SOLN

Solving and Graphing Inequalities

A. Solving Inequalities

- When solving inequalities versus equations, there is one major operational difference:

When mult. or dividing by a negative #, flip the inequality sign! (or reverse)

Ex 1: Solve the inequality for y using two different approaches. Compare answers.

a. $2x-y > 7$

$-2x \quad -2x$

$\frac{-y}{-1} > \frac{-2x+7}{-1}$ * flip it!

$y < 2x-7$

b. $2x-y > 7$

$+y \quad +y$

$2x > 7+y$

$-7 \quad -7$

$2x-7 > y$

Both are read, "y is less than 2x-7"

B. Graphing Inequalities

1. Solve the inequality for y so it is in slope-intercept form. (Ie. $y > mx + b$ or $y < mx + b$)
2. Graph the line using the y-intercept and slope.
   a. If $\geq, \leq$ → solid line
   b. If $>, <$ → dashed line
3. Shade either above or below the line.
   a. What does the shaded region represent?

      Solutions to the inequality (points that make the inequality true)
4. Choose a Test Point to either check the shading, or to determine which region to shade.
   a. Choose any point *not* on the line.
   b. Plug the point into the original inequality.
   c. Is the statement true?
      i. If yes, the point lies in the shaded region and is a solution.
      ii. If no, shade the other region—this point is not a solution.

Ex 1c: Graph $y < 2x-7$

Test point: $(\overset{x}{0}, \overset{y}{0})$

$0 < 2(0)-7$

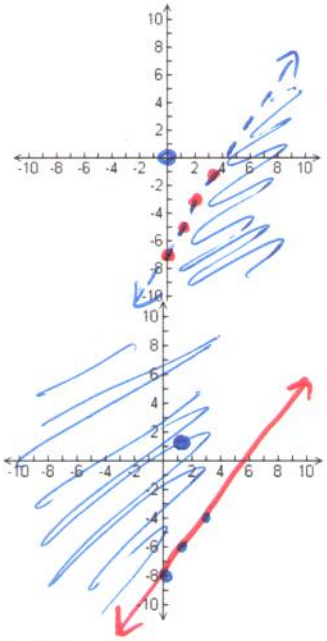
$0 < -7$ X

So (0,0) is not a soln ∴ not shaded

$m = \frac{2}{1} = \frac{\text{rise}}{\text{run}}$, $b = -7$

Read "y is less than 2x-7"

so shade below the line



Ex 2: Graph $4x-2y \leq 16$

$-4x \quad -4x$

$\frac{-2y}{-2} \leq \frac{-4x+16}{-2} \quad \frac{}{-2}$ * flip it!

$y \geq 2x-8$

$m = \frac{2}{1}$, $b = -8$

"y is greater than or equal to 2x-8"

so shade above line

Test pt (1,1)

$4(1)-2(1) \leq 16$

$2 \leq 16$ ✓

test pt: $(x, y) = (1, -1)$

Ex 3: Graph $-3x < 9y$

$\frac{-3x}{9} < \frac{9y}{9}$

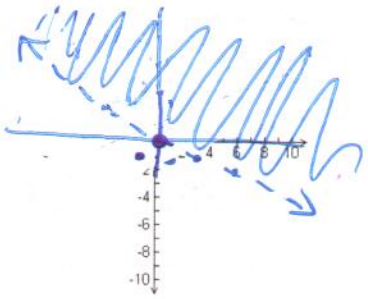
$-3(1) < 9(-1)$

$3 < -9$ ✗

$\frac{-3x}{9} < y$

$-\frac{1}{3}x < y$ or $y > -\frac{1}{3}x + 0$

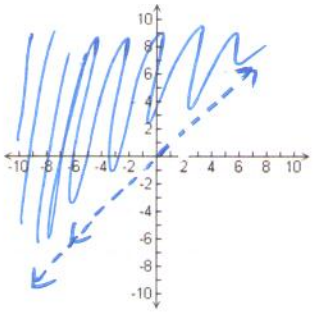
"y is greater than $-\frac{1}{3}x$"



Ex 4: Graph $y > x$

$y > x + 0$

$m = 1 \quad b = 0$



Ex 5: Graph $11y + 22x \leq 33$

$-22x \quad -22x$

$11y \leq -22x + 33$

$y \leq -2x + 3$