

Section 2 – Topic 11
Systems of Linear Inequalities

The entrance exam to graduate college has two sections: a verbal reasoning section and a quantitative reasoning section. The exam has a maximum score of 1,600 for the entire test and maximums for each section of the test of 800. The school of your choice has set a minimum quantitative score of at least 625 and a total minimum score of 1250. Write a system of inequalities to model scores that meet the school's requirements and solve the system by graphing.

$$\begin{aligned} & \textcircled{x + y \leq 1600} \quad y \geq 625 \quad x + y \geq 1250 \textcircled{} \\ x \leq 800 \quad y \leq 800 \end{aligned}$$

Graph the region that represents the possible verbal and quantitative scores that will meet the school's requirements.



Let's Practice!

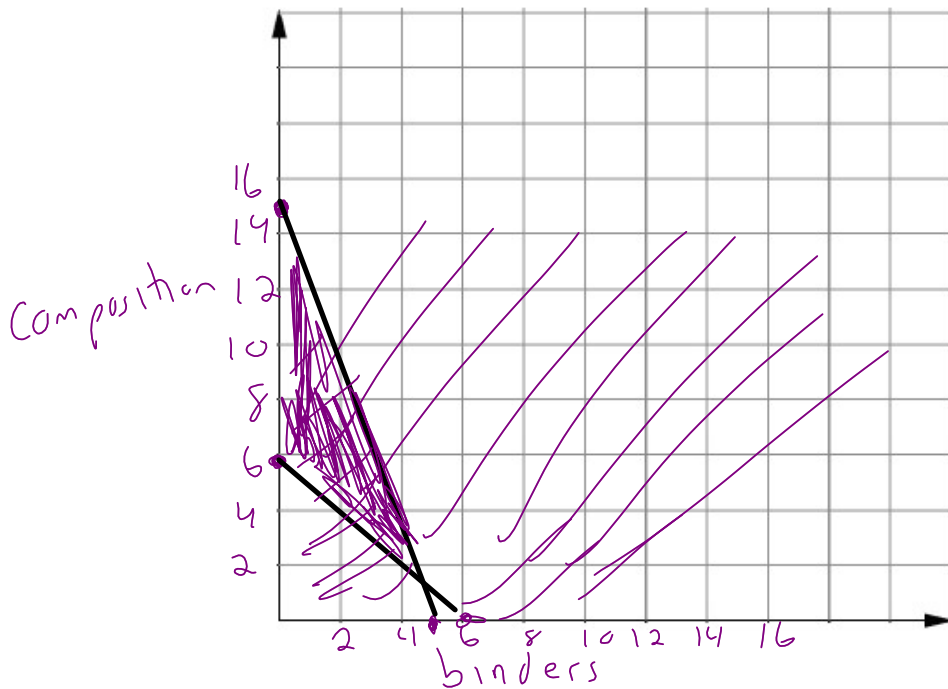
1. Suppose you are buying two kinds of notebooks for school. A composition book costs \$1, and a one-inch three-ring binder costs \$3. You must have at least 6 notebooks. The cost of the notebooks can be no more than \$15.

a. Write a system of inequalities to model the situation.

$$c + b \geq 6$$

$$c + 3b \leq 15$$

b. Solve the system by graphing.



$$c + b \geq 6$$

$$c \geq 6 - b$$

$$b \geq 6 - c$$

$$c + 3b \leq 15$$

$$c \leq 15 - 3b$$

$$\frac{3b}{3} \leq \frac{15}{3}$$

$$b \leq 5$$

Try It!

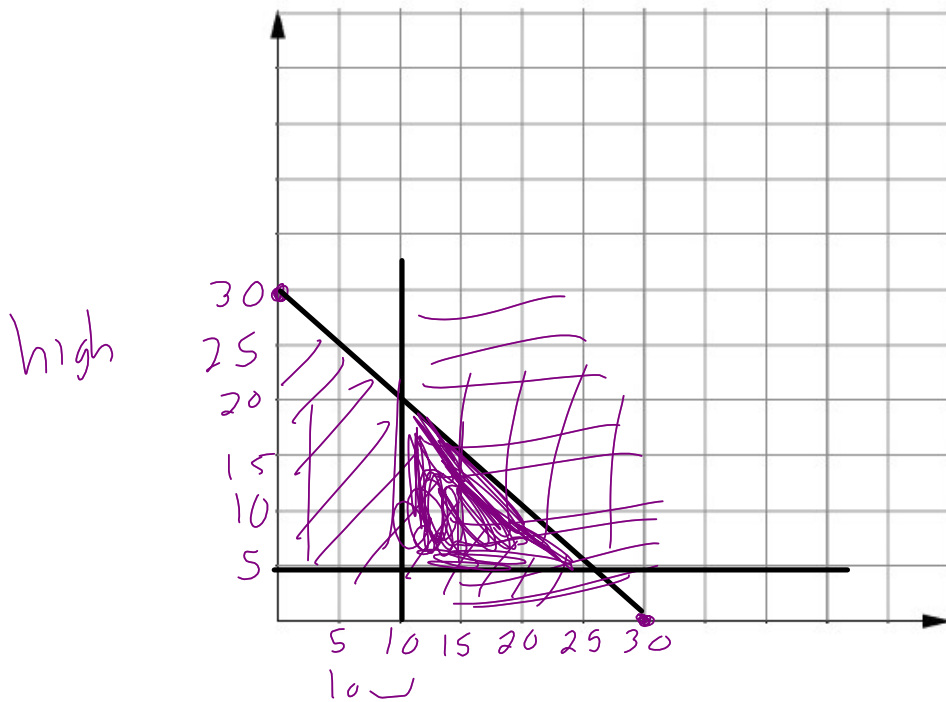
2. Chahua Camp Grounds provides mountain hikes. A camp counselor can take no more than 30 campers for hiking per day. Each day there is a low trail and high trail hike. The counselor must have a minimum of 10 campers on the low trail and a minimum of 5 campers on the high trail.

