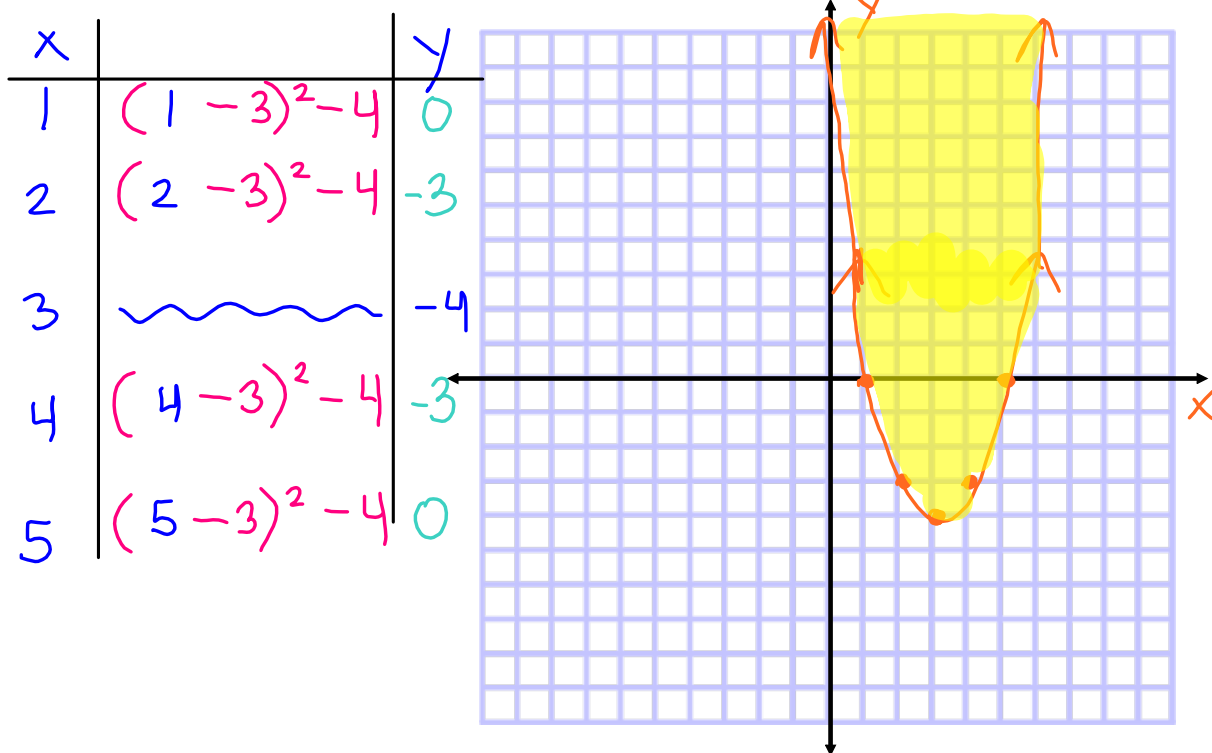


5.8 GRAPHING & SOLVING QUADRATIC INEQUALITIES

Example 1

solid/shade above vertex

Graph the solution to $y \geq (x - 3)^2 - 4$. *vertex (3, -4)*

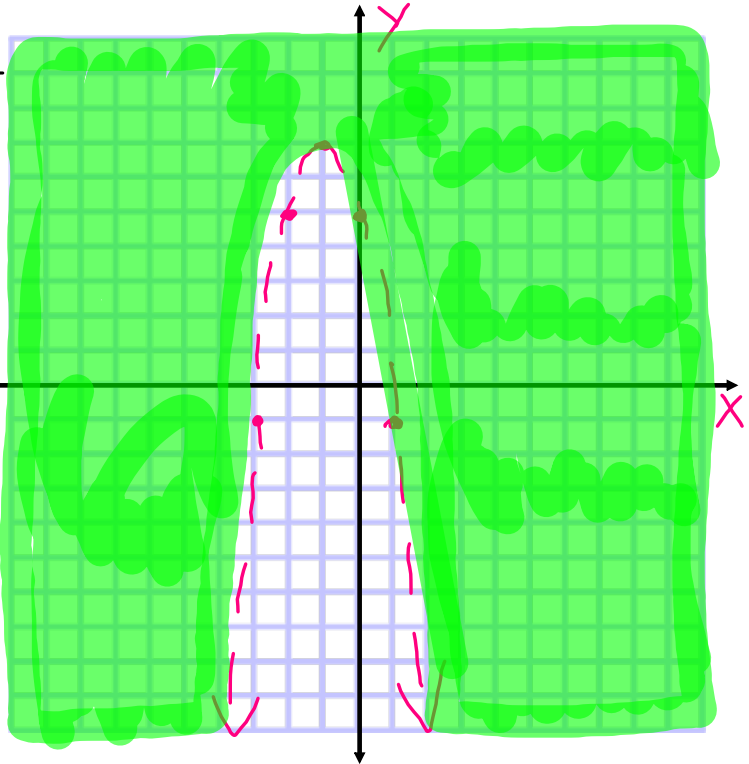


Example 2

dotted/shade above vertex

Graph the solution to $y > -2(x + 1)^2 + 7$. vertex $(-1, 7)$

x		y
-3	$-2(-3+1)^2+7$	-1
-2	$-2(-2+1)^2+7$	5
