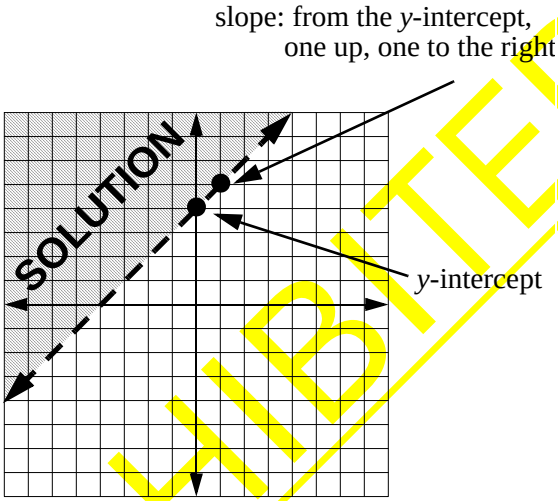
Section 4.3
Graphing Inequalities with Two Variables

Because an inequality does not represent *one* exact answer ($a > -3$), but a definite *set* of many answers, when we try to plot an inequality with two variables, the solution is a region containing many points.

Example: Graph the inequality $y > x + 4$

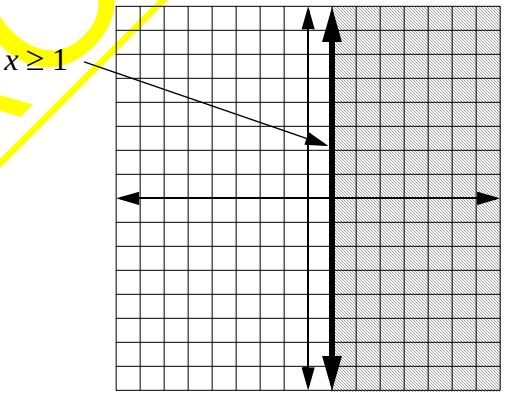
First we plot the boundary line by recognizing that the slope of the line is 1 (coefficient of x) and the y-intercept is 4 (See graph to the right).



Now we set the region using only the direction given by y. According to the example, ($y >$) y is "greater", thus the solution area is above the line.

Example: Graph the inequality $x \geq 1$

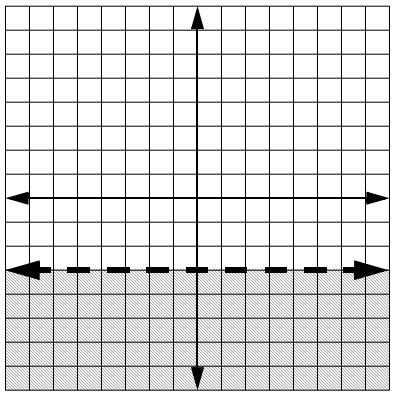
Graphed in two dimensions, an inequality with only one variable is either vertical (x only) or horizontal (y only). In this case it is vertical passing through $x \geq 1$.



Notice that in the two examples shown above, the line for "greater than" (>) is graphed *dashed* and the line for "greater than or equal to" (≥) is graphed *solid*. Solid indicates that points ON the line are solutions.

Example: Graph the inequality $y < -3$

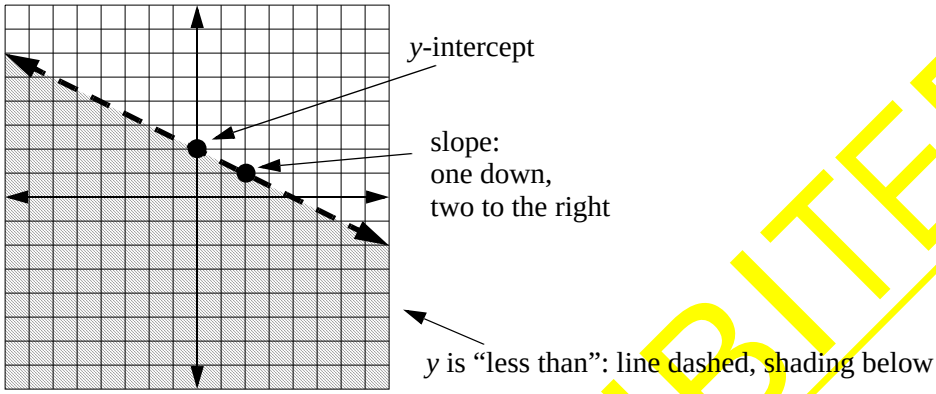
Graphed in two dimensions, an inequality with only one variable is either vertical (x only) or horizontal (y only). In this case it is horizontal passing through $y < -3$.



Because the y in the inequality indicates "less than", the solution area is found below the *dashed* (<) line.

Example: Graph the inequality $y < -\frac{1}{2}x + 2$

Because the inequality is already in *y*-intercept form, we can read the *y*-intercept as 2 and the slope as $-\frac{1}{2}$.



Example: Graph the inequality $3x + 2y \le 6$

Because the inequality is not in *y*-intercept form, we first turn it into *y*-intercept by solving for *y*.

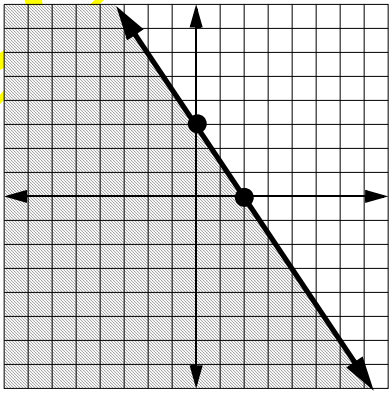
$3x - 3x + 2y \le -3x + 6$ subtract $3x$

$2y \le -3x + 6$ divide by 2

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

$y \le -\frac{3}{2}x + 3$

The *y*-intercept is 3 and the slope is $\frac{-3}{2}$.

