one Real solution

no Real solutions

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wHat is tHe discRiminant?

two Real solutions

What is the Discriminant?

Recall- The **Quadratic Formula** is:

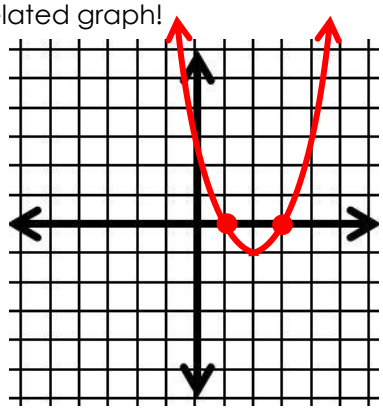
The **discriminant** of the quadratic equation is:

(the part of the equation under the radical sign)

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

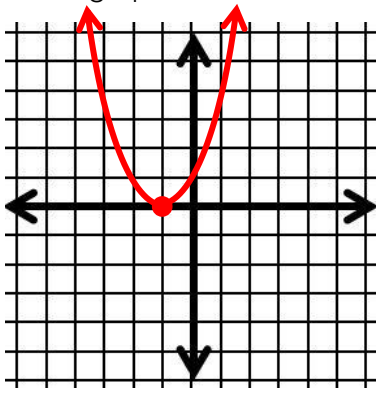
Example 1: $x^2 - 4x + 3 = 0$

Look at the related graph!



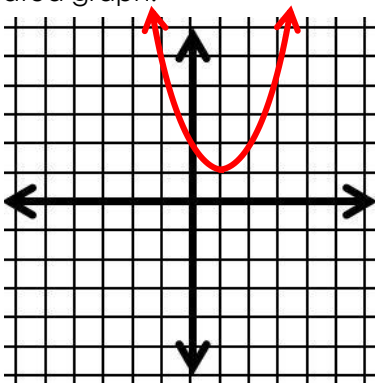
Example 2: $x^2 + 2x + 1 = 0$

Look at the related graph!



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

Look at the related graph!



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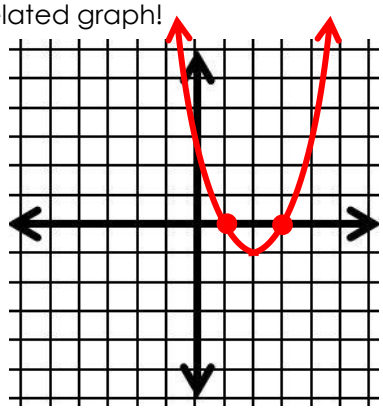
Example 1: $x^2 - 4x + 3 = 0$

$$b^2 - 4ac$$
$$= (-4)^2 - 4(1)(3)$$
$$= 16 - 12$$
$$= 4$$

If the discriminant is **positive, there are **two solutions**.

Look at the related graph!

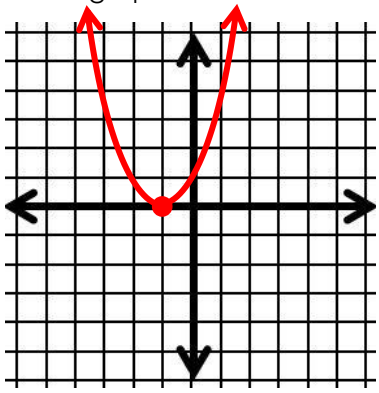


Example 2: $x^2 + 2x + 1 = 0$

$$b^2 - 4ac$$
$$= (2)^2 - 4(1)(1)$$
$$= 4 - 4$$
$$= 0$$

If the discriminant is **zero, there is **one solution**.

Look at the related graph!

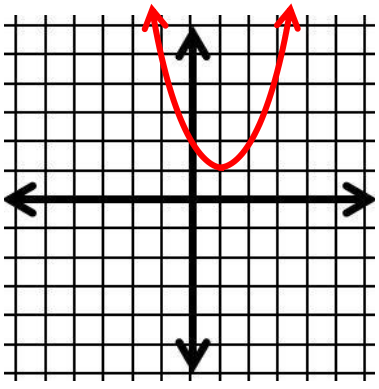


Example 3: $x^2 - 2x + 2 = 0$

$$b^2 - 4ac$$
$$= (-2)^2 - 4(1)(2)$$
$$= 4 - 8$$
$$= -4$$

If the discriminant is **negative, there are **no solutions**.

Look at the related graph!



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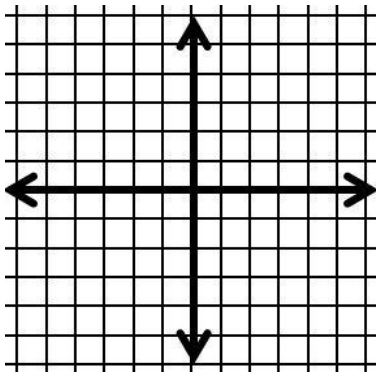

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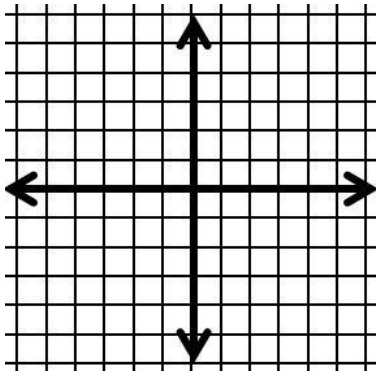

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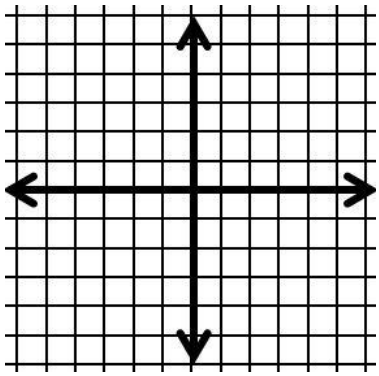

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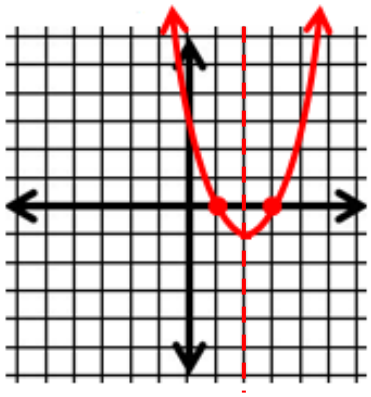
If the discriminant is **positive, there are **two solutions**.

