Section 5-8: Systems of Linear Inequalities

In today's lesson, you are going to take what you learned about graphing linear inequalities and combine it with systems. Work with a partner as you progress through this notesheet, discussing what you cover. A system of inequalities will look at the areas where our half-planes overlap.

You need to start out by reading section 5-8 (including the book examples) and filling in definitions for the following terms.

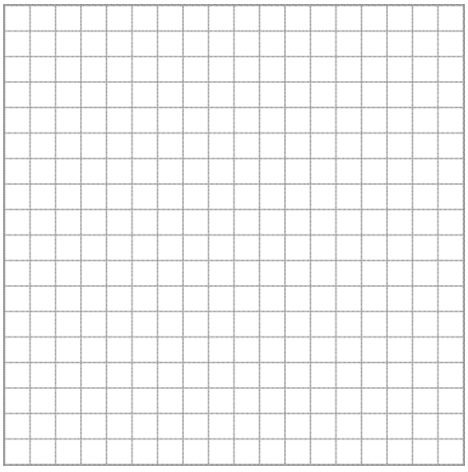
Feasible Set/Region:

Vertex:

Now you're going to go through a few examples, piecing together how to work with systems of inequalities.

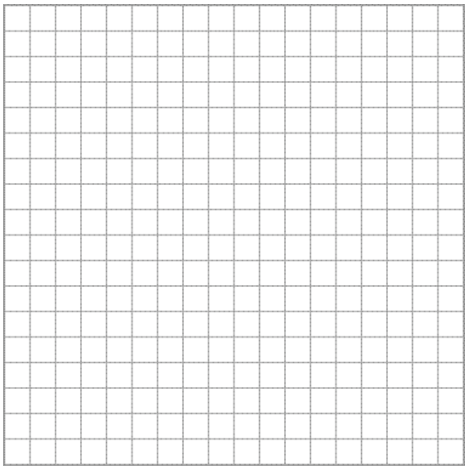
Example 1: Graph the feasible set for the systems and state the vertices.

$$\begin{cases} x + 2y \le 12 \\ 2x + y \le 12 \\ x \ge 0 \\ y \ge 0 \end{cases}$$



As you work through this example, you should notice the feasible set will be in the first quadrant.

Graph all of your boundary lines and shade appropriately. You will probably notice that there is a lot of shading of your graph. This leads to a very complicated answer. Let's graph it again.



First, begin with the boundary lines, but don't shade them yet. Instead, determine whether we will shade above or below the particular boundary line and draw arrows that point to where you would shade. Find the area where all the arrows point and shade it in. That is our feasible set.

From graphing this, you should also see that the vertices are (0, 0), (6, 0), (0, 6), and (4, 4). You can double-check all of these vertices by substituting into the original system.

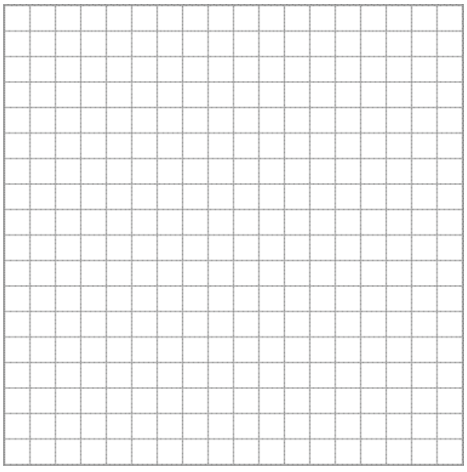
Example 2: The Fuzzy Jeff Company makes two action figures: Muscular Matt Mitarnowski and Shaggy Shecky. Each figure passes through two processing operations. Muscular Matt Mitarnowski (MMM) requires one hour for each process. Shaggy Shecky (SS) requires two hours for Process 1 and 3 hours for Process 2. Process 1 has a total capacity of 1000 hours per day and Process 2 has a capacity of 1275 hours per day.
a. Make a table for the info. This will help us gather what we're working with in this complicated problem and then turn it into a system of inequalities.

Process	Hours for MMM	Hours for SS	Total hours per day
1			
2			

b. Identify variables.

c. Write a system of inequalities for this situation. You should be able to write this from the information in your table.

d. Graph your system.



BTW, here is your system, if you were struggling with it:

$$\begin{cases} x + 2y \le 1000 \\ x + 3y \le 1275 \\ x \ge 0 \\ y \ge 0 \end{cases}$$

x = number of MMM figures made per day
y = number of SS figures made per day

e. State the vertices of the feasible region.

Homework: (Listed on calendar on wiki)

"The first precept was never to accept a thing as true until I knew it as such without a single doubt." - Rene Descartes