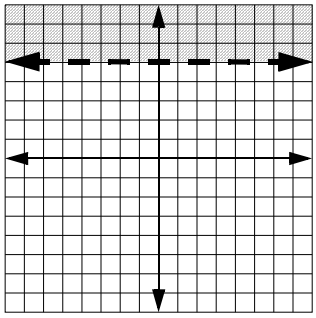


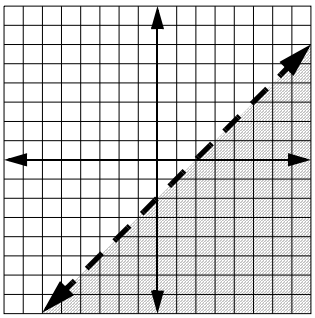
Because the inequality is $y \le$ ("less than or equal to"), the area is under the line and the line is solid.

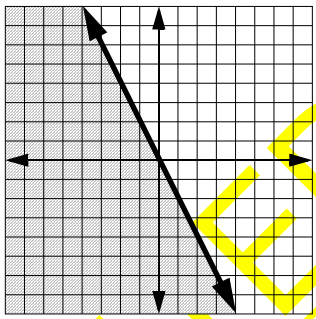
Practice:
Graph the inequalities.

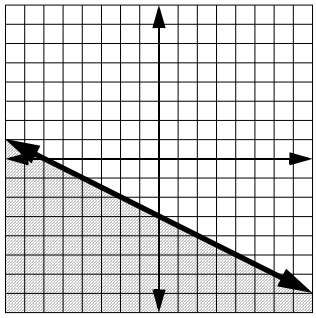
1. $y > x + 5$
2. $y \ge -3x + 1$
3. $y < x - 2$
4. $\frac{3}{4}x + \frac{2}{3}y \le 6$
5. $3x - y > 7$
6. $y - 2x < 5$
7. $4 \ge 2x - 6y$
8. $2y \le x - 3$
9. $\frac{1}{2}x + y \le 8$
10. $8 > y - 2x$
11. $x + y \ge 5$
12. $y \le \frac{3}{4}x - 4$
13. $4 \le \frac{1}{4}x + y$
14. $3x - 4y < 6$
15. $y > 2$
16. $5y + x < 4$
17. $2y - x \ge 9$
18. $x \le -1$
19. $14 \ge 2y - 2x$
20. $x + y > 4$
21. $y \le \frac{3}{4}x - 4$
22. $5 > \frac{1}{2}x - y$
23. $3x - 2y < 6$
24. $y \le 7$
25. $6y + x > 2$
26. $3y - x \ge 5$
27. $x < -7$

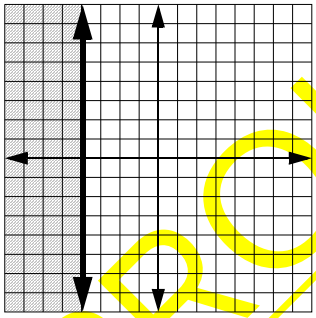
Write the inequality represented in the graph.

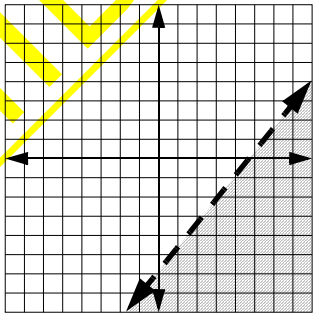
1. 

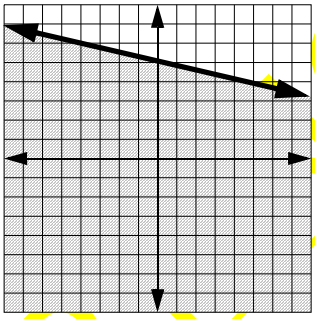
2. 

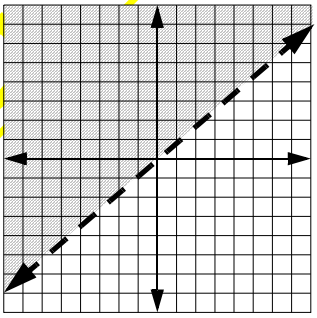
3. 

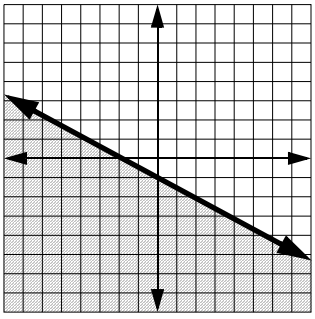
4. 

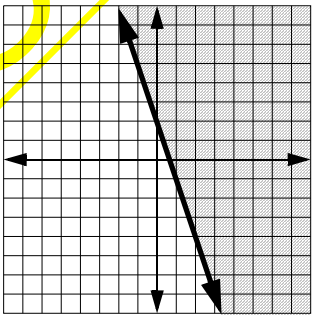
5. 

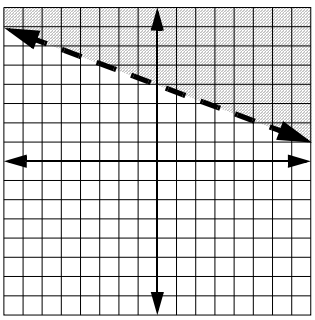
6. 

7. 

8. 

9. 

10. 

11. 

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