Lesson 33 Using the Quadratic Formula to Solve Quadratic Equations

Quadratic Formula: For $ax^2 + bx + c = 0$, where $a \neq 0$

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

Steps to Follow: **for $ax^2 + bx + c = 0$**

1. List a, b, and c
2. Plug the respective values into the quadratic formula
3. Simplify the values under the radical
4. Write the expression as 2 values.
   One expression with a positive radical, and one expression with a negative radical
5. Simplify each expression, if possible.

Examples: Solve the quadratic equations using the quadratic formula.

1. $x^2 + 6 = 5x$

$-5x \quad -5x$

$x^2 - 5x + 6 = 0$

$a = 1$
$b = -5$
$c = 6$

$$x = \frac{5 \pm \sqrt{(-5)^2 - 4(1)(6)}}{2(1)}$$

$$= \frac{5 \pm \sqrt{25 - 24}}{2}$$

$$= \frac{5 \pm 1}{2} =$$

$\frac{5+1}{2} = \frac{6}{2} = 3$ $\quad \frac{5-1}{2} = \frac{4}{2} = 2$

2. $x^2 - 2x - 8 = 0$

$a = 1$
$b = -2$
$c = -8$

$4 + 32 = 36$

$$x = \frac{2 \pm \sqrt{(-2)^2 - 4(1)(-8)}}{2(1)}$$

$$= \frac{2 \pm \sqrt{36}}{2}$$

$$= \frac{2 \pm 6}{2}$$

$$= \frac{2+6}{2} = \frac{8}{2} = 4 \quad \text{or} \quad \frac{2-6}{2} = \frac{-4}{2} = -2$$

3. $2x^2 + 4x - 7 = 0$ $\quad 16 + 56 = 72$

$a = 2$
$b = 4$
$c = -7$

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

$$x = \frac{-4 \pm \sqrt{72}}{4}$$

$$= \frac{-4 \pm 6\sqrt{2}}{4}$$

$$= \frac{-2 + 3\sqrt{2}}{2} \quad \text{or} \quad \frac{-2 - 3\sqrt{2}}{2}$$

72
2 36
2 18
2 9
3 3

$6\sqrt{2}$