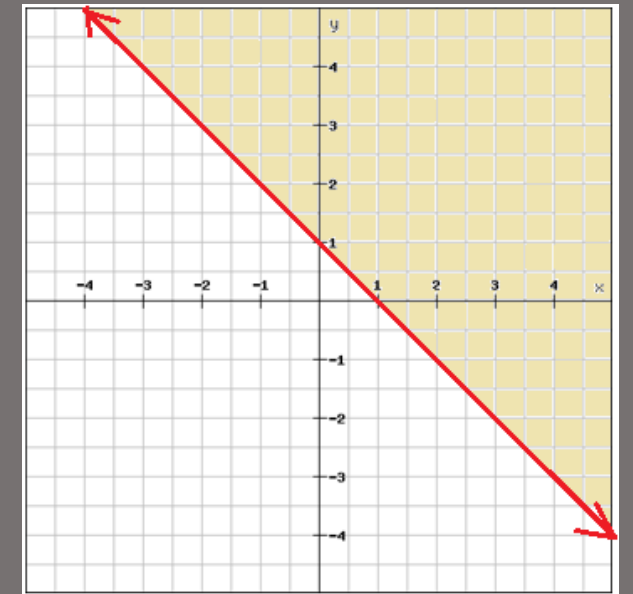


Linear Inequalities



Objectives

After completion of this session you will be able to

- Understand solutions of linear inequalities
- Graph solutions of inequalities
- Graph solutions of inequalities that pass through the origin.
- Graph solutions of inequalities of vertical and horizontal lines.

- Consider the following inequality,

$$y > 2x + 1.$$

- The goal of the section is to determine what points (x, y) solve the inequality.
- We first start with what does a solution of the inequality actually mean?
- Let us consider our first example to fully understand the nature of the solutions.

Example 1. Determine which of the following are solution points to the inequality

