

NOTES: Section 9.8 – Graphing Quadratic Inequalities

Goals: #1 - I can graph a quadratic inequality in two variables.

Homework: Section 9.8 Worksheet



$$b^2 - 4ac$$

Warm Up: Find the value of the discriminant. Then use the value to determine whether the equation has *two solutions*, *one solution*, or *no real solution*.

1. $x^2 + 3 = 0$
 $(0)^2 - 4(1)(3)$
 $0 - 12$
 -12
 no real solution

2. $x^2 - 6x + 13 = 0$
 $(-6)^2 - 4(1)(13)$
 $36 - 52$
 -16
 no real solution

3. $x^2 - 2x + 1 = 0$
 $(-2)^2 - 4(1)(1)$
 $4 - 4$
 0
 one solution

Exploration #1: Work with a partner. Answer the following questions.

1. Which of the following ordered pairs are solutions of $y \geq x^2 - 3x - 3$?

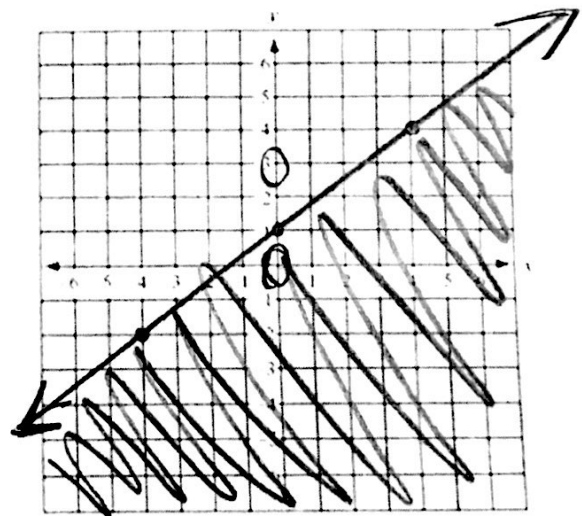
a. (1, 4)	b. (3, 2)	c. (4, -3)	d. (0, -3)
$4 \geq (1)^2 - 3(1) - 3$	$2 \geq (3)^2 - 3(3) - 3$	$-3 \geq (4)^2 - 3(4) - 3$	$-3 \geq (0)^2 - 3(0) - 3$
$4 \geq 1 - 3 - 3$	$2 \geq 9 - 9 - 3$	$-3 \geq 16 - 12 - 3$	$-3 \geq -3 \checkmark$
$4 \geq -5 \checkmark$	$2 \geq -3 \checkmark$	$-3 \geq 1$	

Exploration #2: Graph the following linear inequality.

1. $y \leq \frac{3}{4}x + 1$

Test:

$0 \leq \frac{3}{4}(0) + 1$	$3 \leq \frac{3}{4}(0) + 1$
$0 \leq 1 \checkmark$	$3 \leq 1$



Name: _____ Hour: _____ Date: _____

Notes:

To graph quadratic inequalities, we need to first graph the function.

We use a solid line for \leq, \geq and a dashed line for $<, >$.

Then, we test points not on the line to determine where to shade.

Example #1: Graph the following quadratic inequalities.

1. $y < 2x^2 - 3x$ ^{dashed}

$$y = 2x^2 - 3x$$

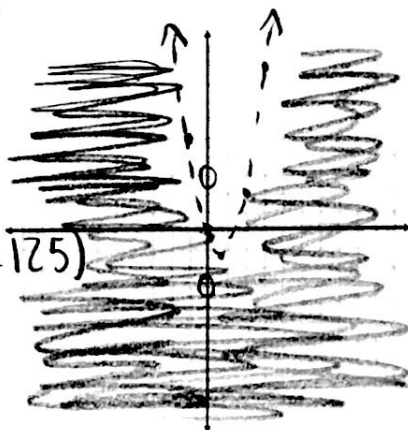
$$x = \frac{-(-3)}{2(2)} = \frac{3}{4}$$

AOS: $x = 0.75$

vertex: $(0.75, -1.125)$

y-int: $(0, 0)$

opens: Up



x	-1	0	0.75	2	3
y	5	0	-1.125	2	9

Test:

