4.8: Quadratic Formula Notes
"I WILL …
Solve using the Quadratic Formula."

I. Discriminant

A. Standard form equation, $ax^2 + bx + c = 0$

B. Discriminant is from standard form, the expression, $b^2–4ac$ indicates how many real number solutions the equation has

C. To Determine Solutions:

a. POSITIVE – 2 Real Solutions

b. ZERO – 1 Solution, Double Root

c. NEGATIVE – 2 Imaginary Solutions

II. The Quadratic Formula: $x =$ ———————————

A. Make sure the **equation equals to zero**

B. Identify **A, B, C**

C. **Plug** into **equation**

D. **Check** your work

III. Model Problems

Ex 1: Determine the amount of solutions for this equation and the discriminant of $x^2 – 4x + 3 = 0$	Your Turn: Determine the amount of solutions for this equation and the discriminant of $–2x^2 – 5x – 6 = 0$
Ex 2: Solve $x^2 – 4x + 3 = 0$ using Quadratic Formula	Ex 3: Solve $–5x^2 – 15x + 10 = 0$ using Quadratic Formula

Your Turn: Solve $-9x - 1 = -9x^2$ using Quadratic Formula	Ex 4: Solve $x^2 + 4x + 13 = 0$ using Quadratic Formula
Ex 5: Solve $x^2 - 2x + 19 = 0$ using Quadratic Formula	Your Turn: Solve $-2x^2 + 4x - 3 = 0$ using Quadratic Formula
Ex 6: An object is thrown upward from the top of a 200-foot cliff with a velocity of 12 feet per second. The height h in feet of the object after t seconds is $h = -16t^2 + 12t + 200$. How long after the object is thrown will it strike the ground? Round your answer to the nearest thousandth of a second.	Ex 7: An object is thrown upward at the edge of a building, 45 feet high, with the initial velocity of 20 feet per second. The height h in feet of the object after t seconds is $h = -16t^2 + 20t + 45$. How long after the object is thrown will it strike the ground? Round your answer to the nearest thousandth of a second.
Your Turn: The height h in feet of a person on a waterslide is modeled by the function, $h(t) = -0.025t^2 - 0.5t + 50$, where t is the time in seconds. At the bottom of the slide, the person lands in a swimming pool. To the nearest tenth of a second, how long does the ride last?	Ex 8: The area of a rectangle is 84 square inches. If the width is $x + 3$ inches and length is $x - 2$ inches, what is the length of the rectangle?
Your Turn: A rectangle is 7 cm long and 4 cm wide. When each dimension is increased by x cm, the area is tripled. Find x.	

Assignment: Pg 296: 3-21 odd, 31-39 odd, 49; Pg 290: 63, 65 (using Q. Formula)

EQUATIONS IN STANDARD FORM **Use the quadratic formula to solve the equation.**

3. $x^2 - 4x - 5 = 0$ **4.** $x^2 - 6x + 7 = 0$ **5.** $t^2 + 8t + 19 = 0$

6. $x^2 - 16x + 7 = 0$ **7.** $8w^2 - 8w + 2 = 0$ **8.** $5p^2 - 10p + 24 = 0$

9. $4x^2 - 8x + 1 = 0$ **10.** $6u^2 + 4u + 11 = 0$ **11.** $3r^2 - 8r - 9 = 0$

12. **TAKS REASONING** What are the complex solutions of the equation $2x^2 - 16x + 50 = 0$?

(A) $4 + 3i, 4 - 3i$ (B) $4 + 12i, 4 - 12i$

(C) $16 + 3i, 16 - 3i$ (D) $16 + 12i, 16 - 12i$

EQUATIONS NOT IN STANDARD FORM **Use the quadratic formula to solve the equation.**

13. $3w^2 - 12w = -12$ **14.** $x^2 + 6x = -15$ **15.** $s^2 = -14 - 3s$

16. $-3y^2 = 6y - 10$ **17.** $3 - 8v - 5v^2 = 2v$ **18.** $7x - 5 + 12x^2 = -3x$

19. $4x^2 + 3 = x^2 - 7x$ **20.** $6 - 2t^2 = 9t + 15$ **21.** $4 + 9n - 3n^2 = 2 - n$

USING THE DISCRIMINANT **Find the discriminant of the quadratic equation and give the number and type of solutions of the equation.**

31. $x^2 - 8x + 16 = 0$ **32.** $s^2 + 7s + 11 = 0$ **33.** $8p^2 + 8p + 3 = 0$

34. $-4w^2 + w - 14 = 0$ **35.** $5x^2 + 20x + 21 = 0$ **36.** $8z - 10 = z^2 - 7z + 3$

37. $8n^2 - 4n + 2 = 5n - 11$ **38.** $5x^2 + 16x = 11x - 3x^2$ **39.** $7r^2 - 5 = 2r + 9r^2$

ERROR ANALYSIS ***Describe*** **and correct the error in solving the equation.**

49.

$3x^2 + 6x + 15 = 0$

$x = \frac{-6 \pm \sqrt{6^2 - 4(3)(15)}}{2(3)}$

$= \frac{-6 \pm \sqrt{-144}}{6}$

$= \frac{-6 \pm 12}{6}$

$= 1$ or -3

50.

$x^2 + 6x + 8 = 2$

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

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

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

$= -2$ or -4

63. **VOLLEYBALL** The height h (in feet) of a volleyball t seconds after it is hit can be modeled by $h = -16t^2 + 48t + 4$. Find the volleyball's maximum height.

65. **VIDEO GAME REVENUE** A store sells about 40 video game systems each month when it charges \$200 per system. For each \$10 increase in price, about 1 less system per month is sold. The store's revenue can be modeled by $y = (200 + 10x)(40 - x)$. Use vertex form to find how the store can maximize monthly revenue.