Algebra 1 Notes SOL A.5 Graphing Inequalities in Two Variables Mrs. Grieser

Name: _____ Date: _____ Block: _____

Graphing Inequalities in Two Variables

Inequalities in two variables are similar to linear equations in two variables.

- Find solutions and graph them in a similar manner.

Example: Find solutions for $x - 3y < 6$

** To find solutions, we need to find **(x, y) pairs** that make the inequality **true**. **

- Substitute the x, y values into the inequality; if we get a true statement, then we have found a solution

Which of the ordered pairs below are solutions to $x - 3y < 6$? _____

a) (0,0) b) (6, -1) c) (10, 2) d) (-1, 2)

Graphing Linear Equations in One and Two Variables

Graphing a Linear Equation in Two Variables:

1) Graph the boundary line (graph the line as if it were an equation).
   - Use a **solid line if ≤ or ≥**; use a **dashed line for < or >**

     (similar to open and closed circles when graphing inequalities on number lines).
2) Pick a test point.
   - Decide whether the test point is a solution to the inequality. A good test point to try, if it is not on the line, is (0,0). **TEST POINT SHOULD NOT BE ON THE LINE**.
3) Shade the half-plane that is the solution.
   - If the test point is in the solution, then shade half-plane containing the point. If the test point is NOT in the solution, then shade the half-plane that does NOT contain it.

Examples:

a) Graph $y > 4x - 3$

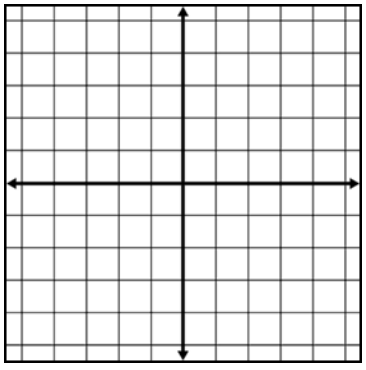
1) Graph the equation $y = 4x - 3$. Use a _____ line.

2) Test (0, 0). Is it a solution to $y > 4x - 3$?

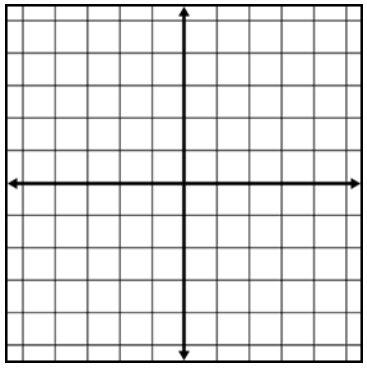
   $0 > 4 \cdot 0 - 3$

   $0 > -3$ ✓

3) Shade half-plane that contains (0,0).



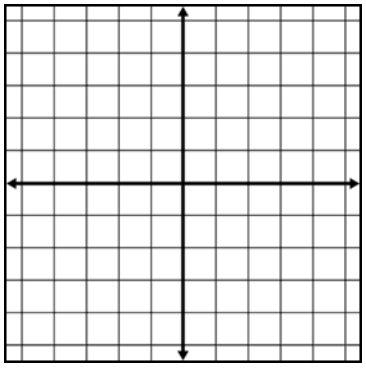
b) Graph: $2x - y \geq 8$



Graph inequalities in one variable using the same process:

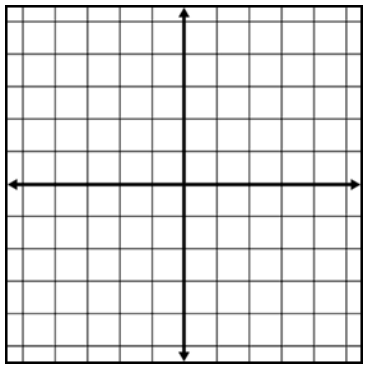
Graph $y \geq -3$

1) Graph y = -3; use solid line
2) Test a point.
3) Shade area with point if it is a solution; otherwise shade other area.



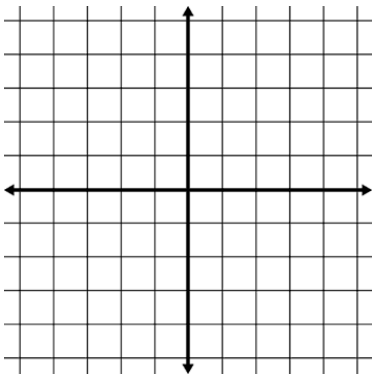
Graph $x < -1$

1) Graph x = -1; use dashed line.
2) Test a point.
3) Shade area with point if it is a solution; otherwise shade other area.



Alternative Method to Determine Where to Shade

Example: Graph $4x + 2y > 6$

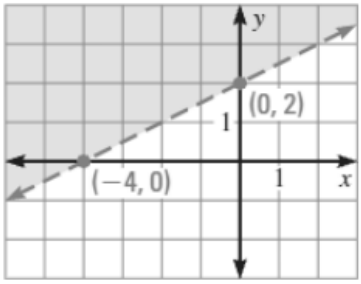


1) Re-write the inequality to isolate y (function form), remembering that multiplying by a negative or positive number reverses the inequality symbol!
2) If you have y **<** or y ≤, shade **BELOW** the line.
3) If you have y **>** or y ≥, shade **ABOVE** the line.
4) Note: when looking at vertical lines (e.g. $x < -1$), shade to the left if < or ≤; shade to the right if > or ≥.

Try all the examples in these notes using this method.

Writing Inequalities from Graphs:

Write an inequality for the graph at right:



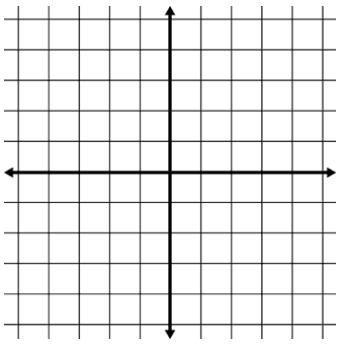
1) Find the slope and y-intercept; write the equation.

_____

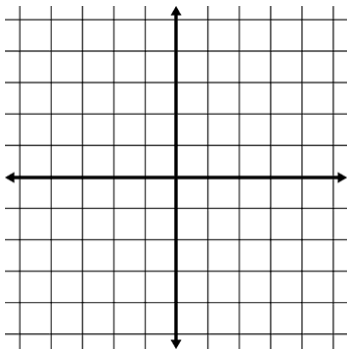
2) Dashed or solid? _____
3) Above or below? _____
4) Write inequality _____

You try: Graph the inequalities

a) $x + 3y \geq -1$



b) $x + 2y < 0$



c) $y > 1$