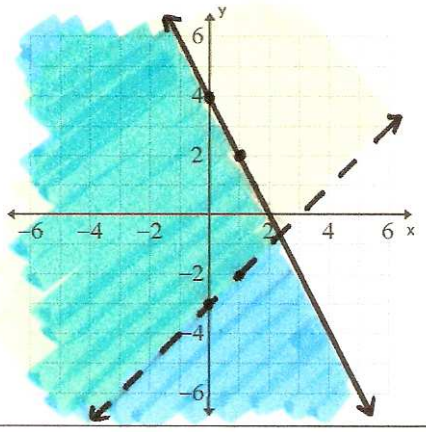
Algebra 2 Notes Name: key

Section 3.2 – Solving Systems of Linear Inequalities

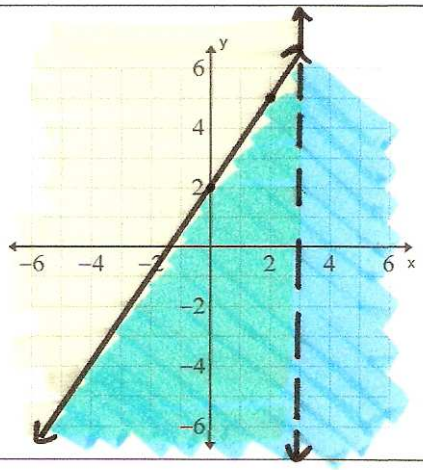
A System of linear inequalities is a set of two or more linear inequalities with the same variables. The solution to a system of inequalities is often an infinite set of points that can be represented graphically by shading. When you graph multiple inequalities on the same graph, the region where the shadings overlap is the solution region.

Example 1: Graph each system of inequalities.

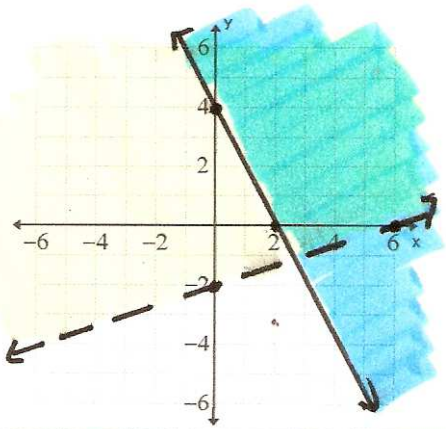
a. $\begin{cases} y \le -2x+4 \\ y > x-3 \end{cases}$



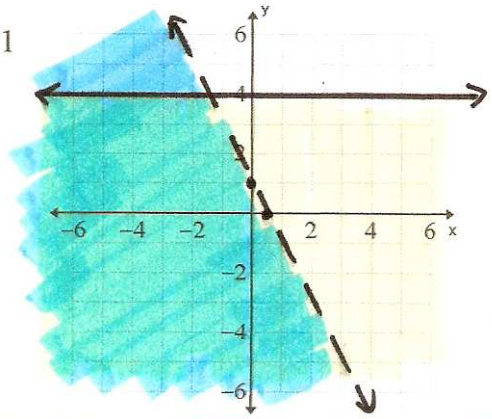
b. $\begin{cases} y \le \frac{3}{2}x+2 \\ x < 3 \end{cases}$



c. $\begin{cases} x-3y < 6 \\ 2x+y > 4 \end{cases}$



d. $\begin{cases} y \le 4 \\ 2x+y < 1 \end{cases}$



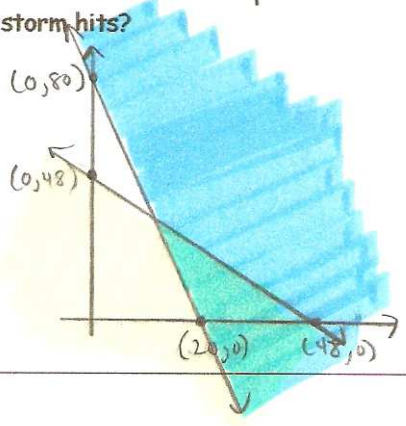
Example 2: Expedition Application

A polar expedition is 240 miles away from base camp, and a snowstorm is predicted to reach the area in 48 hours. The expedition will travel as far as possible by boat and then walk the remaining distance to camp before the storm hits. The explorers can navigate the boat through the ice at a rate of 12 miles per hour or walk with the equipment at a rate of 3 miles per hour. Write and graph a system of inequalities that can be used to determine how long the explorers may travel by foot or by boat to reach the camp before the storm. If the expedition travels 25 hours by boat and 15 hours by foot, will they reach the base camp before the storm hits?

x = # hours by boat

y = # hours by foot

$\begin{cases} x+y \le 48 & \text{hours} \\ 12x+3y \ge 240 & \text{miles covered} \end{cases}$



(25, 15)

$25+15 \le 48$

$40 \le 48$ ✓

$12(25)+3(15) \ge 240$

$300+45 \ge 240$

$345 \ge 240$ ✓

yes

Example 3: Graph the system of inequalities and classify the figure created.

a. $\begin{cases} y \le 5 \\ y \ge 2 \\ y \le 3x+1 \\ y \ge 3x-4 \end{cases}$

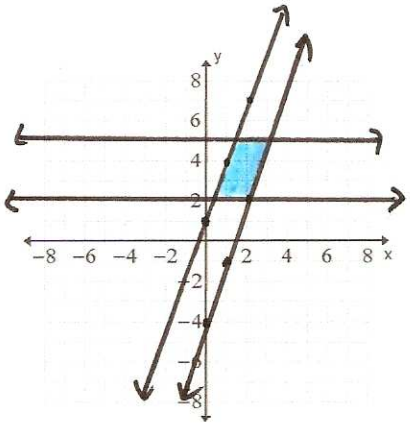


Figure Created?

parallelogram

How do you know?

quadrilateral w/ opp. sides parallel (since horiz. lines are parallel and since $y = 3x+1$ and $y = 3x-4$ have same slopes)

b. $\begin{cases} x \le 6 \\ y \le \frac{1}{2}x+1 \\ y \ge -2x+4 \end{cases}$

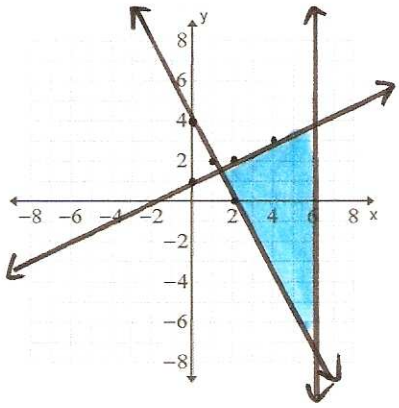


Figure Created?

triangle

How do you know?

3-sided figure

c. $\begin{cases} y \le 4 \\ y \ge -1 \\ y \le -x+8 \\ y \le 2x+2 \end{cases}$

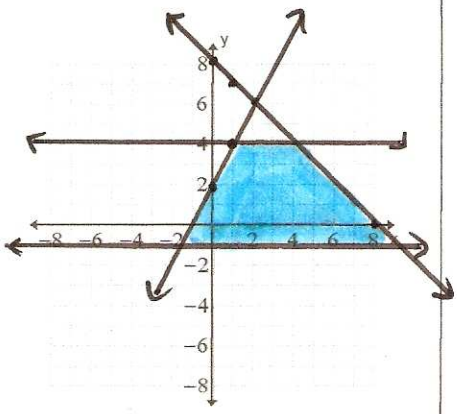


Figure Created?

trapezoid

How do you know?

One pair opp. sides parallel (since horizontal lines are parallel to each other)