

6.4 Solving by Factoring

01d Solving Quadratics

What does it mean to solve Quadratics?

- To determine the x-intercept(s) of the functions.
- Other names for x-intercept(s) are roots, zeros, solutions, finding x.
- Zero product principle is used to solve when Quadratic is factored. $(a)(b) = 0$
 $a=0$ or $b=0$.

[Examples] Solve the Quadratics.

$$\begin{aligned} \textcircled{1} \quad 16x^2 - 8x &= 0 \\ 8x(2x-1) &= 0 \\ 8x=0 \text{ or } 2x-1 &= 0 \\ x=0 \text{ or } 2x &= 1 \\ x &= \frac{1}{2}. \end{aligned}$$

$$\begin{aligned} \textcircled{2} \quad x^2 - 4 &= 0 \\ (x-2)(x+2) &= 0 \\ x &= \pm 2. \end{aligned}$$

$$\begin{aligned} \textcircled{3} \quad 4y^2 - 9 &= 0 \\ (2y-3)(2y+3) &= 0 \\ y &= \pm \frac{3}{2} \end{aligned}$$

$$\begin{aligned} \textcircled{4} \quad x^2 + 9x + 14 &= 0 \\ (x+7)(x+2) &= 0 \\ x &= -7, -2 \end{aligned}$$

$$\begin{aligned} \textcircled{5} \quad x^2 + 5x &= 14 \\ x^2 + 5x - 14 &= 0 \\ (x+7)(x-2) &= 0 \\ x &= -7, 2. \end{aligned}$$

$$\begin{aligned} \textcircled{6} \quad 2x^2 &= -10x + 12 \\ 2x^2 + 10x - 12 &= 0 \\ 2(x^2 + 5x - 6) &= 0 \\ 2(x+6)(x-1) &= 0 \\ x &= -6, 1. \end{aligned}$$

$$\begin{aligned} \textcircled{7} \quad 2x^2 + 11x &= -9 \\ 2x^2 + 11x + 9 &= 0 \\ (2x+9)(x+1) &= 0 \\ x &= -\frac{9}{2}, -1. \end{aligned}$$

$$\begin{aligned} \textcircled{8} \quad 4x^2 + 4x - 3 &= 0 \\ (2x+3)(2x-1) &= 0 \\ x &= -\frac{3}{2}, \frac{1}{2}. \end{aligned}$$

new-A Solving by factoring (grouping)

$$\begin{aligned} \textcircled{1} \quad 4x^3 + 16x^2 - x - 4 &= 0 \\ 4x^2(x+4) - 1(x+4) &= 0 \\ (4x^2-1)(x+4) &= 0 \end{aligned}$$

$$\begin{aligned} 4x^2-1 &= 0 \text{ or } x+4=0 \\ (2x+1)(2x-1) &= 0 & x &= -4 \\ x &= -\frac{1}{2}, \frac{1}{2}, -4. \end{aligned}$$

$$\begin{aligned} \textcircled{2} \quad x^3 + 5x^2 - 4x - 20 &= 0 \\ x^2(x+5) - 4(x+5) &= 0 \\ (x^2 - 4)(x+5) &= 0 \\ (x-2)(x+2)(x+5) &= 0 \\ x &= 2, -2, -5. \end{aligned}$$

$$\begin{aligned} \textcircled{3} \quad x^3 - 9x + 5x^2 - 45 &= 0 \\ x(x^2 - 9) + 5(x^2 - 9) &= 0 \\ (x+5)(x^2 - 9) &= 0 \\ (x+5)(x-3)(x+3) &= 0 \\ x &= -5, 3, -3. \end{aligned}$$