Algebra 1: 13.1 Guided Notes **Name** ______________________________ **Period** _________

The Quadratic Formula

Learning Goals:
To find solutions (roots or zeros) using the quadratic formula.
To determine the number of solutions for a quadratic equation using the discriminant.

The Quadratic Formula

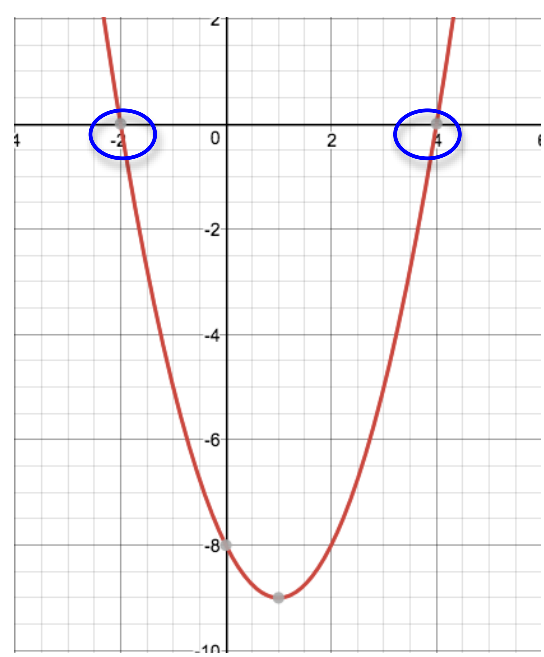
Use the Quadratic Formula to find solutions when the quadratic equation is difficult to factor.

- If $ax^2 + bx + c = 0$ and $a \neq 0$, then $x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$.

Solve Using the Quadratic Formula

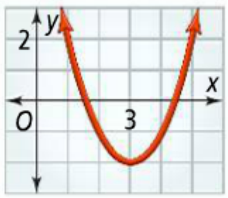
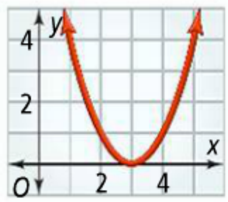
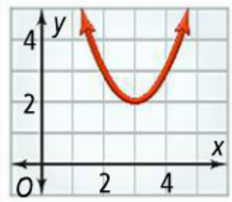
Steps:	**What are the solutions for $x^2 - 8 = 2x$? Use the quadratic formula to solve.**
▪ Write the quadratic equation in standard form. ▪ Substitute numeric values for a, b, and c. ▪ Use the quadratic formula to solve for the roots or zeros. ▪ Simplify.	

The graph of $y = x^2 - 2x - 8$.
The solutions $x = 4$ and $x = -2$ are the x-intercepts.



The Discriminant

- Quadratic equations can have ________, ________, or ________ solutions. You can determine the number of solutions a quadratic equation has using the ____.
- The discriminant is the expression under the radical sign in the quadratic formula: __________________.
- The discriminant can be ______________________, ______________________, or ______________________.

Discriminant	$b^2 - 4ac > 0$	$b^2 - 4ac = 0$	$b^2 - 4ac < 0$
Example	$x^2 - 6x + 7 = 0$ The discriminant is $(-6)^2 - 4(1)(7) = 8$, which is positive.	$x^2 - 6x + 9 = 0$ The discriminant is $(-6)^2 - 4(1)(9) = 0$.	$x^2 - 6x + 11 = 0$ The discriminant is $(-6)^2 - 4(1)(11) = -8$, which is negative.
			
Number of Solutions	There are two real-number solutions.	There is one real-number solution.	There are no real-number solutions.

Using the Discriminant

Steps:

- Write the quadratic equation in standard form.
- Substitute numeric values for a, b, and c.
- Simplify.
- Determine the number of solutions.
- $b^2 - 4ac$:
  - $> 0 \rightarrow$ 2 solutions
  - $= 0 \rightarrow$ 1 solution
  - $< 0 \rightarrow$ no solution

How many real number solutions does $2x^2 - 3x = -5$ have?