

Name: Key

### Lesson 6.5 – Graphing Inequalities

#### Symbols

$<$ less than	$>$ greater than	$\leq$ less than or equal to	$\geq$ greater than or equal to
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#### Examples

- 1)  $x+3 \leq 5$   
 $x \leq 2$
- 2)  $-2x \geq 8$   
 $x \leq -4$
- 3)  $1 > \frac{1}{3}x$   
 $3 > x$   
 $x < 3$
- 4)  $-3(x+1) > 9$   
 $x+1 < -3$   
 $x < -4$

#### RULES

- 1) When you multiply or divide both sides by a negative, you MUST flip inequality
- 2) For  $<$  OR  $>$ , you must use an open dot
- 3) For  $\leq$  OR  $\geq$ , you must use a closed dot
- 4) An inequality can have No solutions or  $\infty$  solutions

when is  
 $x+1 > x+3$

when is  
 $x+3 > x+1$

**Assignment:**

1)  $x+1 \leq 2$   
 $x \leq 1$

2)  $-3x \geq -6$   
 $x \leq 2$

3)  $\frac{1}{3}x > 4$   
 $x > 12$

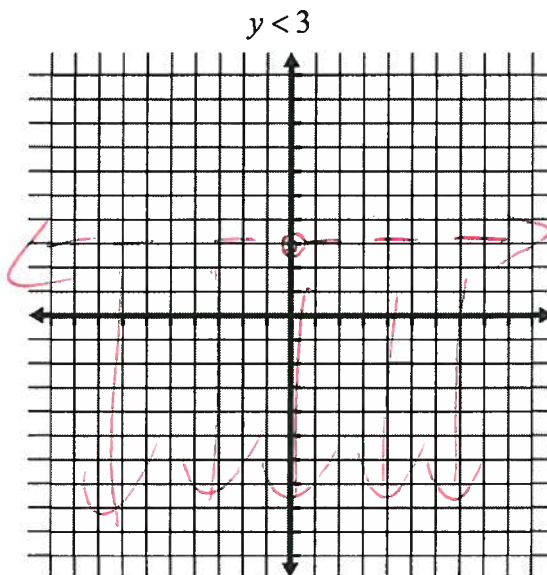
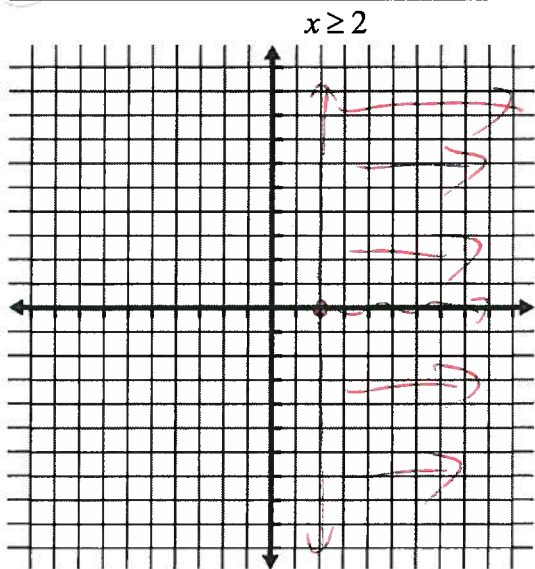
4)  $-2(x+3) < 6$   
 $x+3 > -3$   
 $x > -6$

