

Sec. 4.5 Quadratic Equations

Vocabulary

zero of a function: where $f(x) = 0$; x -intercept

Zero Product Property:

If $ab = 0$ then $a = 0$ or $b = 0$.

Problem 1: What are the solutions of the quadratic equation?

a. $x^2 + 3x - 18 = 0$ 1.18
2.9
-3.6

$$(x + 6)(x - 3) = 0$$

$$\begin{array}{r} x + 6 = 0 \\ -6 \quad -6 \\ \hline x = -6 \end{array} \qquad \begin{array}{r} x - 3 = 0 \\ +3 \quad +3 \\ \hline x = 3 \end{array}$$

b. $10x^2 + 2x - 42 = x - 4$

$$\begin{array}{r} -x \quad +4 \quad -x +4 \\ \hline \end{array}$$

$10x^2 + x - 42 = 0$ 1.42
2.21
3.14
6.7

$$(10x + 21)(x - 2) = 0$$

$$10x^2 - 20x + 21x - 42 = 0$$

$$10x(x - 2) + 21(x - 2) = 0$$

$$(10x + 21)(x - 2) = 0$$

$$\begin{array}{r} 10x + 21 = 0 \\ -21 \quad -21 \\ \hline 10x = -21 \\ \frac{10x}{10} = \frac{-21}{10} \\ x = -\frac{21}{10} \end{array} \qquad \begin{array}{r} x - 2 = 0 \\ +2 \quad +2 \\ \hline x = 2 \end{array}$$

$$\frac{10x}{10} = \frac{-21}{10}$$

$$x = -\frac{21}{10}$$

$$x = 2$$

420
1.420
2.210
3.140
4.105
6.70
7.66
10.42
12.35
15.28
20.21

$$c. \quad 5x^2 - 8 = 18x$$

$$5x^2 - 18x - 8 = 0 \quad \begin{array}{l} 1.8 \\ 2.4 \end{array}$$

$$(5x + 2)(x - 4) = 0$$

$\underbrace{\hspace{10em}}_{-20x}$
 $\underbrace{\hspace{5em}}_{2x}$

$$\underline{5x^2 + 2x - 20x - 8} = 0$$

$$x(5x + 2) - 4(5x + 2) = 0$$

$$(5x + 2)(x - 4) = 0$$

$$\begin{array}{r} 5x + 2 = 0 \\ -2 \quad -2 \\ \hline \end{array}$$

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

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

$$\begin{array}{r} x - 4 = 0 \\ +4 \quad +4 \\ \hline \end{array}$$

$$x = 4$$

$$5 \cdot -8 = -40$$

$$\begin{array}{r} 1 \cdot 40 \\ \hline 2 \cdot 20 \\ 4 \cdot 10 \\ 5 \cdot 8 \end{array}$$

$$5x^2 - 18x - 8 = 0$$

$$x^2 - 18x - 40 = 0 \quad \begin{array}{l} 1.40 \\ 2.20 \\ 4.10 \\ 5.8 \end{array}$$

$$(x + \frac{2}{5})(x - \frac{20}{5}) = 0$$

$$(5x + 2)(x - 4) = 0$$

$$81x^4 - 16y^4 \quad \text{Diff} \quad \underline{\underline{\#23}}$$

$$(9x^2 + 4y^2)(9x^2 - 4y^2)$$

$$(9x^2 + 4y^2)(3x + 2y)(3x - 2y)$$

$$\begin{matrix} 1.81 \\ 2.27 \\ 9.9 \end{matrix} \quad \textcircled{81x^4} + \underline{0x^2y^2} - 16y^4$$

$$(9x^2 + 4y^2)(9x^2 - 4y^2)$$