$\frac{-b}{2a} = \frac{4}{2(1)} = 2$

$2^2 - 4(2) + 3 = -1$

x	y
0	3
1	0
2	-1
3	0
4	3



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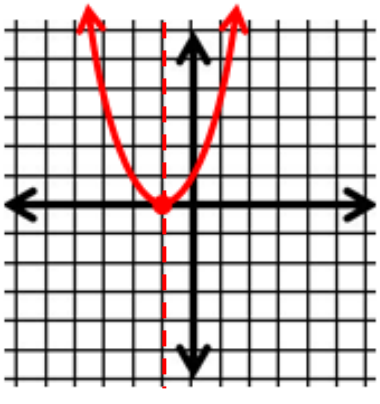
$$b^2 - 4ac$$
$$= (2)^2 - 4(1)(1)$$
$$= 4 - 4$$
$$= 0$$

If the discriminant is **zero, there is **one solution**.

$\frac{-b}{2a} = \frac{-2}{2(1)} = -1$

$(-1)^2 - 2(-1) + 1 = 0$

x	y
-3	4
-2	1
-1	0
0	1
1	4



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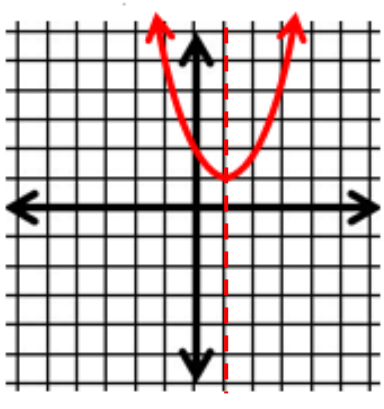
$\frac{-b}{2a} = \frac{2}{2(1)} = 1$

$1^2 - 2(1) + 2 = 1$

x	y
-1	5
0	2
1	1
2	2
3	5



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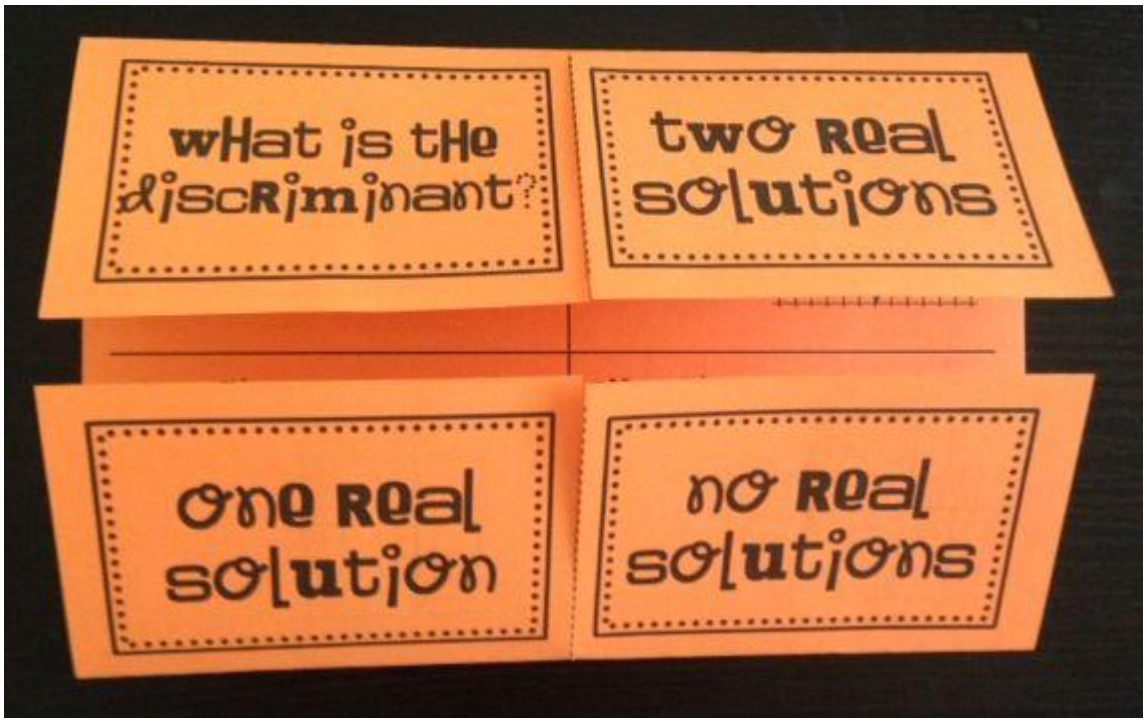
Directions:

Print pages 1&2 so that the text is facing in opposite directions (my printer has the option to print front to back & flip pages on the short edge).
Fold the top and bottom in to the solid line at the center. Cut along the dotted lines to create the four tabs.

(I have included two different options. The first option focuses on the discriminant with the graph given so that students can see the connection to previously taught material. The second option allows students to review graphing the quadratic as well.

The final product should look like this: