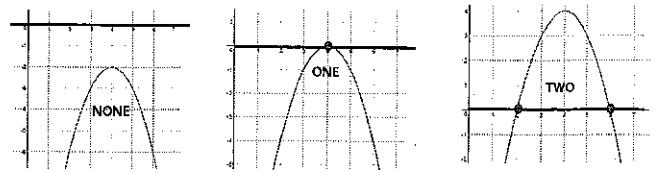


THE QUADRATIC FORMULA

~ Solutions to quadratic equations are called zeros

~ We can find zeros from a graph by looking at where the parabola crosses the x axis

~ You can have **no real solutions**, **One real solution** or **No real solutions**



~ The **discriminant** is a formula that tells you how many a solutions a quadratic equation will have without a graph

$$b^2 - 4ac$$

If the answer is **negative**: **NO** real solutions

If the answer is **positive**: **TWO** real solutions

If the answer is **zero**: **ONE** real solution

How many zeros (or solutions) will the following quadratic equation have?

1) $f(x) = x^2 + 3x - 40$

$a=1$

$b=3$

$c=-40$

$$3^2 - 4(1)(-40)$$

$$169$$

TWO REAL SOLUTIONS

How many zeros (or solutions) will the following quadratic equation have?

2) $f(x) = 2x^2 - 6x + 13$

$a=2$

$b=-6$

$c=13$

$$(-6)^2 - 4(2)(13)$$

$$-68$$

NO REAL SOLUTIONS

How many zeros (or solutions) will the following quadratic equation have?

3) $f(x) = 25x^2 - 20x + 4$

$a=25$

$b=-20$

$c=4$

$$(-20)^2 - 4(25)(4)$$

$$0$$

ONE REAL SOLUTION

~The quadratic formula can find the ACTUAL zeros(solutions) of a quadratic function

~Useful when there is no graph to look at or if the answers are not whole numbers

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

~Your original equation MUST be in standard form $ax^2 + bx + c = 0$

Find the solutions of the following equation **DISCRIMINANT**

4) $x^2 + 3x - 40 = 0$

$a = 1$

$b = 3$

$c = -40$

$$\frac{-3 \pm \sqrt{(3)^2 - 4(1)(-40)}}{2(1)} \leftarrow \text{DO INSIDE FIRST}$$

$$\frac{-3 \pm \sqrt{169}}{2}$$

$$\frac{-3 \pm 13}{2} \rightarrow \frac{-3+13}{2} = 5$$

$$\frac{-3 \pm 13}{2} \rightarrow \frac{-3-13}{2} = -8$$

SPLIT INTO 2 EQUATIONS

Find the solutions of the following equation

5) $25x^2 - 20x + 4 = 0$

$a = 25$

$b = -20$

$c = 4$

$$\frac{20 \pm \sqrt{(-20)^2 - 4(25)(4)}}{2(25)}$$

$$\frac{20 \pm \sqrt{0}}{50}$$

$$\frac{20}{50} = \left(\frac{2}{5}\right) \text{ ONLY 1 SOLUTION}$$

SINCE THE DISCRIMINANT IS ZERO

Find the solutions of the following equation

6) $-x^2 + 30x - 6 = 0$

$a = -1$

$b = 30$

$c = -6$

$$\frac{30 \pm \sqrt{(30)^2 - 4(-1)(-6)}}{2(-1)}$$

$$\frac{30 \pm \sqrt{876}}{-2}$$

$$\frac{30 \pm 2\sqrt{219}}{-2}$$

$$15 \pm \sqrt{219}$$

SIMPLY THE RADICAL

SIMPLY BY DIVIDING -2 INTO THE NUMERATOR

$$\left(\begin{array}{l} 15 + \sqrt{219} \\ 15 - \sqrt{219} \end{array} \right)$$

Find the solutions of the following equation

7) $2x^2 - 30 = 7x$ ← MOVE SO IT IS IN STANDARD FORM

$$2x^2 - 7x - 30 = 0$$

$a = 2$

$b = -7$

$c = -30$

$$\frac{7 \pm \sqrt{(-7)^2 - 4(2)(-30)}}{2(2)} = \frac{7 \pm \sqrt{289}}{4}$$

$$\left(\frac{6}{1} \right) = \frac{7+7}{4} \leftarrow \frac{7 \pm 17}{4}$$

$$\left(\frac{-5}{2} \right) = \frac{7-17}{4}$$

8) $-4x^2 = 36$

$$-4x^2 - 36 = 0$$

$a = -4$

$b = 0$

$c = -36$

$$\frac{0 \pm \sqrt{0^2 - 4(-4)(-36)}}{2(-4)} = \frac{0 \pm \sqrt{-576}}{-8}$$

CANNOT HAVE A NEGATIVE DISCRIMINANT

NO SOLUTIONS!