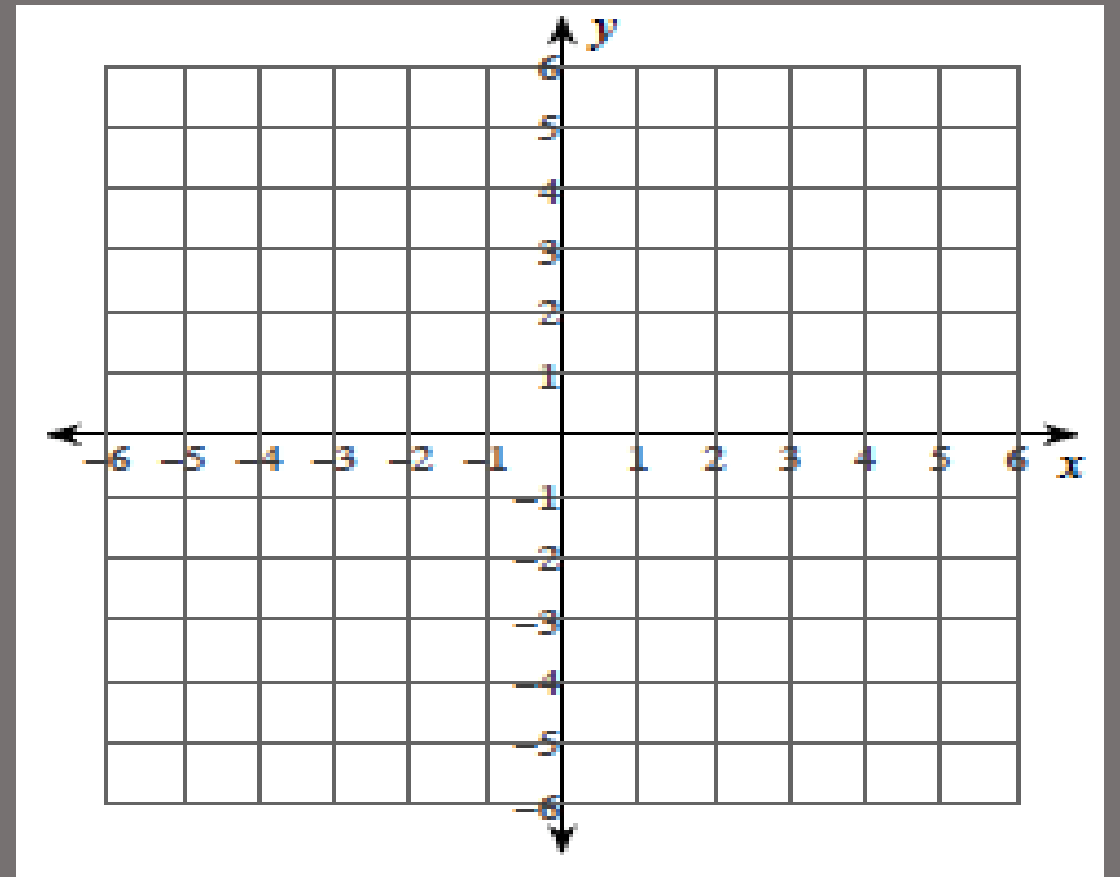
$$y > 2x + 1.$$

- (a) (1,4)
- (b) (0,0)
- (c) (-1, -2)
- (d) (0,1)

We now determine all solutions points of the inequality. How do we accomplish this task? We use graphing techniques.

