5.2 Graphing Linear Inequalities in Two Variables

When graphing a Linear Inequality:

< and > are represented by a dotted line line on a coordinate grid.

≤ and ≥ are represented by a solid line on a coordinate grid.

Steps to Graph a Linear Inequality:

slope = rise/run → y-intercept

1. Graph the line on the coordinate grid using $y = mx + b$ form of the line. Make sure you identify if a dotted or solid line is required.
2. Choose a test point that is not on the line. I suggest picking (0,0) unless it is on the line.
3. Substitute the test point into the original equation:
   - If it satisfies the inequality shade on the side of the line where the test point is
   - If it does not satisfies the equality shade on the opposite side of the line

Example #1: Graph the inequality $x - 3y > 6$ → dotted line

① $x - 3y > 6$

Recall: when ÷ or × by a negative, switch the inequality

$\frac{-3y}{-3} > \frac{6}{-3} - \frac{x}{-3}$

$y < \frac{1}{3}x - 2$

y-int: -2

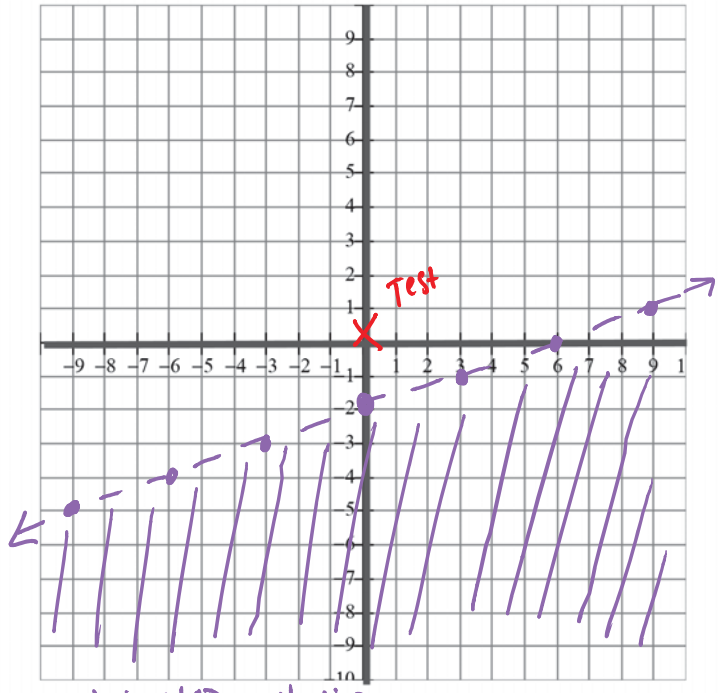
slope: $\frac{1}{3} = \frac{\text{rise}}{\text{run}}$

② Test (0,0)

③ Sub into $x - 3y > 6$

$0 - 3(0) > 6$

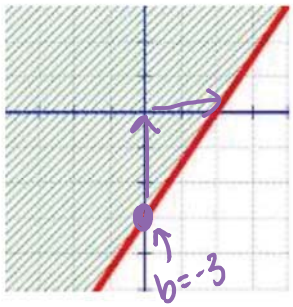
$0 > 6$ False!



∴(0,0) is NOT a solution, so we shade the "other" region.

Example #2: Write an inequality to describe the following graphs.

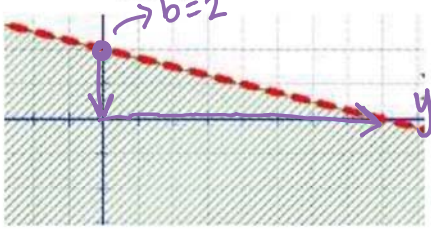
a.



$y = mx + b$

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

b.



$y = mx + b$

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

$m = \frac{2}{8} = \frac{1}{4}$

Example #3: Carmen has up to \$15 to buy seeds. A package of vegetable seeds cost \$1.50 and a package of flower seeds costs \$2.

a. Write an inequality to represent the total cost of the seeds.

let v = vegetable seeds, f = flower seeds

$1.50v + 2f \leq 15$

b. Graph the inequality

$1.5v + 2f \leq 15$

$-2f \quad -2f$

$\frac{1.5v}{1.5} \leq \frac{-2f}{1.5} + \frac{15}{1.5}$

$v \leq \frac{-4}{3}f + 10$

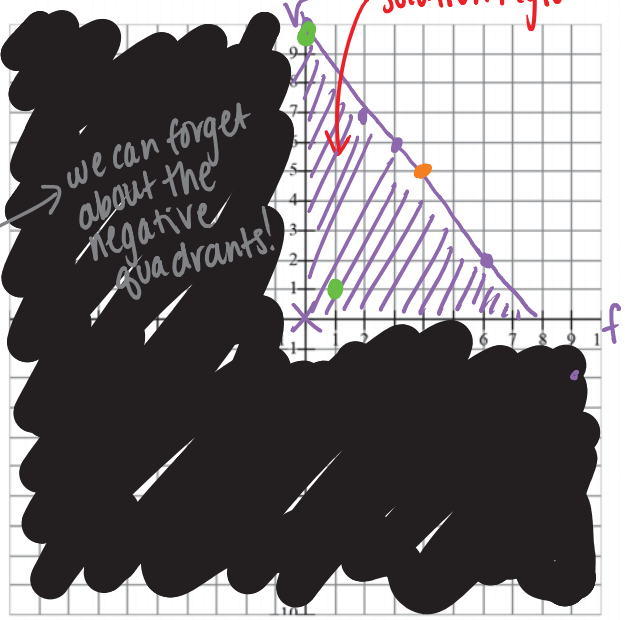
Test (0,0):

$0 \leq 10$ TRUE

Implicit:

$v \geq 0$

$f \geq 0$



c. Use the graph to determine 2 possible ways Carmen can spend up to \$15.

10 v, 0 f (0, 10)

1 v, 1 f (1, 1)

d. Can Carmen buy 5 packages of vegetable seeds and 4 packages of flower seeds? NO :((4, 5)

e. What is the most money Carmen can spend and still have change from \$15? \$14.50 (2, 7)