KEY

Algebra 1

Systems of Inequalities Word Problems!!

1. You need at least 3 pounds of fruit to make muffins. Blueberries cost $4 per pound, strawberries cost $3 per pound, and you can spend at most $21 on fruit.

a. Write and graph a system of linear inequalities.

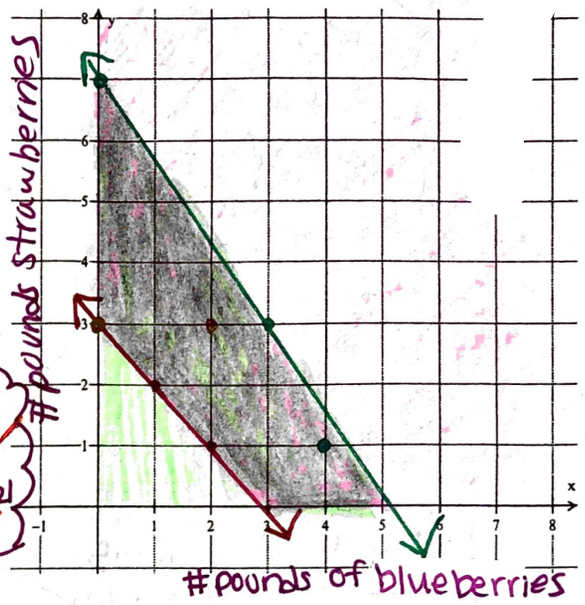
x: # pounds of blueberries y: # pounds of strawberries

$$\begin{cases} x+y \geq 3 \\ 4x+3y \leq 21 \end{cases}$$

$x+y \geq 3 \rightarrow y \geq -x+3$

$4x+3y \leq 21 \rightarrow 3y \leq -4x+21$

$y \leq -\frac{4}{3}x+7$



b. Identify and interpret a solution of the system.

(2,3) You could buy 2lb blueberries & 3lb strawberries.

TEST (2,3): $2+3 \geq 3$ ✓; $2(2)+3(3) \leq 21$ ✓

c. Use your graph to determine whether you can buy 4 pounds of blueberries and 1 pound of strawberries.

Yes! In shaded area.

2. You need to earn at least $120 per week working as both a manager at a grocery store and teaching music lessons. You earn $10 per hour at the store and $15 per hour teaching music. You are required to work at the grocery store at least 8 hours a week, but do not want to work more than 20 hours total.

a. Write and graph a system of linear inequalities. You should have three inequalities (constraints) total!

x: # hrs Grocery Store y: # hrs Music

$$\begin{cases} 10x+15y \geq 120 \\ x \geq 8 \\ x+y \leq 20 \end{cases}$$

$10x+15y \geq 120 \rightarrow 15y \geq -10x+120$

$y \geq -\frac{2}{3}x+8$

$x+y \leq 20 \rightarrow y \leq -x+20$

b. Identify and interpret a solution of the system.

(10,4) I could work 10 hrs at store & 4 hrs Music.

TEST (10,4)... $10(10)+15(4) \geq 120$? ✓ $10 \geq 8$? ✓ $10+4 \leq 20$? ✓

c. Use your graph to determine whether you can work 8 hours at the grocery store and teach 1 hour of music.

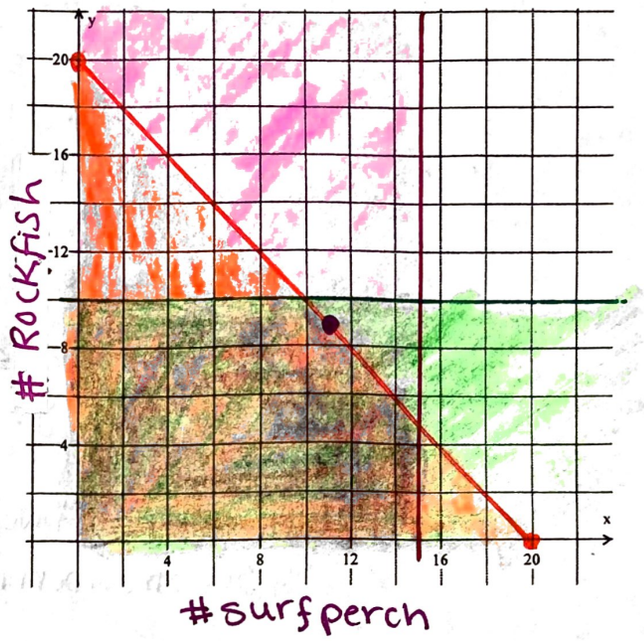
NO !! Not in shaded area. NOT a soln.

3. You are fishing for surfperch and rockfish. Gaming laws allow you to catch no more than 15 surfperch per day, no more than 10 rockfish per day, and no more than 20 total fish per day.

a. Write and graph a system of linear inequalities. You should have three constraints.

x: # of surfperch y: # of rockfish

$$\begin{cases} x \le 15 \\ y \le 10 \\ x+y \le 20 \rightarrow y \le -x+20 \end{cases}$$



b. Use your graph to determine whether you can catch 11 surfperch and 9 rockfish.

Yes! On the (solid) line in overlap area.

Test... (11, 9)

$$\begin{cases} 11 \le 15 \checkmark \\ 9 \le 10 \checkmark \\ 11+9 \le 20 \checkmark \end{cases}$$

4. On a road trip with a friend, you drive 70 miles per hour and your friend drives 60 miles per hour. The two of you want to drive less than 15 hours and at least 600 miles per day. Your friend will drive more than you. How many hours can you and your friend drive per day?

x: #hrs you drive y: #hrs friend drives

$$\begin{cases} 70x+60y \ge 600 \rightarrow 60y \ge -70x+600 \rightarrow y \ge -\frac{7}{6}x+10 \\ x+y < 15 \rightarrow y < -x+15 \\ y > x \end{cases}$$