Example 2. Sketch the solution points of the linear inequality

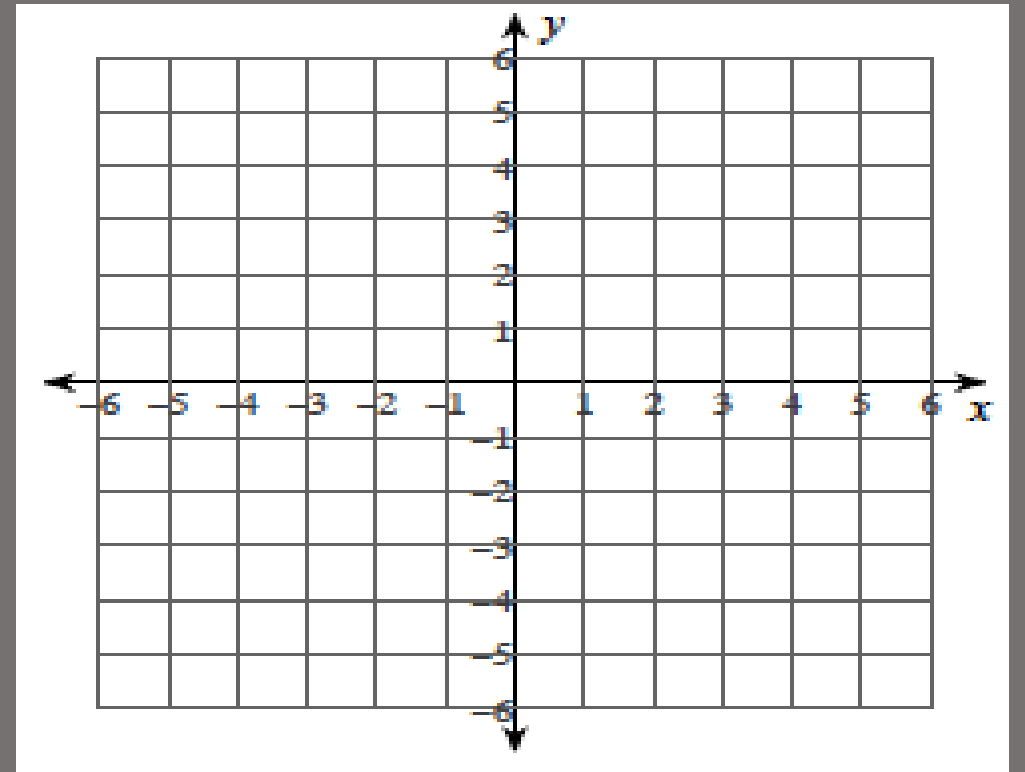
$$y > 2x + 1.$$



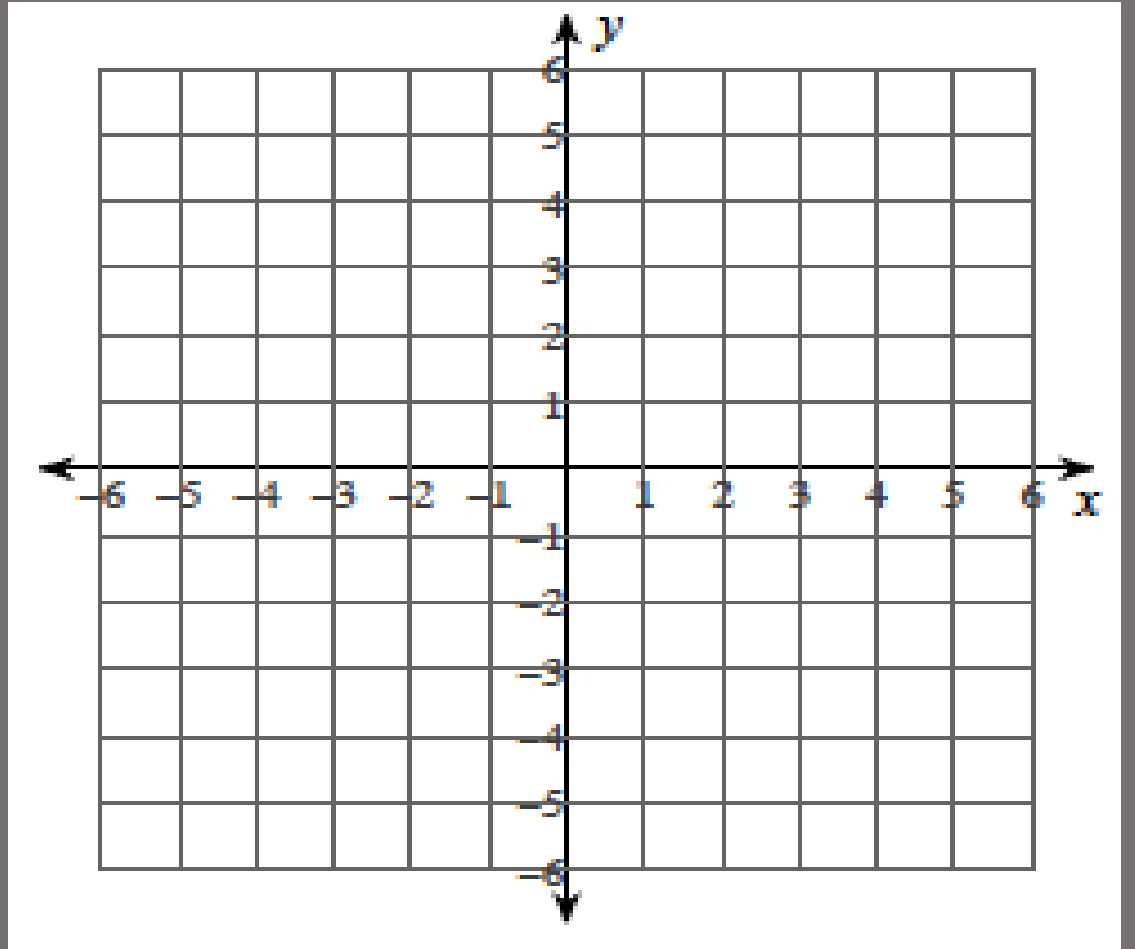
1. If we have \leq or \geq then we have a solid line when graphing.
2. If we have a $<$ or $>$ then we have a dotted line when graphing.

Example 3. Sketch the graph of each inequality.

