2-Variable Inequalities

2/3/14

changes to ineq.

Need $y = mx + b$ form

Notes: Solving Linear Inequalities (Graphing Solutions)

1. To solve linear inequalities, use the same methods we used for equations.
2. When solving inequalities, make sure your answer has the variable y on the left. This will lead to a better interpretation of the solution.
3. Interpretation of solutions: Graph the solution on a coordinate grid by shading and use:

   Dotted Line for $<$ and $>$ (open) Solid Line for $\leq$ and $\geq$ (closed)

   Shade above for $>$ and $\geq$ Shade below for $<$ and $\leq$

   Rules for Inequalities: When multiplying and dividing by negatives on both sides of an inequality, the inequality sign is reversed. (flipped)
4. Check your answer: Try picking a number you just shaded over. Substitute your ordered pair in for x and y. Does it make a true statement? If not, check your shading. If so, your answer is correct!
5. Remember: **Solutions are always in the** shaded area **or on the** solid line.

Example

13)

Check

Example

15) y

1) solve for y
2) Graph using m & b

$y \geq mx + b$ inequality

$m = \frac{rise}{run}$

b = y-int.

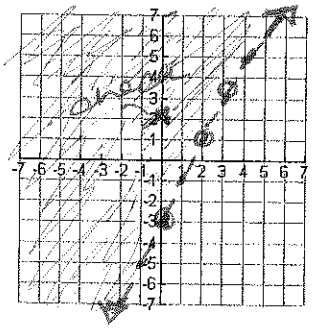
Examples of Solving Linear Inequalities by Graphing

13) $\frac{2y}{2} > \frac{4x}{2} - \frac{6}{2}$

$y > 2x - 3$

b: -3

m: $\frac{2}{1}$ ↑ →



dotted line (open >)

shade above

Check your answer: (0,2)

1. $2y > 4x - 6$
2. $2(2) > 4(0) - 6$
3. $4 > -6$ ✓ true

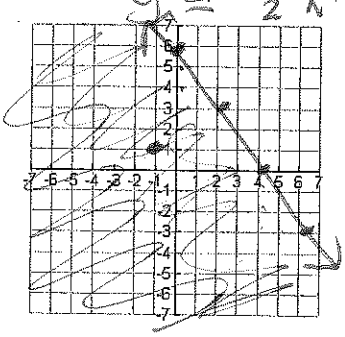
14) $3x + 2y \leq 12$

$\frac{2y}{2} \leq \frac{-3x}{2} + \frac{12}{2}$

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

b = 6

$m = \frac{-3}{2}$



solid line (≤)

shade below

Check your answer: (-1,1)

$3x + 2y \leq 12$

$3(-1) + 2(1) \leq 12$

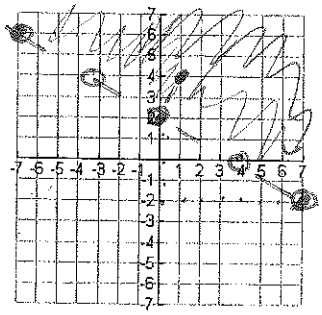
$-1 \leq 12$ ✓ true

Examples of Solving Linear Inequalities by Graphing

15) $y - 2 > -\frac{4}{7}x$

$+2 \quad +2$

$y > -\frac{4}{7}x + 2$



dotted line (open circles)

> shade above

Are the following points a solution to this inequality?

(1,4) yes

$4 - 2 > -\frac{4}{7}(1)$

$2 > -\frac{4}{7}$ ✓ True

(0,2) NO (on dotted line)

$2 - 2 > -\frac{4}{7}(0)$

$0 > 0$ NO False

16) $-x + 2y \leq -14$

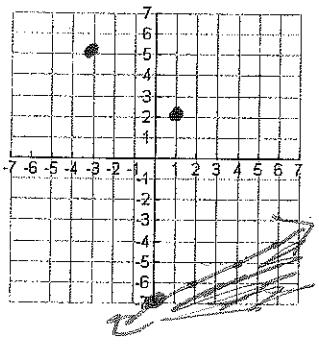
$+x \quad +x$

$\frac{2y}{2} \leq \frac{x}{2} - \frac{14}{2}$

$y \leq \frac{1}{2}x - 7$

b: -7

m: $\frac{1}{2}$



line: solid

shade: below

Are the following points a solution to this inequality?

(-3, 5) NO

$-(-3) + 2(5) \leq -14$

$13 \leq -14$

False

(1,2) NO

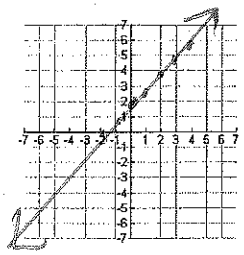
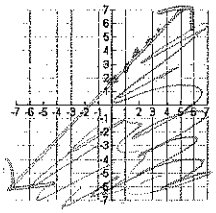
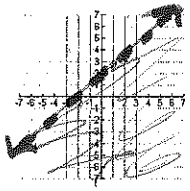
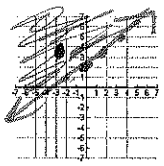
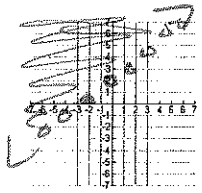
$-(1) + 2(2) \leq -14$

$3 \leq -14$

False

Graphing Two Variable Linear Inequalities

Notes: Graphing Solutions to (Two Variable) Linear Inequalities

Symbol	Problem	Solutions	Graph of Solution
= EQUALITY	$y = x + 2$	On the line	Use solid line with N/O shading 
$\leq$	$y \leq x + 2$	on the line in shaded area below the line	Use solid line and shade below 
$<$	$y < x + 2$	in the shaded area below the line	Use dotted line and shade below 
$\geq$	$y \geq x + 2$	on the line and in the shaded area above the line ex: (-3,4)	Use solid line and shade above the line 
$>$	$y > x + 2$	only in the shaded area above the line	Use dotted line and shade above 

Notes: Solving Linear Inequalities (without graphing)

"Is the ordered pair a solution"

1. To check is an ordered pair is a solution, plug the ordered pair into the inequality for x and y. F S S
2. Simplify the expression, following all rules for inequalities.
3. Check that the simplified inequality is true.
4. Remember: **Solutions always make the inequalities** true !

Examples: Solving Linear Inequalities (without graphing) (x, y)

"Is the ordered pair a solution" (circle the solutions)

17) $2x - 4y > 6$ F

(1,1) $2(1)-4(1) > 6$

$-2 > 6$ False

(4,-1) $2(4)-4(-1) > 6$

$12 > 6$ True

(3,0) $2(3)-4(0) > 6$

$6 > 6$ False

18) $-3y \leq 2x - 4$ x y

(1,2) $-3(2) \leq 2(1) - 4$

$-6 \leq -2$ true

(-2,1) $-3(1) \leq 2(-2) - 4$

$-3 \leq -8$ False

(0,0) $-3(0) \leq 2(0) - 4$

$0 \leq -4$ False

19) $-3x + 4y < 1$

(1,1) (2,-1)

(-1,-2) (0,1)

20) $-3x + 4y < 1.$

(1,1) (2,-4)

(-1,-6) (0,-3)