$x = \text{low}$ $y = \text{high}$

- a. Write a system of inequalities to model this situation.

$x + y \leq 30$ $x \geq 10$
 $y \geq 5$

- b. Solve the system by graphing.



BEAT THE TEST!

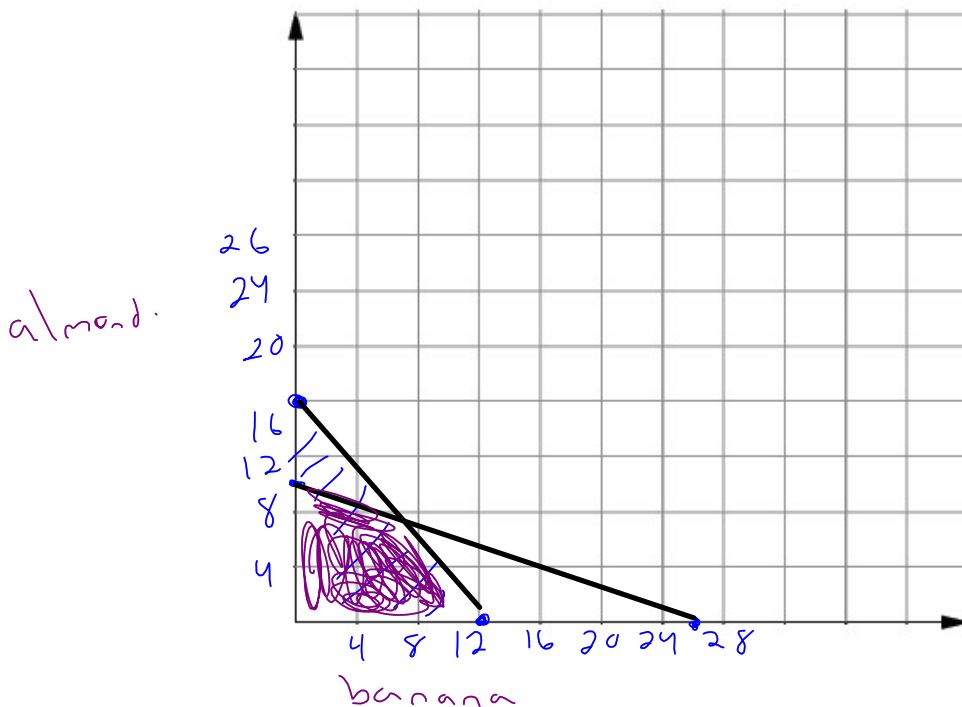
- Martha's Bakery is baking loaves of banana bread and poppy-seed almond bread. The recipe for one loaf of banana bread calls for two cups of flour and one teaspoon of baking soda. One loaf of poppy-seed almond bread requires $1\frac{1}{2}$ cups of flour and $2\frac{1}{2}$ teaspoons of baking soda. The bakery has 24 cups of flour and 26 teaspoons of baking soda in stock.

b = banana a = almond

Part A: Write a system of linear inequalities to model how many loaves of bread can be baked.

Flour $\rightarrow 2b + 1.5a \leq 24$
 Baking soda $\rightarrow b + 2.5a \leq 26$

Part B: Graph the inequalities that represent how many loaves of each type of bread the bakers can make.



$$2b + 1.5a \leq 24$$

$$2b \leq 24 - 1.5a \quad 1.5a \leq 24$$

$$b \leq 12 \quad a \leq 16$$

$$b + 2.5a \leq 26$$

$$b \leq 26 - 2.5a \quad \frac{2.5a \leq 26}{2.5} \quad \frac{2.5}{2.5}$$

$$a \leq 10.4$$

Part C: Which of the following combinations can they make based on their current supply of flour and baking soda? Check all that apply.

- 1 banana bread and 5 poppy-seed almond breads
- 3 banana breads and 11 poppy-seed almond breads
- 6 banana breads and 8 poppy-seed almond breads
- 7 banana breads and 9 poppy-seed almond breads
- 9 banana breads and 5 poppy-seed almond breads

Part D: Do any of the combinations above use all the flour and baking soda? If so, write the combination below.

banana bread(s) and poppy-seed almond bread(s).