

Types of Quadratics Investigation

Given the following quadratic functions, find the zeros:

- $x^2 - 49 = 0$
- $x^2 + 16 = 0$
- $x^2 = 0$

Discuss with your partner the following questions:

- When can you expect 2 solutions in a quadratic equation?
- When can you expect 1 solution in a quadratic equation?
- When can you expect a quadratic to have no solutions?

Recall from the previous lesson, the quadratic formula:

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

This part of the quadratic formula helps us to determine how many solutions a quadratic will have:

$$b^2 - 4ac$$

It is called the **Discriminant**.

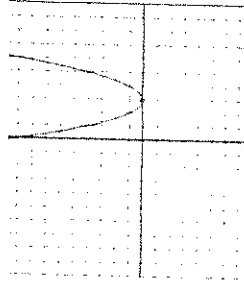
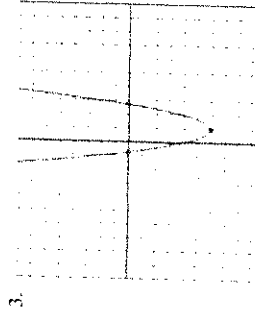
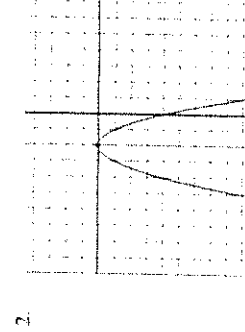
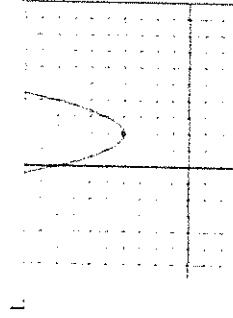
Because the quadratic formula contains a square root, we can determine the number of solutions based on the discriminant.

- If the discriminant is **negative**, how many solutions will the quadratic have?
- If the discriminant is **positive**, how many solutions will the quadratic have?
- If the discriminant is **zero**, how many solutions will the quadratic have?

Given the following quadratics, use the discriminant to determine how many solutions it will have.

- $x^2 - 6x + 11 = 2$
- $3x^2 + 5x = 12$
- $3x^2 + 48 = 0$
- $x^2 - 27 = 0$
- $x^2 + x + 1 = 0$
- $x^2 + 4x - 1 = 0$

Given the following graphs of quadratic functions: a) determine the sign of the discriminant and b) whether the solutions are real or non-real.



Name: _____ Date: _____ Class: _____

The Discriminant Practice

$$b^2 - 4ac$$

Quadratic equation	a	b	c	Discriminant $b^2 - 4ac$	Number of roots	Solutions, if any
1. $x^2 - 4x + 4 = 0$	1	-4	4	$(-4)^2 - 4(1)(4) =$ $16 - 16 = 0$	One, because $b^2 - 4ac = 0$	2
2. $x^2 + 8x - 20 = 0$	2	-3	1	$(-3)^2 - 4(2)(1) =$ $9 - 8 = 1$	Two, because $b^2 - 4ac > 0$	$\frac{1}{2}, 1$
3. $2x^2 - 3x + 1 = 0$						
4. $x^2 - 49 = 0$						
5. $2x^2 - 3x + 7 = 0$						
6. $6x^2 + x - 1 = 0$						
7. $x^2 - 11x + 28 = 0$						
8. $3x^2 + 14x - 5 = 0$						
9. $4x^2 - 17x - 15 = 0$						
10. $x^2 + x = 12$						
11. $100x^2 - 625 = 0$						
12. $x^2 + 35x = 105$						
13. $8x^2 = 56$						
14. $2x^2 + 9x = -4$						
15. $2x^2 = -16x + 42$						
16. $4x^2 - 7x = 2$						
17. $2x^2 = 13x + 7$						
18. $3x^2 - 5x - 2 = 0$						
19. $6x^2 + x = 5$						
20. $x^2 = 5x$						

two Real solutions

What is the discriminant?

no Real solutions

one Real solution

What is the discriminant?

Recall- The Quadratic formula is:

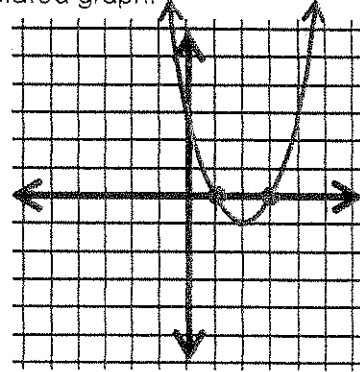
The **discriminant** of the quadratic equation is:

(the part of the equation under the radical sign)

You can determine the number of solutions by evaluating the discriminant.

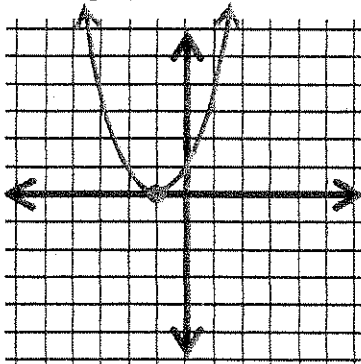
Example 1: $x^2 - 4x + 3 = 0$

Look at the related graph!



Example 2: $x^2 + 2x + 1 = 0$

Look at the related graph!



Example 3: $x^2 - 2x + 2 = 0$

Look at the related graph!

