Name: KEY Hour: _____ Date: _____

NOTES: Section 2.8 – Graph Linear Inequalities in Two Variables

Goals: #1 – I can graph linear inequalities in one and two variables.

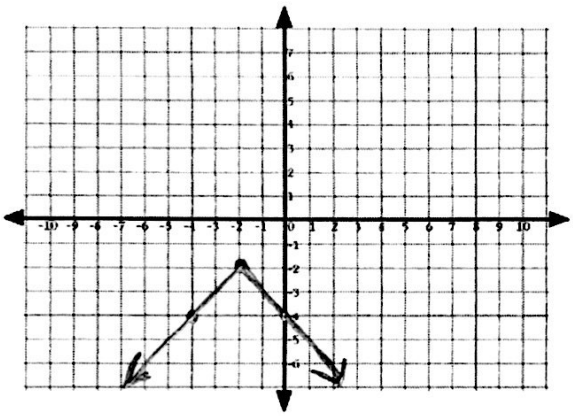
#2 – I can graph absolute value inequalities.



Homework: Lesson 2.8 Worksheet

Warm Up:

1. Graph $y = -|x + 2| - 2$ and compare it with the graph of $y = |x|$



vertex: $(-2, -2)$

Comparisons:

- Reflection in the x-axis.
- Translation left 2 units.
- Translation down 2 units.

x	y
0	-4
-2	-2
-4	-4

2. What is the vertex of $y = \frac{1}{4}|x - 4| + 3$

↑ ↑

$(4, 3)$

Exploration #1: Work with a partner.

1. Which of the following ordered pairs are solutions of $3x + 4y > 8$?

a. $(6, -3)$

$3(6) + 4(-3) \stackrel{?}{>} 8$

$18 - 12 \stackrel{?}{>} 8$

$6 \not> 8$

NO

b. $(-2, -1)$

$3(-2) + 4(-1) \stackrel{?}{>} 8$

$-6 - 4 \stackrel{?}{>} 8$

$-10 \not> 8$

NO

c. $(3, 2)$

$3(3) + 4(2) \stackrel{?}{>} 8$

$9 + 8 > 8$

$17 > 8$

Yes

d. $(0, 2)$

$3(0) + 4(2) \stackrel{?}{>} 8$

$0 + 8 \stackrel{?}{>} 8$

$8 \not> 8$

NO

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CHALLENGE: How would we represent this on a graph?

2. $y \leq -3$

Test:

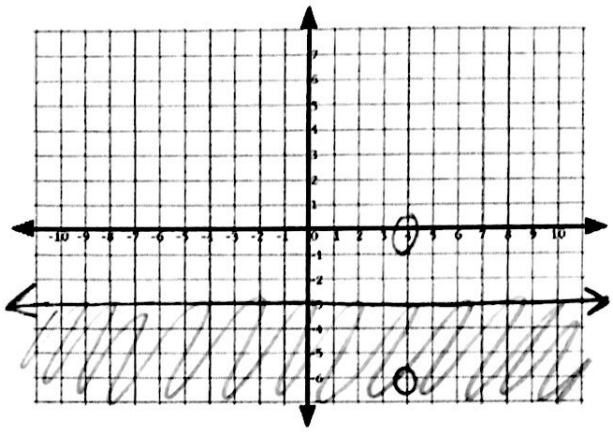
x	y
4	0
NO	
4	-6
YES	

$0 \overset{?}{\leq} -3$

$-6 \overset{?}{\leq} -3$

what about $y = -3$?

Also need to represent $y < -3$



Example #2: Graph $y > -2x$

Test:

x	y
3	0
YES	
-3	0
NO	

$0 \overset{?}{>} -2(3)$

$0 > -6$ ✓

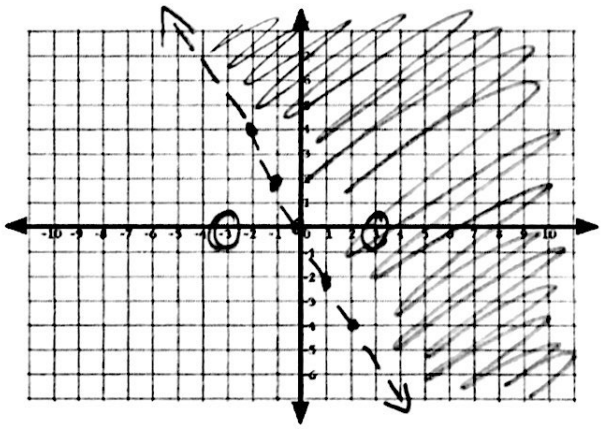
$0 \overset{?}{>} -2(-3)$

$0 \not> 6$

$y = -2x$

y-int: 0

slope: -2



Notes:

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

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

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

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Example #3: Graph $5x - 2y \leq -4$

Test:

x	y
-4	0
Yes	
6	0
NO	

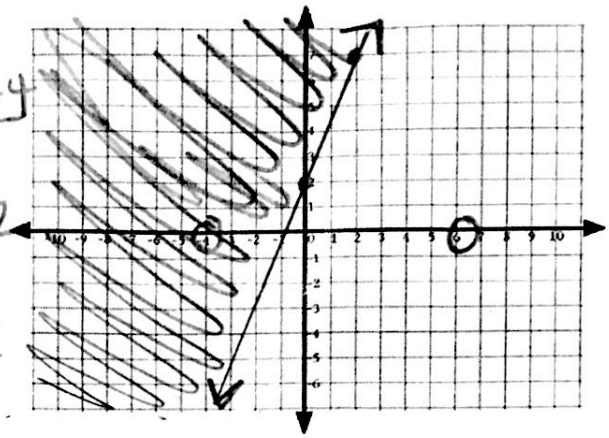
$5(-4) - 2(0) \stackrel{?}{\leq} -4$
$-20 - 0 \leq -4$
$-20 \leq -4$ ✓

$5(6) - 2(0) \stackrel{?}{\leq} -4$
$30 - 0 \leq -4$
$30 \not\leq -4$

① $5x - 2y \leq -4$
$-5x \quad -5x$
$\frac{-2y}{-2} \leq \frac{-5x-4}{-2}$
$y \geq \frac{5}{2}x + 2$
y-int: 2
slope: $\frac{5}{2}$

② $\geq \rightarrow$ solid

③ shade?