-1	~~~~~	7
0	$-2(0+1)^2+7$	5
1	$-2(1+1)^2+7$	-1



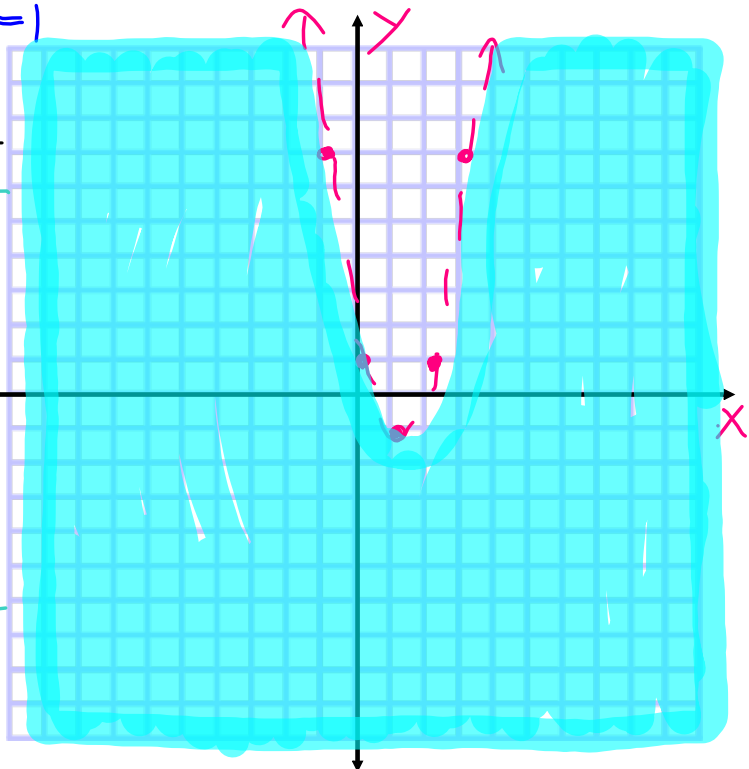
Example 3

dotted/shade below vertex

Graph the solution to $y < 2x^2 - 4x + 1$.

$$x = \frac{-b}{2a} = \frac{4}{2 \cdot 2} = \frac{4}{4} = 1$$

x		y
-1	$2(-1)^2 - 4(-1) + 1$	7
0	$2(0)^2 - 4(0) + 1$	1
1	$2(1)^2 - 4(1) + 1$	-1
2	$2(2)^2 - 4(2) + 1$	1
3	$2(3)^2 - 4(3) + 1$	7