1. $3x - 4y \leq -4$



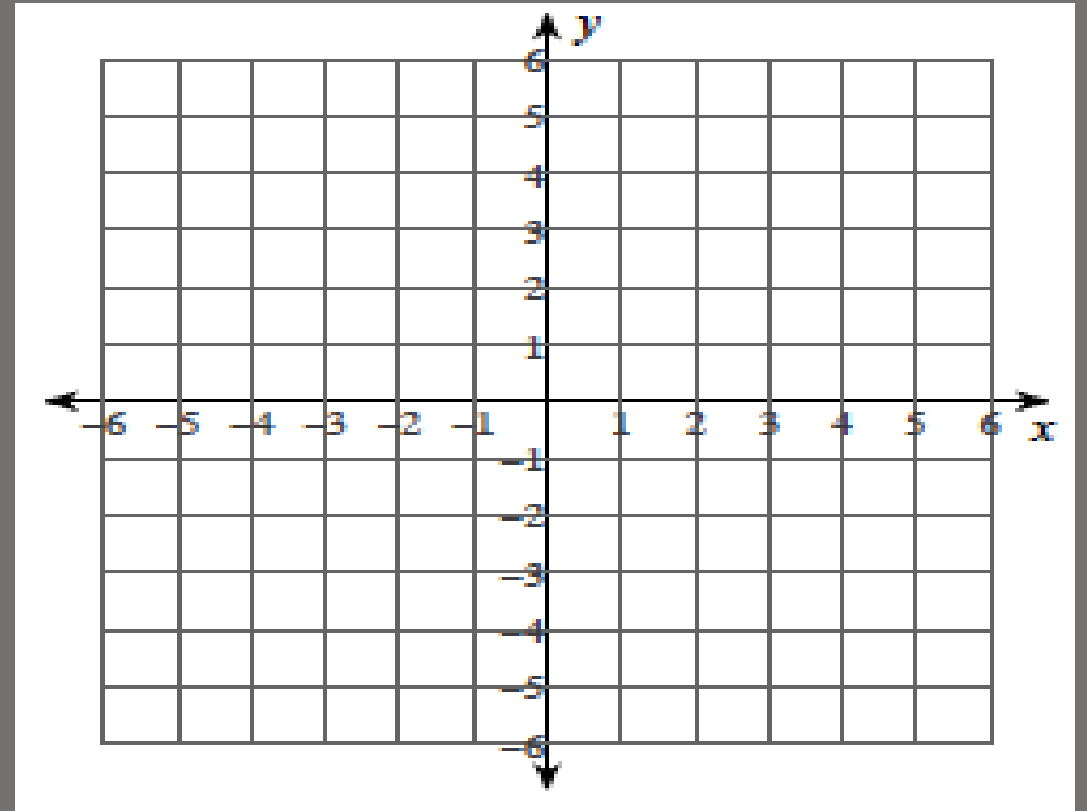
$$2. 8x + 3y < -15$$



Example 4 (Lines That Go Through the Origin)

Sketch the graph of the following inequality.