5)  $y-9 \leq -2y$   
 $+2y \quad +2y$   
 $3y \leq 9$   
 $y \leq 3$

6)  $-n+2 \geq 2n+11$   
 $-3n \geq 9$   
 $n \leq -3$

7)  $x-3x > -2x-7$   
 $-2x > -2x-7$   
 $0 > -7$   
 Always true

**GRAPHING IN TWO DIMENSIONS**



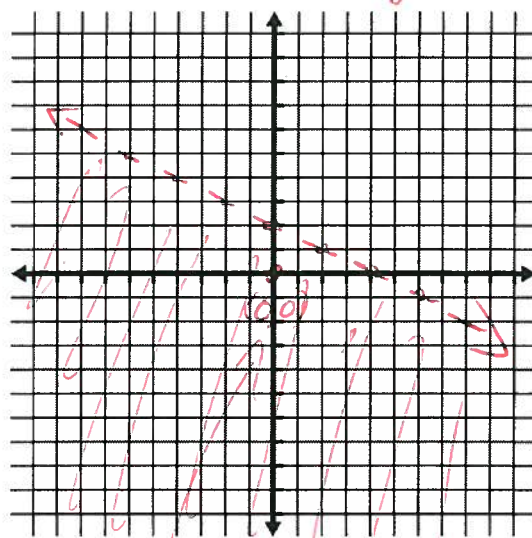
**Graphing Linear Inequalities**

STEP #1 *solve for y*

Example: Graph  $x + 2y < 4$

$2y < -x + 4$   
 $y < -\frac{1}{2}x + 2$

STEP #2 *dotted or solid*



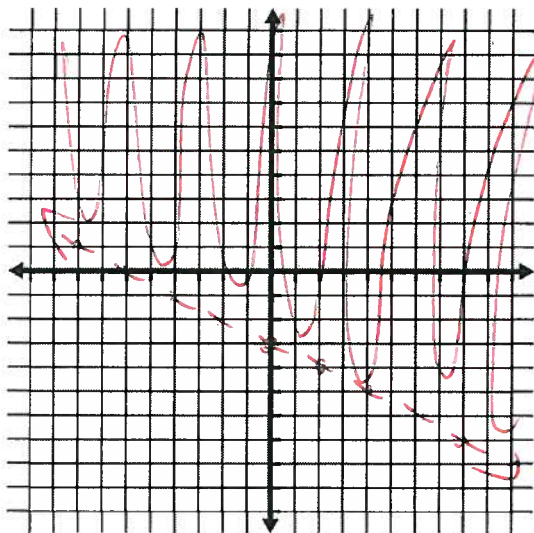
STEP #3 *test point*  
 $(0) + 2(0) < 4$  ?  
 $0 < 4$  ✓

STEP #4 *shading*

*test point*

**Assignment:**

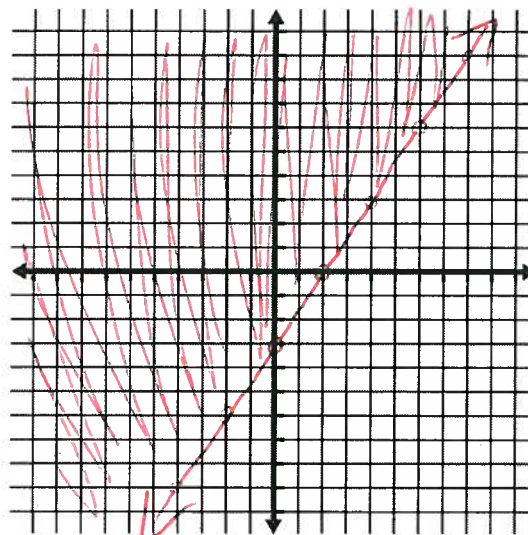
1)  $y > -\frac{1}{2}x - 3$



2)  $3x - 2y \leq 6$

$-2y \leq -3x + 6$

$y \geq \frac{3}{2}x - 3$

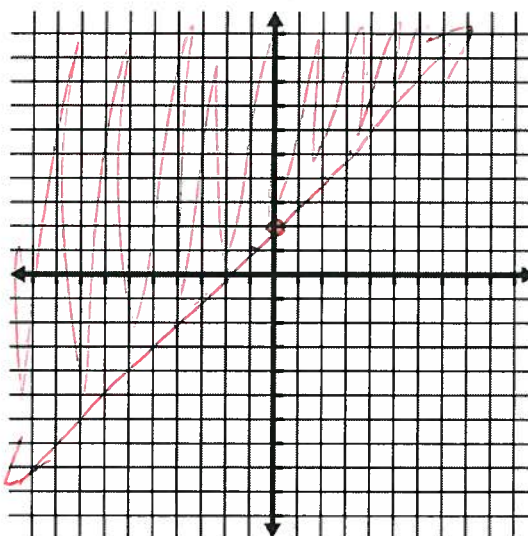


3)  $-3(x - y) \geq 6$

$x - y \leq -2$

$-y \leq -x - 2$

$y \geq x + 2$



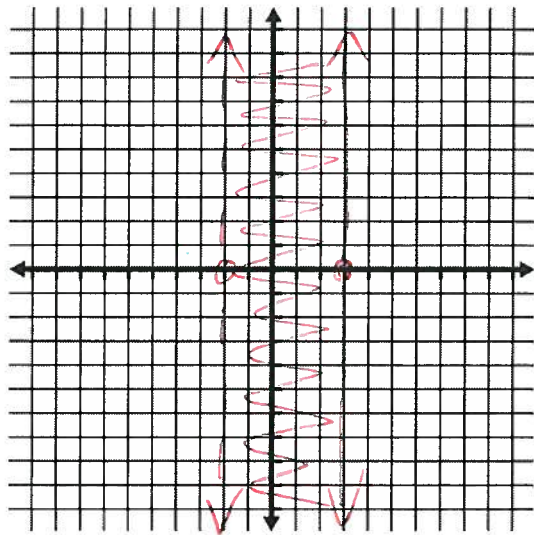
**System of Inequalities**

Symbols:  $0 < x < 2$   $x$  is between 0 and 2  
 $0 > x > 2$   $x$  is outside of 0 and 2

