## Essential Question: What is the discriminant?

**Do Now:** Using the quadratic formula, find the solution(s) to the following equations

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

## How many solutions can a quadratic equation have?

Before solving a quadratic equation, the <u>discriminant</u> can be used to determine the number of real solutions.

The <u>discriminant</u> is the expression under the radical in the quadratic formula.

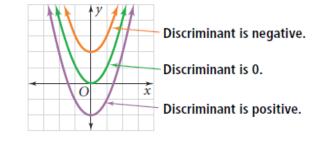
 $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$   $\checkmark$  the discriminant

## To determine the number of solutions:

If b<sup>2</sup> - 4ac > 0, there are \_\_\_\_\_ solutions.

If b<sup>2</sup> - 4ac = 0, there is \_\_\_\_\_\_ solution.

If b<sup>2</sup> - 4ac < 0, there are \_\_\_\_\_\_ solutions.



## To determine the type of solutions:

If b<sup>2</sup> - 4ac is a perfect square, the solutions are \_\_\_\_\_ numbers.

If b<sup>2</sup> - 4ac is not a perfect square, the solutions are \_\_\_\_\_ numbers.

For each quadratic equation below:

- a) Find the value of the discriminant and determine how many solutions the equation has.
- b) Determine if the solution(s) are rational or irrational.

1.  $x^2 - 2x + 4 = 0$ 2.  $-3x^2 + 5x - 1 = 0$ 

3.  $-x^2 - 10x - 25 = 0$ 

4.  $2x^2 + 10x = -12$ 

5.  $3x^2 - 2x = -5$ 

6.  $x^2 + 14 = -9x$