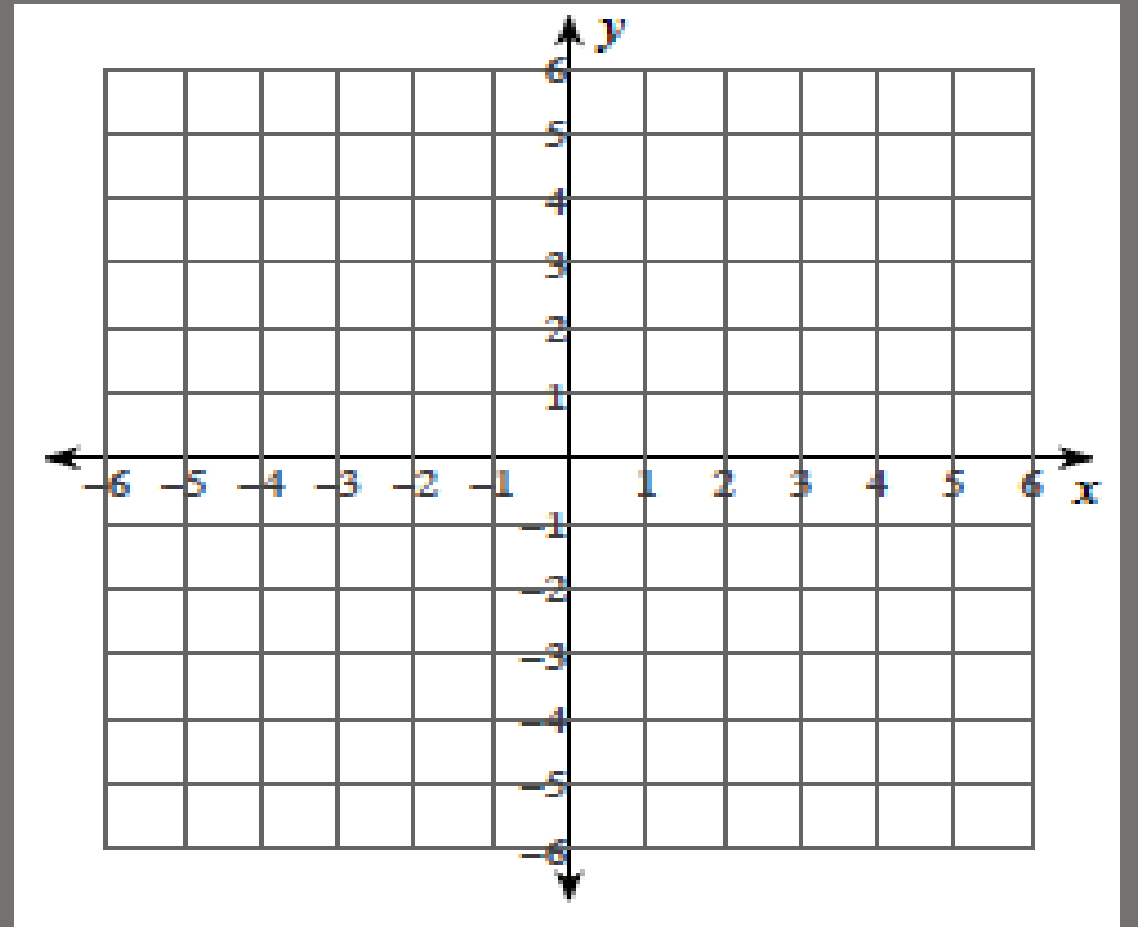
$$x - y < 0$$



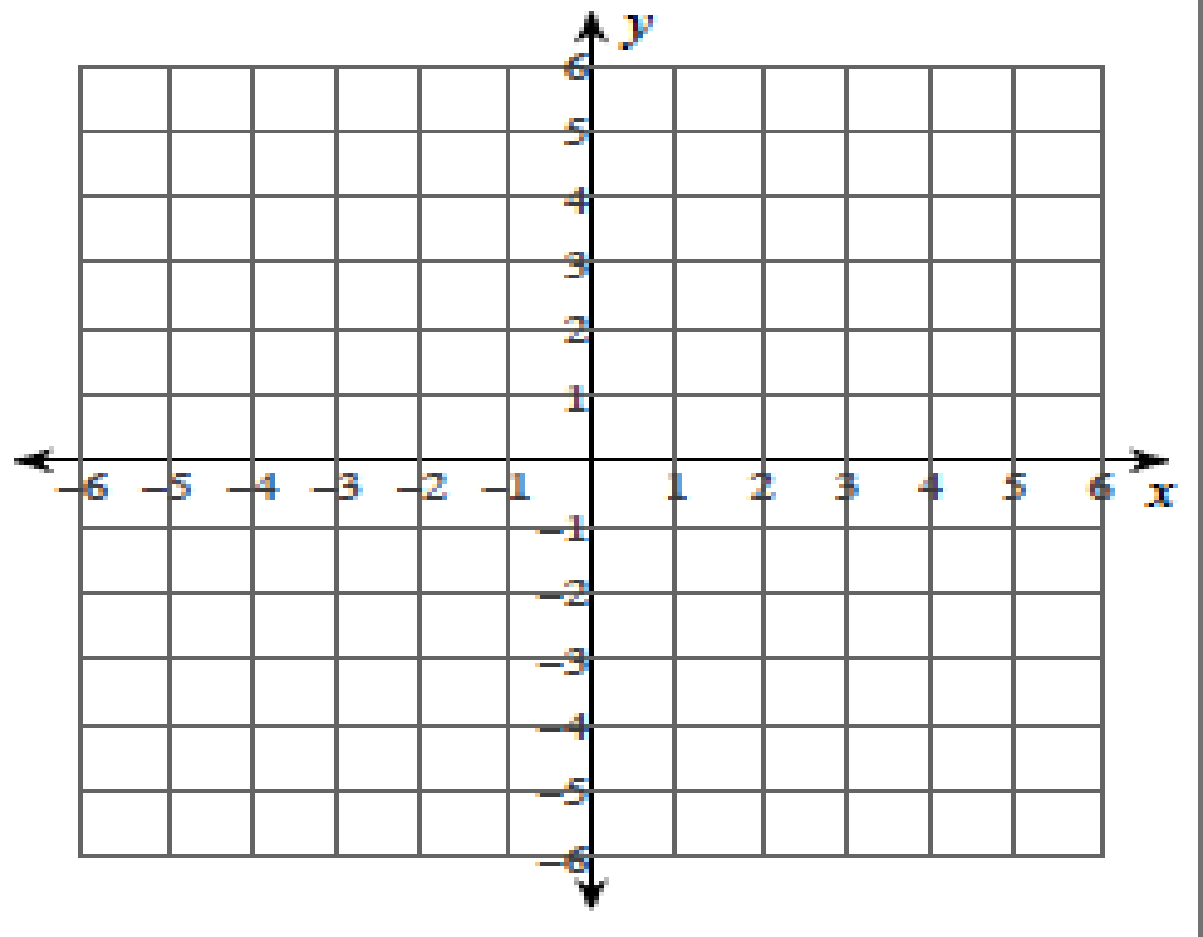
Example 5.

Sketch the graph of the following inequalities.

(a) $x < 1$



(b) $y \geq 2$



Often times students get confused, especially on an exam when both inequalities are present, with the solutions of the following inequality,

$$x + 5 > 1.$$

Let us look at the solutions of $x + 5 > 1$ and $y > 2x + 1$ side-by-side.

$$x + 5 > 1$$

$$y > 2x + 1$$