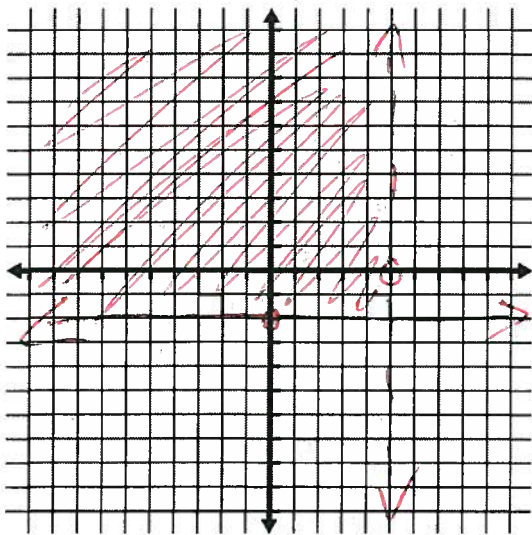
**SYSTEMS OF INEQUALITIES**

In a system of inequalities, you are trying to figure out where All are true

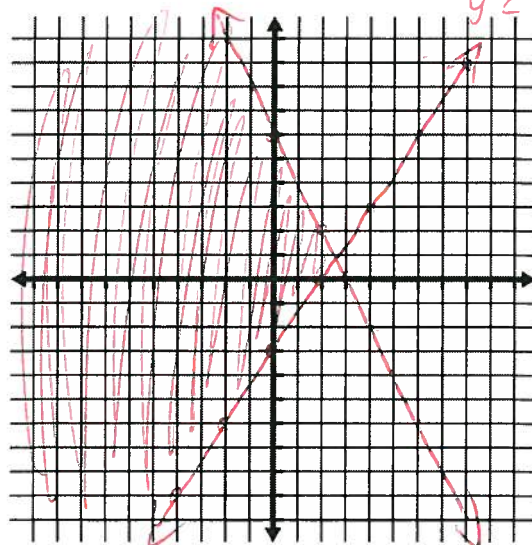
Example #1:  $-2 < x \leq 3$



Example #2:  $x < 5$   
 $y \geq -2$



Example #3:  $2x + y \leq 6$   $y \leq -2x + 6$   
 $3x - 2y \leq 6$   $-2y \leq -3x + 6$   
 $y \geq \frac{3}{2}x - 3$