Example #4: Graph $y > -2|x - 3| + 4$.

Test:

x	y
3	0
NO	
3	7
Yes	

$0 \stackrel{?}{>} -2|3-3| + 4$
$0 > -2(0) + 4$
$0 \not> 4$

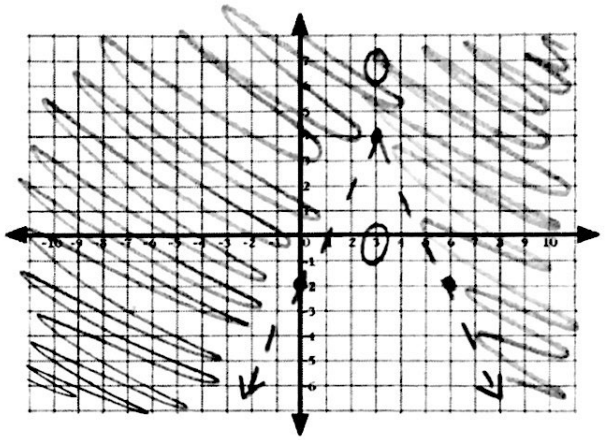
$7 > -2|3-3| + 4$
$7 > -2(0) + 4$
$7 > 4$ ✓

① $y > -2|x-3| + 4$
vertex: (3, 4)

x	y
0	-2
3	4
6	-2

② $> \rightarrow$ dashed

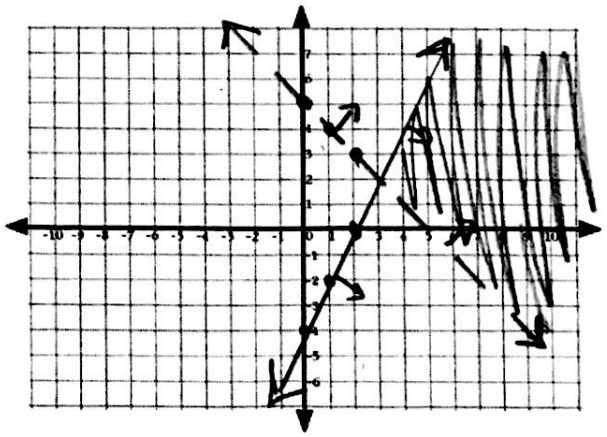
③ shade?



CHALLENGE: Graph the solution to the system of inequalities: $\begin{cases} x + y > 5 \\ 2x - y \leq 4 \end{cases}$

$x + y > 5$
$-x \quad -x$
$y > -x + 5$

$2x - y \leq 4$
$-2x \quad -2x$
$-y \leq -2x + 4$
$y \geq 2x - 4$



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Example #5: A film class is recording a DVD of student-made short films. Each student group is allotted up to 300 megabytes (MB) of video space. The films are encoded on the DVD at two different rates: a standard rate of 0.4 MB/sec for normal scenes and a high-quality rate of 1.2 MB/sec for complex scenes.

a. Write an inequality describing the possible amounts of time available for standard and high-quality video.

Standard Rate → 0.4 · Standard time → x + High-Quality rate → 1.2 · High-Quality time → y ≤ 300 (total space)

$$0.4x + 1.2y \leq 300$$

b. Graph the inequality.

x-int:

$0.4x + 1.2(0) = 300$

$0.4x = 300$

$x = 750$

y-int:

$0.4(0) + 1.2y = 300$

$1.2y = 300$

$y = 250$

Test point: (0,0)

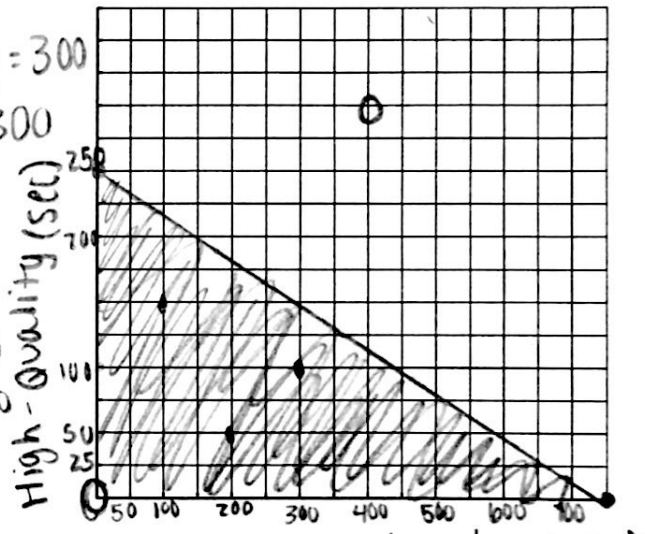
$0.4(0) + 1.2(0) \leq 300$

$0 \leq 300$ ✓

(400, 300)

$.4(400) + 1.2(300) \leq 300$

$520 \not\leq 300$



c. Identify three possible solutions of the inequality.

(100, 150) (200, 50) (300, 100)