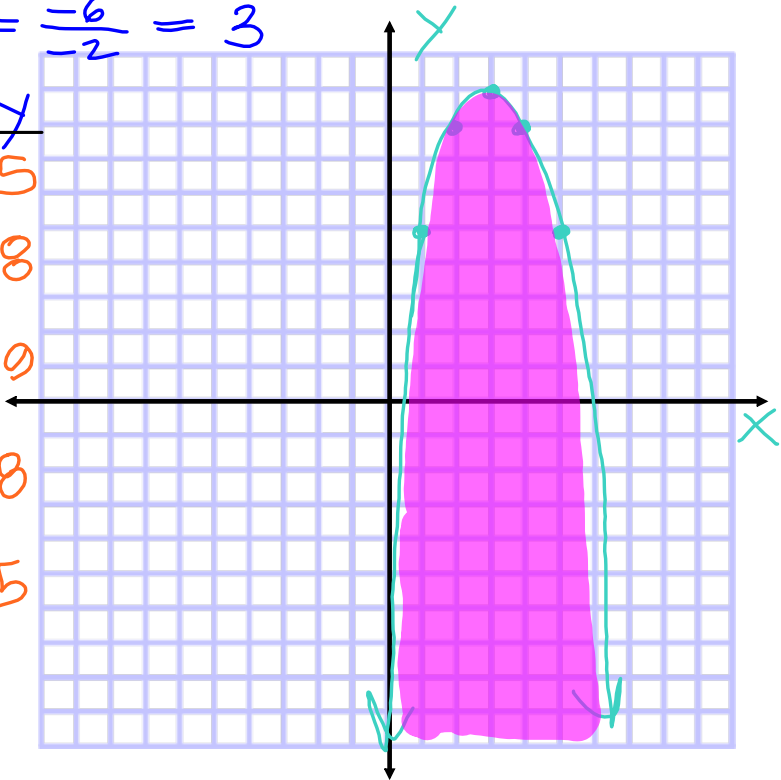


Example 4

Graph the solution to $y \leq -x^2 + 6x$.

$$x = \frac{-b}{2a} = \frac{-6}{2(-1)} = \frac{-6}{-2} = 3$$

x	y
1	$-(1)^2 + 6(1) = -1 + 6 = 5$
2	$-(2)^2 + 6(2) = -4 + 12 = 8$
3	$-(3)^2 + 6(3) = -9 + 18 = 9$
4	$-(4)^2 + 6(4) = -16 + 24 = 8$
5	$-(5)^2 + 6(5) = -25 + 30 = 5$



When **SOLVING** a quadratic inequality, you must solve as if set equal to zero and then do a **number line test** to find the solutions.

Example 5

Solve the inequality $x^2 - 2x - 15 \geq 0$ and graph the solution on a number line.

$(x+3)(x-5) \geq 0$
 $x+3=0 \quad x-5=0$
 $x=-3 \quad x=5$

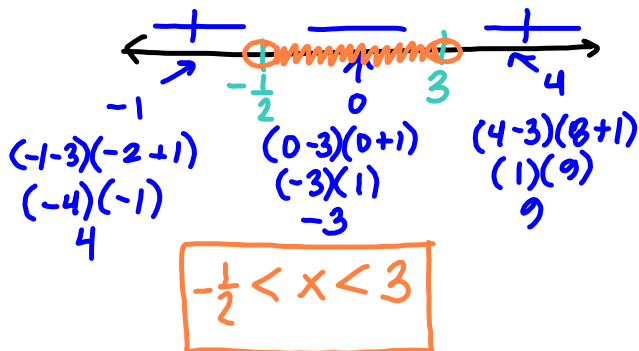
sum -2 product -15
 positive 3 -5
 1 1

$(-4+3)(-4-5) = (-1)(-9) = 9$
 $(0+3)(0-5) = (3)(-5) = -15$
 $(6+3)(6-5) = (9)(1) = 9$

$x \leq -3$ or $x \geq 5$

Example 6

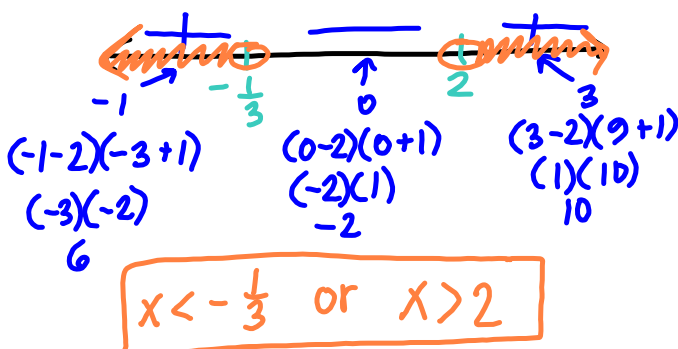
Solve the inequality $2x^2 - 5x - 3 < 0$ and graph the solution on a number line.



sum -5 product -6
 $\frac{-3}{1}$ $\frac{-6}{2}$ $\frac{1}{2}$ negative
 $(x-3)(2x+1) < 0$
 $x-3=0$ $2x+1=0$
 $x=3$ $x=-\frac{1}{2}$

Example 8

Solve the inequality $3x^2 - x > 4x + 2$ and graph the solution on a number line.



$3x^2 - x > 4x + 2$
 $3x^2 - 5x - 2 > 0$

sum -5 product -6
 $\frac{-2}{1}$ $\frac{-6}{3}$ $\frac{1}{3}$ positive
 $(x-2)(3x+1) > 0$
 $x-2=0$ $3x+1=0$
 $x=2$ $x=-\frac{1}{3}$