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

Examples of applying the quadrtatic formula

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

a b c

$a=4$
$b=3$
$c=-5$

$$x = \frac{-3 \pm \sqrt{3^2-4(4)(-5)}}{2(4)}$$

$$\sqrt{9+80}$$

$$x = \frac{-3 \pm \sqrt{89}}{8}$$

$x = 0.8$
$x = -1.55$

$$x = \frac{-3 \pm 9.4}{8}$$

Branch off

$$x = \frac{-3+9.4}{8} \rightarrow \frac{6.4}{8} = 0.8$$

$$x = \frac{-3-9.4}{8}$$

$$x = \frac{-12.4}{8}$$

How to use the quadratic formula to solve a quadratic equation

1. *Make equation = 0 using addition/subtraction.*
2. *Identify a, b, and c.*
3. *Substitute a, b, and c into quadratic formula.*
4. *Simplify expression under radical.*
5. *Simplify radical/evaluate radical.*
6. *Once numerator is simplified, solve for all solutions.*

2. $2x^2 - 8x = -3$

$+3 \quad +3$

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

$a=2$
$b=-8$
$c=3$

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

$$x = \frac{-(-8) \pm \sqrt{(-8)^2-4(2)(3)}}{2(2)}$$

$$\sqrt{64-24}$$

$$x = \frac{8 \pm \sqrt{40}}{4}$$

$$x = \frac{8 \pm 6.3}{4}$$

$$x = \frac{8-6.3}{4}$$

$x \approx 0.4$

$$x = \frac{8+6.3}{4}$$

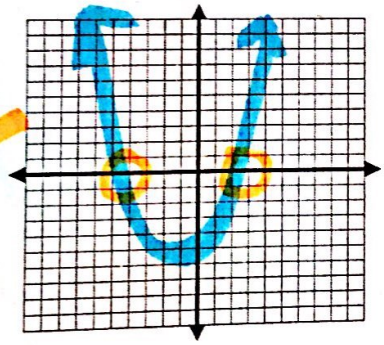
$x \approx 3.5$

Part 2:

What shape does a quadratic equation take when graphed? parabola

If this graph was to slide around the coordinate plane, how many times could it possibly cross the x-axis?

2



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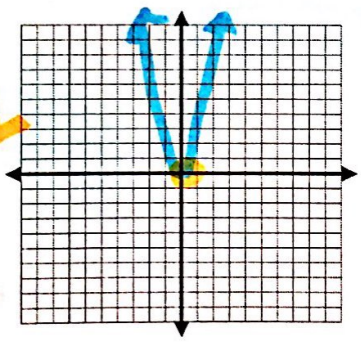

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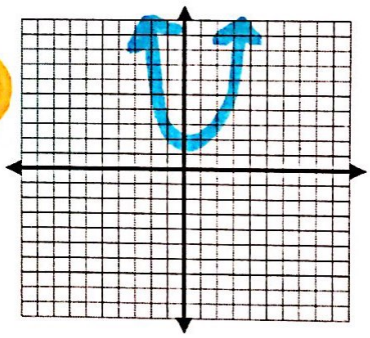


What do you ***have*** to do when solving a quadratic equation (by factoring or by the formula)?

Keeping this in mind, where do you think the solutions are on a graph?

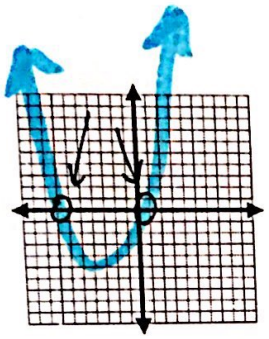
Solve = Roots = X-intercepts

Discriminant or B^2-4AC is the part of the quadratic equation that leads to how many solutions the quadratic equation has.

If all you need to know is **how *many*** solutions a quadratic equation has, just use....

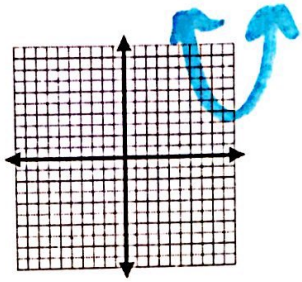
If B^2-4AC = $+$,....

THERE ARE 2 REAL SOLUTIONS



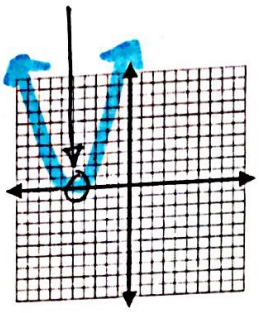
If B^2-4AC = $-$,....

THERE ARE NO REAL SOLUTIONS



If B^2-4AC = 0,....

THERE IS ONE REAL SOLUTION



B^2-4AC

How many real solutions does the equation have?

$4x^2 + 12x + 9 = 0$

$a=4$, $b=12$, $c=9$

B^2-4AC

$12^2-4(4)(9)$

$144-144$

0

Since the discriminant $=0$, there is one real solution

$5x = 2x^2 + 20$

$-5x \quad -5x$

$0 = 2x^2 - 5x + 20$

$a=2$, $b=-5$, $c=20$

B^2-4AC

$(-5^2)-4(2)(20)$

$25-160$

Negative: no real solutions

$0 = 2x^2 + 15x - 28$

$a=2$, $b=15$, $c=-28$

B^2-4AC

$15^2-4(2)(-28)$

$225+224$

Positive

2 real solutions

Exit ticket: Imagine you were given a quadratic equation. List the order in which you would try to solve the equation.