$(0, 3)$

$(0, -3)$

$$3 < 2(0)^2 - 3(0)$$

$$-3 < 2(0)^2 - 3(0)$$

$$3 < 0 - 0$$

$$-3 < 0 - 0$$

$$3 < 0 \times$$

$$-3 < 0 \checkmark$$

2. $y \leq -x^2 - 5x + 4$ ^{solid}

$$y = -x^2 - 5x + 4$$

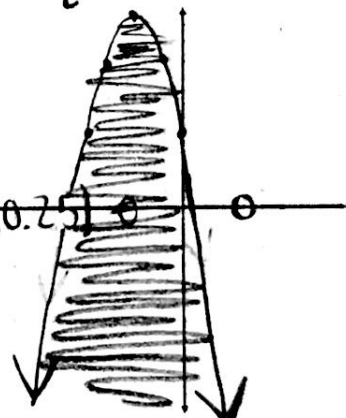
$$x = \frac{-(-5)}{2(-1)} = \frac{5}{-2} = -2.5$$

AOS: $x = -2.5$

vertex: $(-2.5, 10.25)$

y-int: $(0, 4)$

opens: down



x	-5	-4	-2.5	-1	0
y	4	8	10.25	8	4

Test:

$(-3, 0)$

$(3, 0)$

$$0 \leq -(-3)^2 - 5(-3) + 4$$

$$0 \leq -9 + 15 + 4$$

$$0 \leq 10 \checkmark$$

$$0 \leq -(3)^2 - 5(3) + 4$$

$$0 \leq -9 - 15 + 4$$

$$0 < -20 \times$$

You practice: Graph the following quadratic inequalities.

1. $y < -x^2 - 2x + 3$ ^{dashed}

$$y = -x^2 - 2x + 3$$

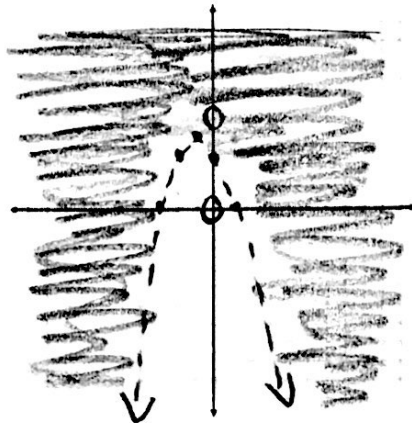
$$x = \frac{-(-2)}{2(-1)} = \frac{2}{-2} = -1$$

AOS: $x = -1$

vertex: $(-1, 4)$

y-int: $(0, 3)$

opens: down



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

Test:

$(0, 0)$

$$0 > -(0)^2 - 2(0) + 3$$

$$0 > 3 \times$$

$(0, 5)$

$$5 > -(0)^2 - 2(0) + 3$$

$$5 > 3 \checkmark$$

2. $y \geq 2x^2 - 4x + 2$ ^{solid}

$$y = 2x^2 - 4x + 2$$

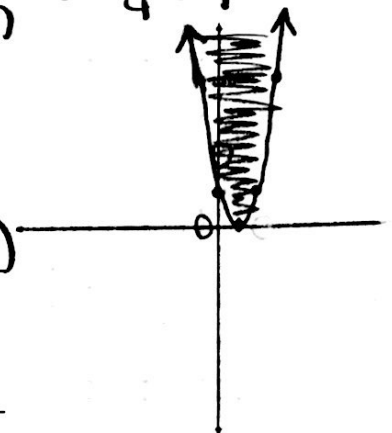
$$x = \frac{-(-4)}{2(2)} = \frac{4}{4} = 1$$

AOS: $x = 1$

vertex: $(1, 0)$

y-int: $(0, 2)$

opens: up



x	-1	0	1	2	3
y	8	2	0	2	8

Test:

$(-1, 0)$

$$0 \geq 2(-1)^2 - 4(-1) + 2$$

$$0 \geq 2 + 4 + 2$$

$$0 \geq 8 \times$$

$(0, 4)$

$$4 \geq 2(0)^2 - 4(0) + 2$$

$$4 \geq 0 - 0 + 2$$

$$4 \geq 2 \checkmark$$