Algebra 1B Live Lesson

U4L6: The Quadratic Formula and The Discriminant
(Chapter 9-6 in textbook)

Agenda

1. Review selected problems and topics from U4L6 – The Quadratic Formula and The Discriminant.

2. Use the 2-column note system to take better notes in math class. Bring your math notebook and pen or pencil to each math LiveLesson class.

2-Column Notes Template

1. Announcements/To Do's	1. Write down important details.
2. School-Wide Learner Outcomes	2. What are you going to work on this week?
3. LL Objectives	
4. Vocabulary words	4. Definitions (fill in as we go)
5. Problems	5. Steps to solving problems
6. Summary (End of class)	6. 1 or 2 sentences about the LL class.

Reminders and To – Do's

Information	What to do
1. Complete 1 math lesson per day.	1. Go to your Planner in Connexus to find the math lesson for the day
2. Check your WebMail every day	2. Go to Connexus to find WebMail
3. Be prepared to spend 4 - 6 hours per day on schoolwork.	3. Complete lessons for the day from your Planner. Do not get behind on lessons.
4. Remind your Learning Coach to take daily attendance	4. Have your Learning Coach log into Connexus daily.

Reminders and To – Do's

Information	What to do
5. Go to the Message Board first for information about our math class.	
6. Contact Mr. Elizondo for math questions. Remember: You need at least 2 phone calls with Mr. Elizondo per semester.	6. Call (559) 549 - 3244 and leave a voicemail if call is not answered. Make an appointment at: https://elizondo.youcanbook.me Send a WebMail

U4L6 – California Common Core State Standards

- HSA-REI.B.4: Solve quadratic equations in one variable.

U4L6 - Objectives

- Solve quadratic equations using the quadratic formula
- Find the number of solutions of a quadratic equation

U4L6 - Vocabulary

- quadratic formula
- discriminant

U4L6 - Introduction

- Recall that quadratic equations can have two, one or no real-number solutions. A quadratic equation can never have more than two solutions.

- You can find the solution(s) of any quadratic equation using the **quadratic formula**.

take note

Key Concept Quadratic Formula

Algebra

If $ax^2 + bx + c = 0$, and $a \neq 0$, then

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

Example

Suppose $2x^2 + 3x - 5 = 0$. Then $a = 2$, $b = 3$, and $c = -5$. Therefore

$$x = \frac{-(3) \pm \sqrt{(3)^2 - 4(2)(-5)}}{2(2)}$$

U4L6 - Using the Quadratic Formula

What are the solutions of $x^2 - 8 = 2x$?
Use the quadratic formula.

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

Write the equation in standard form.
a = 1, b = -2, c = -8

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

Use the Quadratic Formula

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

Substitute 1 for a, -2 for b and -8 for c

$$x = \frac{2 \pm \sqrt{4 + 32}}{2}$$

Simplify

U4L6 - Using the Quadratic Formula

What are the solutions of $x^2 - 8 = 2x$?
Use the quadratic formula.

$$x = \frac{2 \pm \sqrt{4 + 32}}{2}$$

Simplify

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

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

Write as two equations

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

$$\boldsymbol{x = 4} \quad \text{or} \quad \boldsymbol{x = -2}$$

U4L6 - Using the Quadratic Formula

What are the solutions of $x^2 - 4x = 21$?
Use the quadratic formula.

$$x^2 - 4x - 21 = 0$$

Write the equation in standard form.
a = 1, b = -4, c = -21

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

Use the Quadratic Formula

$$x = \frac{-(-4) \pm \sqrt{(-4)^2 - 4(1)(-21)}}{2(1)}$$

Substitute 1 for a, -2 for b and -8 for c

$$x = \frac{4 \pm \sqrt{16 + 84}}{2}$$

Simplify

U4L6 - Using the Quadratic Formula

What are the solutions of $x^2 - 8 = 2x$?
Use the quadratic formula.

$$x = \frac{4 \pm \sqrt{16 + 84}}{2}$$

Simplify

$$x = \frac{4 \pm \sqrt{100}}{2}$$

$$x = \frac{4 \pm 10}{2}$$

Write as two equations

$$x = \frac{4 + 10}{2} \quad \text{or} \quad x = \frac{4 - 10}{2}$$

$$\boldsymbol{x = 7} \quad \text{or} \quad \boldsymbol{x = -3}$$

U4L6 - There are many methods for solving a quadratic equation.

Method	When to Use
Graphing	Use if you have a graphing calculator handy.
Square roots	Use if the equation has no x-term.
Factoring	Use if you can factor the equation easily.
Completing the square	Use if the coefficient of x^2 is 1, but you cannot easily factor the equation.
Quadratic Formula	Use if the equation cannot be factored easily or at all.

U4L6 - Choosing an Appropriate Method

$3x^2 - 9 = 0$	Square roots; there is no x-term.
$x^2 - x - 30 = 0$	Factoring; the equation is easily factorable.
$6x^2 + 13x - 17 = 0$	Quadratic formula, graphing; the equation cannot be factored.
$x^2 - 5x + 3 = 0$	Quadratic formula, completing the square, or graphing; the coefficient of the x^2 –term is 1, but the equation cannot be factored.
$-16x^2 - 50x + 21 = 0$	Quadratic formula, graphing; the equation cannot be Factored easily since the numbers are large.

U4L6 - The Discriminant

- Quadratic equations can have two, one, or no real-number solutions. Before you solve a quadratic equation, you can determine how many real-number solutions it has by using the discriminant. The **discriminant** is the expression under the radical sign in the quadratic formula.

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

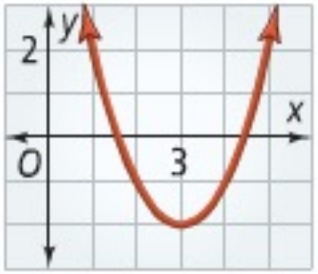
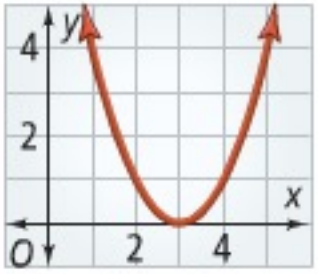
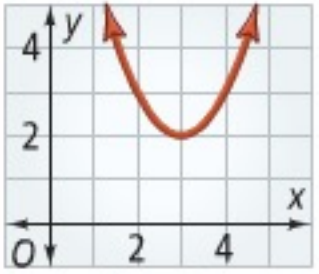
the discriminant

- The discriminant of a quadratic equation can be positive, zero or negative.

U4L6 - The Discriminant

take note

Key Concept Using the Discriminant

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.

U4L6 - Using the Discriminant

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

$$2x^2 - 3x + 5 = 0$$

$$b^2 - 4ac$$

$$(-3)^2 - 4(2)(5)$$

$$9 - 40 = -31$$

Because the discriminant is negative, the equation has no real-number solutions.

Write the equation in standard form.

Use the discriminant.
a = 2, b = -3, c = 5

Draw a conclusion.

Questions?

- Check the Message Board first
- Send a WebMail
- You can also make an appointment at https://elizondo.youcanbook.me
- You can also call me at (559) 549-3244. If I'm not available to answer your call, please leave a voicemail with your full name and phone number.