9. $x^2 + 5x +$

Solve each quadratic equation by completing the square.

10. $x^2 + 10x - 1 = 0$

11. $x^2 + 2x - 7 = 0$

12. $x^2 + 6x - 40 = 0$

Warm-Up

Solve #1 and #2 on the notes.

Put your answer on the board.

Factor

1. $x^2 - 12x + 36$

2. $2x^2 - 24x + 72$