Name _____

Lesson 13/15: Using the Quadratic Formula and Interpreting the Discriminant

LEARNING OUTCOMES

- I can determine whether the solution of a quadratic equation will be real or complex.
- I can find real solutions to quadratic equations in one variable using multiple methods and justify my solution method.

WARM UP:

Identify the coefficients of the terms in each of the following quadratic equations.

1. $x^2 + 7x + 10 = 0$	2. $3x^2 - 18x = 12$
3. $(x + 12)(x - 4) = 0$	4. $x^2 - 8x + 9 = -11$

take note

Key Concept The Quadratic Formula

To solve the quadratic equation $ax^2 + bx + c = 0$, use the **Quadratic Formula**.

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

1. Solve $x^2 + 2x - 8 = 0$ using the quadratic formula.

2. Solve $x^2 + 4 = 4x$ using the quadratic formula.

3. Solve $3x^2 - 10x + 5 = 0$

Exercises 1–5: **Solve the following equations using the quadratic formula:**

1. $x^2 - 2x + 1 = 0$

2. $3b^2 + 4b + 8 = 0$

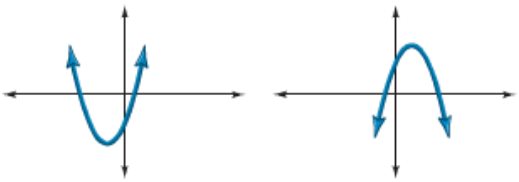
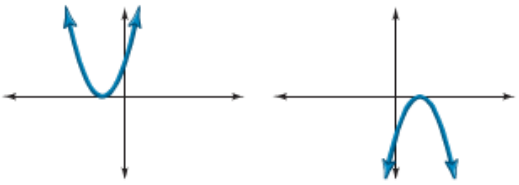
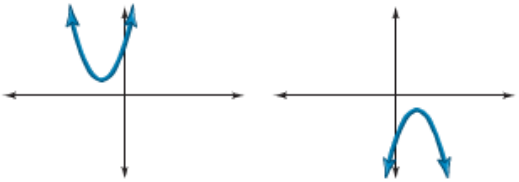
3. $2t^2 + 7t - 4 = 0$

4. $q^2 - 2q - 1 = 0$

5. $m^2 - 4 = 3$

The Discriminant and the Nature of the Roots of Quadratic Equations

Discriminants and Solutions of Quadratic Equations

Value of the Discriminant	Number of Solutions for $ax^2 + bx + c = 0$	x-intercepts of Graph of Related Function $y = ax^2 + bx + c$
$b^2 - 4ac > 0$ perfect square → rational not perfect square → irrational	two real solutions	two x-intercepts 
$b^2 - 4ac = 0$	one real solution	one x-intercept 
$b^2 - 4ac < 0$	no real solutions	no x-intercepts 

1. The roots of the equation $9x^2 + 3x - 4 = 0$ are

   1) imaginary

   2) real, rational, and equal

   3) real, rational, and unequal

   4) real, irrational, and unequal

2. Which number is the discriminant of a quadratic equation whose roots are real, unequal, and irrational?

   1) 0

   2) -5

   3) 7

   4) 4

3. Use the discriminant to determine all values of *k* that would result in the equation

   $x^2 - kx + 4 = 0$ having equal roots (only one solution).

For Exercises 4–7, without solving, determine the number of real solutions for each quadratic equation:

4. $p^2 + 7p + 33 = 8 - 3p$

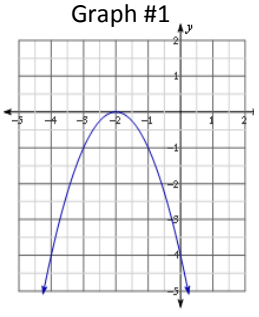
5. $7x^2 + 2x + 5 = 0$

6. $2y^2 + 10y = y^2 + 4y - 3$

7. $4z^2 + 9 = -4z$

8. State whether the discriminant of each quadratic equation is positive, negative, or equal to zero on the line below the graph.

Graph #1



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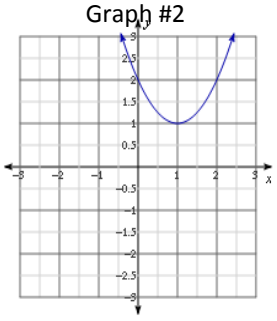
Graph #2



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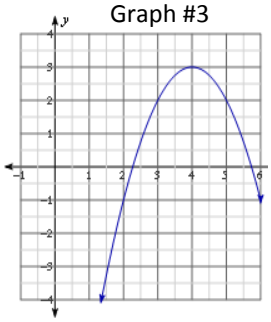
Graph #3



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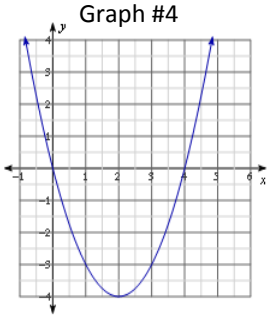
Graph #4



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Identify which graph above matches the discriminants below:

Discriminant A: $(-2)^2 - 4(1)(2)$

Graph #: _____

Discriminant B: $(-4)^2 - 4(-1)(-4)$

Graph #: _____

Discriminant C: $(-4)^2 - 4(1)(0)$

Graph #: _____

Discriminant D: $(-8)^2 - 4(-1)(-13)$

Graph #: _____

Name _____ CW/Homework

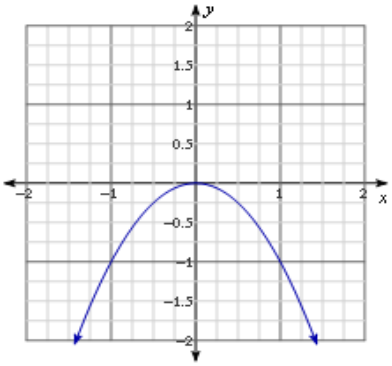
Lesson 13/15: Using the Quadratic Formula and Interpreting the Discriminant

Without solving, determine the number of real solutions for each quadratic equation.

1. $b^2 - 4b + 3 = 0$

2. $2n^2 + 7 = -4n + 5$

3.



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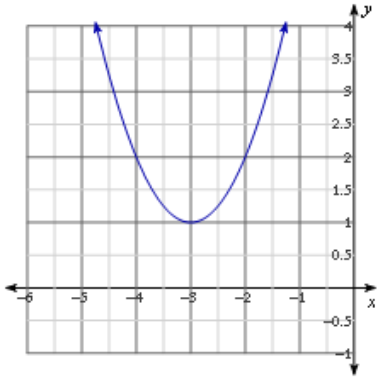

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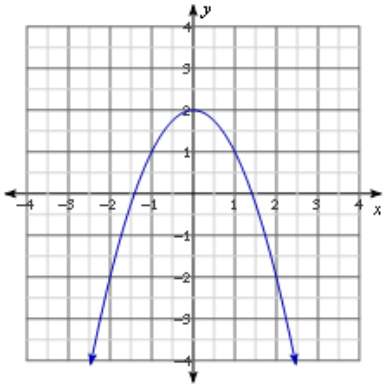

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