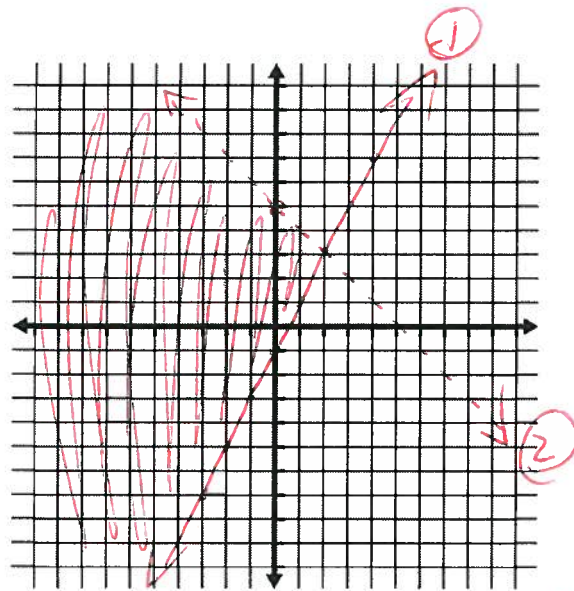


Testpoint  
 $2(0) + (0) \leq 6$  ✓  
 $3(0) - 2(0) \leq 6$  ✓



**Assignment:**

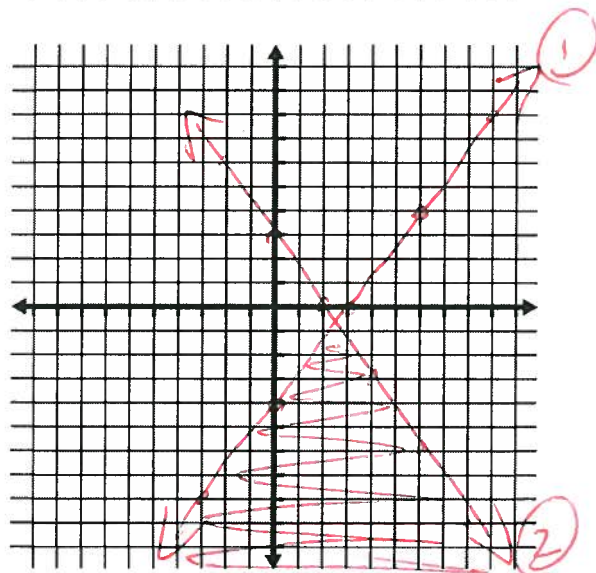
①  $y \geq 2x - 1$   
 ②  $y < -x + 5$



①  $4x - 3y \geq 12$   
 ②  $3x + 2y \leq 6$

①  $-3y \geq -4x + 12$   
 $y \leq \frac{4}{3}x - 4$

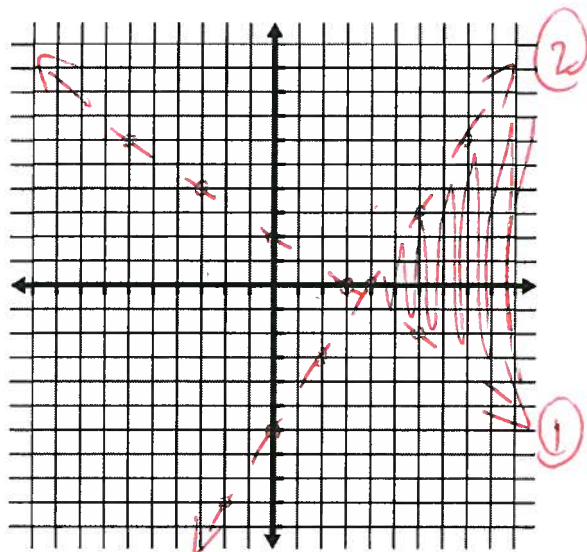
②  $2y \leq -3x + 6$   
 $y \leq -\frac{3}{2}x + 3$



①  $2x + 3y > 6$   
 ②  $3x - 2y > 12$

①  $3y > -2x + 6$   
 $y > -\frac{2}{3}x + 2$

②  $-2y > -3x + 12$   
 $y < \frac{3}{2}x - 6$



**Practice Quiz:**

1) Solve the inequality and display your answer on the number line

$$-2(x+3) < 6$$

$$x+3 > -3$$

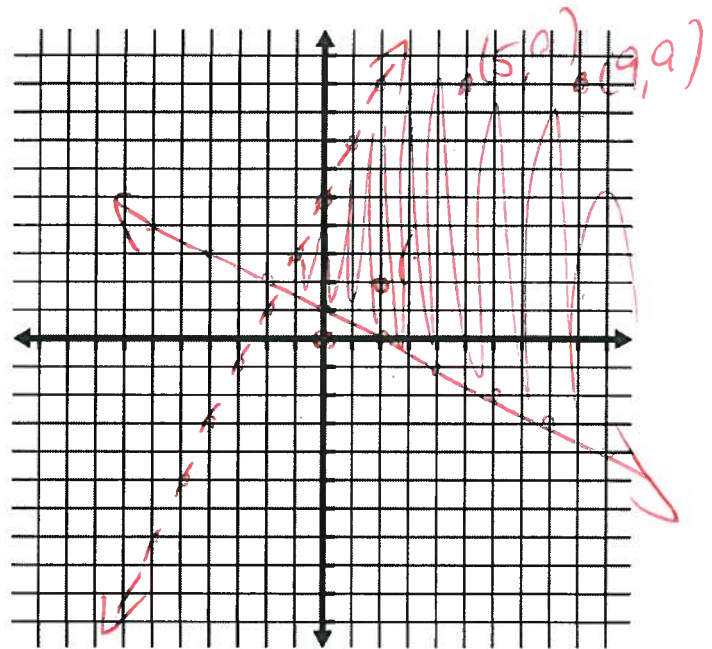
$$x > -6$$



2) Solve the following system of inequalities by graphing. Label two specific coordinates in the solution space.

$$y < 2x + 5$$

$$y \geq -\frac{1}{2}x + 1$$



Testpoint (0,0)

$$0 < 2(0) + 5 \quad \checkmark$$

$$0 \geq -\frac{1}{2}(0) + 1 \quad \times$$

Good  $\checkmark$  (0,0) is not in shaded area

