Quadratic Formula

\[ x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \]

Steps to using the Quadratic Formula
1. Write down the a, b, & c values.
2. Input values to find discriminant.
3. Input values into quadratic formula.
4. Simplify the \(-b\), \textit{discriminant}, and \(2a\).
5. Solve for solutions and simplify.

When simplifying the quadratic formula and the discriminant is NOT a perfect square.
(discriminant positive and not a perfect square = 2 real solutions w/ a radical)

- Attempt to simplify the radical
- If unable to simplify the radical, leave it as it is. Those are the solutions.
Find the x-intercepts.

$$2x^2 - 7x - 3 = 0$$

Standard Form (with "bx")

Best Method: Quad Formula

Other Methods: Graphing, Factoring/Zero Product Property

$$a = 2$$
$$b = -7$$
$$c = -3$$

$$x = \frac{-(-7) \pm \sqrt{73}}{2(2)} = \frac{7 \pm \sqrt{73}}{4}$$

since $\sqrt{73}$ can't be simplified, leave the answer as $7 \pm \sqrt{73}$

Solve for x.

$$3x^2 - 7x - 4 = 0$$

Standard Form (with "bx")

Best Method: Quad Formula

Other Methods: Graphing, Factoring/Zero Product Property

$$a = 3$$
$$b = -7$$
$$c = -4$$

$$x = \frac{-(-7) \pm \sqrt{97}}{2(3)} = \frac{7 \pm \sqrt{97}}{6}$$

$\sqrt{97}$

1.97
If able to simplify the radical, check to see if the coefficients are able to be simplified.

- If unable to simplify the coefficients after simplifying the radical, leave it as it is and those are the solutions to the quadratic.

If the coefficients CAN'T reduce/simplify...

\[
\frac{-(-2) + \sqrt{18}}{2(2)} = \frac{a + 3\sqrt{2}}{4}
\]

\[
\sqrt{18} \quad \frac{\sqrt{9\sqrt{2}}}{3.6} 
\]

\[
\frac{a + 3\sqrt{2}}{4} = \frac{\frac{a}{4} + \frac{3\sqrt{2}}{4}}{4}
\]

\[
\frac{1 + \frac{3\sqrt{2}}{4}}{2} \quad \checkmark
\]
If the coefficients CAN reduce/simplify...

\[
\begin{align*}
\frac{2 + 2\sqrt{2}}{4} & \quad \frac{8 + 4\sqrt{3}}{6} & \quad \frac{8 + 4\sqrt{2}}{4} \\
\frac{1 \pm \sqrt{2}}{2} & \quad \frac{4 \pm 2\sqrt{3}}{3} & \quad \frac{2 \pm \sqrt{2}}{1} \\
\frac{1 \pm \sqrt{2}}{2} & \quad & \frac{2 \pm \sqrt{2}}{2}
\end{align*}
\]

Solve the quadratic.

\[x^2 - 4x - 6 = 0\]

Standard Form (with "bx")

Best Method: Quad Formula

Other Methods: Graphing, Factoring/Zero Product Property

\[a = 1, \quad b = -4, \quad c = -6\]

\[\frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{4 \pm 2\sqrt{10}}{2} = 2 \pm \sqrt{10}\]

\[\sqrt{40} \approx 6.32, \quad \sqrt{4\sqrt{10}} \approx 5.08\]
Solve the quadratic.

\[ 9x^2 - 6x - 11 = 0 \]

**Standard Form (with "bx")**

**Best Method:** Quad Formula

**Other Methods:** Graphing, Factoring/Zero Product Property

\[ a = 9 \quad b = -6 \quad c = -11 \]

\[ \frac{-(-6) \pm \sqrt{432}}{2(9)} = \frac{6 \pm 12\sqrt{3}}{18} = \frac{1 \pm 2\sqrt{3}}{3} \]

\[ \sqrt{432} \quad 1.432 \quad 2.346 \quad 12\sqrt{3} \]

\[ 6x^{2} + 6x = 9 \]

\[ 6x^{2} + 6x - 9 = 0 \]

**Standard Form (with "bx")**

**Best Method:** Quad Formula

**Other Methods:** Graphing, Factoring/Zero Product Property

\[ a = 6 \quad b = 6 \quad c = -9 \]

\[ \frac{-6 \pm \sqrt{252}}{2(6)} = \frac{-6 \pm 6\sqrt{7}}{12} = \left( \frac{1 \pm \sqrt{7}}{2} \right) \]

\[ \sqrt{252} \quad 6.42 \quad 2.136 \quad 9.06 \quad 3.84 \quad 5.66 \quad 6\sqrt{7} \quad 4.83 \quad 6\sqrt{7} \]
Solve the quadratics. Give your answer in simplified radical form.

1. $x^2 - 4x - 7 = 0$  
   $x = 2 \pm \sqrt{11}$

2. $x^2 - 7x - 10 = 0$  
   $x = \frac{7 \pm \sqrt{89}}{2}$

3. $-x^2 + 4x + 10 = 0$  
   $x = 2 \pm \sqrt{14}$

4. $2x^2 - 4x - 3 = 0$  
   $x = \frac{2 \pm \sqrt{10}}{2}$

5. $3x^2 - 4x - 4 = 0$  
   $x = 2, -\frac{2}{3}$

6. $3x^2 + 5x - 6 = 0$  
   $x = \frac{-5 \pm \sqrt{97}}{6}$