

**Learning Target(s):** I can solve quadratic equations using the quadratic formula.  
 I can find the discriminant of a quadratic equation and identify the number and type of solutions.

**Notes: 4.8 Use the Quadratic Formula and the Discriminant**

**Quadratic Formula** – the formula that gives the solutions to any quadratic equation.

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

**Ex 1:** Solve  $x^2 + 7x = 6$  using the quadratic formula.

$$x^2 + 7x - 6 = 0$$

\*\*equations must be set = 0 before using the formula.

a = 1

b = 7

c = -6

$$x = \frac{-7 \pm \sqrt{(7)^2 - 4(1)(-6)}}{2(1)}$$

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

\*\*answers must be left in simplest radical form!

**Ex 2:** Solve  $2x^2 - 8x + 8 = 0$  using the quadratic formula.

a = 2

b = -8

c = 8

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

$$x = \frac{8 \pm \sqrt{0}}{4}$$

$$x = 2$$

Ex 3: Solve  $5x^2 + 20x + 21 = 0$  using the quadratic formula.

a = 5

b = 20

c = 21

$$x = \frac{-20 \pm \sqrt{(20)^2 - 4(5)(21)}}{2(5)}$$

$$x = \frac{-20 \pm \sqrt{-20}}{10} \leftarrow \frac{4}{5}$$

$$x = \frac{-20 \pm 2i\sqrt{5}}{10}$$

$$x = -2 \pm \frac{i\sqrt{5}}{5}$$

Discriminant – the expression  $b^2 - 4ac$  under the radical sign of the quadratic formula.

Ex 4: Find the discriminant.

a: 1 b: 7 c: 11

$s^2 + 7s + 11 = 0$

$$(7)^2 - 4(1)(11) = 49 - 44 = 5$$

Try it! Find the discriminant.

a.  $-4x^2 + x - 14 = 0$

-223

b.  $x^2 + 6x + 9 = 0$

0

Using the discriminant

- If  $b^2 - 4ac > 0$  2 real solutions, 2 x-intercepts
- If  $b^2 - 4ac = 0$  1 real solution, 1 x-intercept
- If  $b^2 - 4ac < 0$  2 imaginary solutions, 0 x-intercepts



Try it! Use the quadratic formula to solve the equation.

1.  $2x^2 + 12x = -16$

2.  $3x^2 - 6x = -6$