Name _____ Date _____

For in class only

Do not need to know this,

9.5 Notetaking with Vocabulary

I can solve quadratic equations using the quadratic formula.
I can interpret the discriminant.

$\frac{\frac{b}{a}}{2} = \frac{b}{a} \cdot \frac{1}{2} = \frac{b}{2a}$

$\left(\frac{b}{2a}\right)^2 = \frac{b^2}{4a^2}$ new c

$ax^2 + bx + c = 0$

$ax^2 + bx = -c$

$\frac{a\left(x^2 + \frac{b}{a}x\right)}{a} = \frac{-c}{a}$

$x^2 + \frac{b}{a}x = \frac{-c}{a}$

$x^2 + \frac{b}{a}x + \frac{b^2}{4a^2} = \frac{b^2}{4a^2} - \frac{c}{a}$

$\sqrt{\left(x + \frac{b}{2a}\right)^2} = \pm\sqrt{\frac{b^2 - 4ac}{4a^2}}$

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

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

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

Core Concepts

Quadratic Formula : works for all quadratics

The real **solutions of the quadratic equation** $ax^2 + bx + c = 0$ **are**

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

where $a \neq 0$ and $b^2 - 4ac \geq 0$.

In Exercises 1–4, solve the equation using the Quadratic Formula. Round your solutions to the nearest tenth, if necessary.

1. $x^2 - 10x + 16 = 0$ $a=1$ $b=-10$ $c=16$

$x = \frac{10 \pm \sqrt{(-10)^2 - 4(1)(16)}}{2(1)}$

$x = \frac{10 \pm \sqrt{100 - 64}}{2} = \frac{10 \pm \sqrt{36}}{2} = \frac{10 \pm 6}{2}$

$x = \frac{16}{2} = 8$ $x = \frac{4}{2} = 2$

2. $3x^2 - x - 2 = 0$

3. $x^2 + 6x = -13$

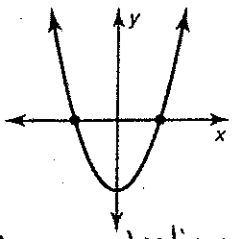
4. $-4x^2 + 8x + 12 = 6$

5. A square pool has a side length of x feet. A uniform border around the pool is 1 foot wide. The total area of the pool and the border is 361 square feet. What is the area of the pool?

Interpreting the Discriminant

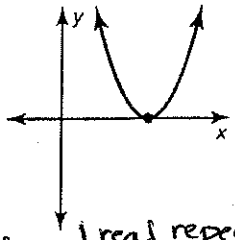
– radicand in quad. formula = $b^2 - 4ac$

positive $b^2 - 4ac > 0$



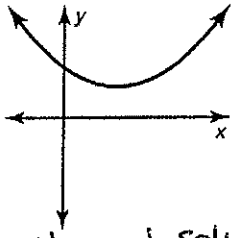
2 real distinct solutions
2 x-int.

$b^2 - 4ac = 0$



1 real repeated solution
1 x-int.

$b^2 - 4ac < 0$



No real solutions
No x-intercepts

In Exercises 6–8, determine the number of real solutions of the equation.

b^2-4ac

6. $-x^2 + 6x + 3 = 0$

$a=-1 \quad b=6 \quad c=3$

$(6)^2 - 4(-1)(3)$

$36 + 12 = 48$ +

2 real sol'n

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

8. $x^2 + 3x + 8 = 0$

In Exercises 9–11 find the number of x-intercepts of the graph of the function.

9. $y = -x^2 + 4x + 3$

10. $y = x^2 + 14x + 49$

$a=1 \quad b=14 \quad c=49$

$(14)^2 - 4(1)(49)$

$196 - 196 = 0$

1 x-int.

11. $y = -x^2 - 8x - 18$