TOPIC: THE QUADRATIC FORMULA

- The solutions to *ANY* quadratic equation in standard form can be found using the **quadratic formula.**

$$x = \text{———————}$$

(Quadratic Formula)

SOLVING QUADRATIC EQUATIONS				
$ax^2 + bx + c = 0$ *(Standard form)*				
	FACTORING	**SQ. ROOT PROPERTY**	**COMPLETE THE SQUARE**	**QUADRATIC FORMULA**
USE IF	• Has obvious factors **OR** • $c = 0$	• $(x + \#)^2 = [\textbf{constant}]$ **OR** • $b = 0$	• Leading coeff. is 1 **AND** • b is even	• Can't easily _____ • Unsure what method to use
STEPS	**1)** Write eqn in standard form **2)** Factor completely **3)** Set factors = 0, solve for x **4)** Check solutions	**1)** Isolate squared expression **2)** Take + & − square root **3)** Solve for x **4)** Check solutions	**1)** Simplify eqn to $x^2 + bx = c$ **2)** + $\left(\frac{b}{2}\right)^2$ to both sides **3)** Factor to $\left(x + \frac{b}{2}\right)^2$ **4)** Solve using sqrt prop.	**1)** Write eqn in standard form **2)** Plug a, b, c in quad. form. $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ **3)** Compute & _____ sol'ns

EXAMPLE: Solve each equation using the quadratic formula.

(A) $x^2 + 2x - 3 = 0$

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

$x =$ _____ & $x =$ _____

(B) $x^2 - 5x = -1$

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

$x =$ _____ & $x =$ _____

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QUADRATIC FORMULA

1) Write eqn in standard form

2) Plug a, b, c in quad. form.

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

3) Compute & simplify sol'ns

PRACTICE**:** Solve the given quadratic equation using the quadratic formula.

$$3x^2 + 4x + 1 = 0$$

PRACTICE**:** Solve the given quadratic equation using the quadratic formula.

$$2x^2 - 3x = -3$$

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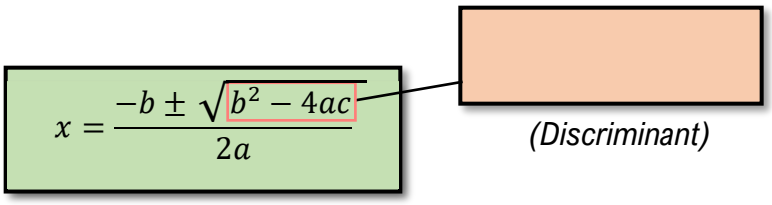
The Discriminant

- You can find **how many real** or **imaginary** solutions a quadratic has *WITHOUT* solving by using the discriminant.
  - **Discriminant:** the expression under the radical in the quadratic formula.
  - _____ determines number/type of solutions: Discriminant is **Positive** = ____ real solution(s)



(Quadratic Formula)

(Discriminant)

Zero = ____ real solution(s)

Negative = ____ real solution(s)

____ _____ solutions

EXAMPLE**:** For the following quadratic equations, determine the number and type of solutions. Do not solve.

$(\boldsymbol{A})$	$(\boldsymbol{B})$	$(\boldsymbol{C})$
$2x^2 + 3x - 2 = 0$	$4x^2 + x + 2 = 0$	$x^2 - 10x + 25 = 0$
$b^2 - 4ac$ is: $[+ \mid 0 \mid -]$	$b^2 - 4ac$ is: $[+ \mid 0 \mid -]$	$b^2 - 4ac$ is: $[+ \mid 0 \mid -]$

PRACTICE**:** Determine the number and type of solutions of the given quadratic equation. Do not solve.

$x^2 + 8x + 16 = 0$

PRACTICE**:** Determine the number and type of solutions of the given quadratic equation. Do not solve.

$-4x^2 + 4x + 5 = 0$