5.4 – 5.5 **A Practice/Solidify Understanding Task – notes** **Name: _____**

Carlos and Clarita have been worried about space and start-up costs for their pet sitters business, but they realize they also have a limit on the amount of time they have for taking care of the animals they board. To keep things fair, they have agreed on the following time constraints:

x = cat y = dog

- *Feeding Time:* Carlos and Clarita estimate that cats will require 6 minutes twice a day – morning and evening – to feed and clear their litter boxes, for a total of 12 minutes per day for each cat. Dogs will require 10 minutes twice a day to feed and walk, for a total of 20 minutes per day for each dog. Carlos can spend up to 8 hours each day for the morning and evening feedings, but needs the middle of the day off for baseball practice and games.

$12x + 20y \leq 480$

- *Pampering Time:* The twins plan to spend 16 minutes brushing and petting each cat, and 20 minutes a day bathing or playing with each dog. Clarita needs time off in the morning for swim team and evening for her art class, but she can spend up to 8 hours during the middle of the day to pamper and play with the pets.

$16x + 20y \leq 480$

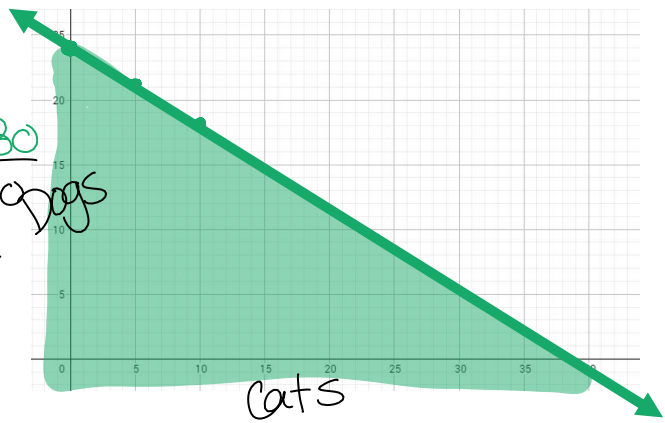
Feeding time inequality and graph: (shade the area that is correct)

$12x + 20y \leq 480$

$-12x \quad -12x$

$\frac{20y}{20} \leq \frac{-12x}{20} + \frac{480}{20}$

$y \leq -\frac{3}{5}x + 24$



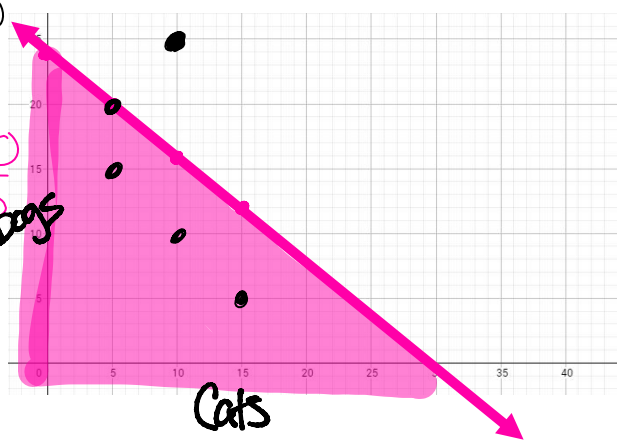
Pampering time inequality and graph: (shade the area that is correct)

$16x + 20y \leq 480$

$-16x \quad -16x$

$\frac{20y}{20} \leq \frac{-16x}{20} + \frac{480}{20}$

$y \leq -\frac{4}{5}x + 24$



Now let's take what you just did and go a little further with it.

Carlos and Carlita have found a way to represent combinations of cats and dogs that satisfy each of their individual "Pet Sitter" constraints, but they realize that they need to find combinations that satisfy all the constraints together at once. Why?

X=cats y=dogs

1. We are going to start with two inequalities that represent *start-up* costs and *space* constraints. Label which one is which.

$$\begin{cases} 32c + 80d \le 1280 \\ 6c + 24d \le 360 \end{cases}$$

start-up

space

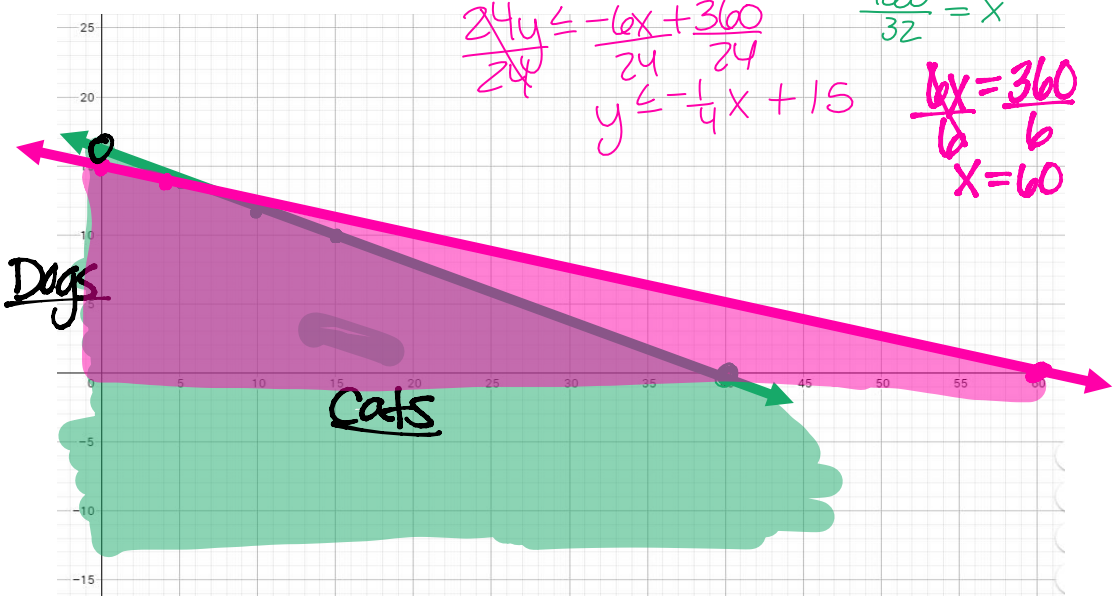
$32x + 80y \le 1280$, $-32x$, $\frac{80y}{80} \le \frac{-32x}{80} + \frac{1280}{80}$, $y \le -\frac{2}{5}x + 16$

2. Given the following graph, shade the region that would represent the **solution set to the system of inequalities**. Show all your work (explain!).

$6x + 24y \le 360$, $-6x$, $\frac{24y}{24} \le \frac{-6x}{24} + \frac{360}{24}$, $y \le -\frac{1}{4}x + 15$

$32x + 80(0) = 1280$, $\frac{1280}{32} = x$

$\frac{6x}{6} = \frac{360}{6}$, $x = 60$



3. Find at least 5 combinations of cats and dogs that would satisfy both of the constraints represented by this system of inequalities. How do you know these combinations work?

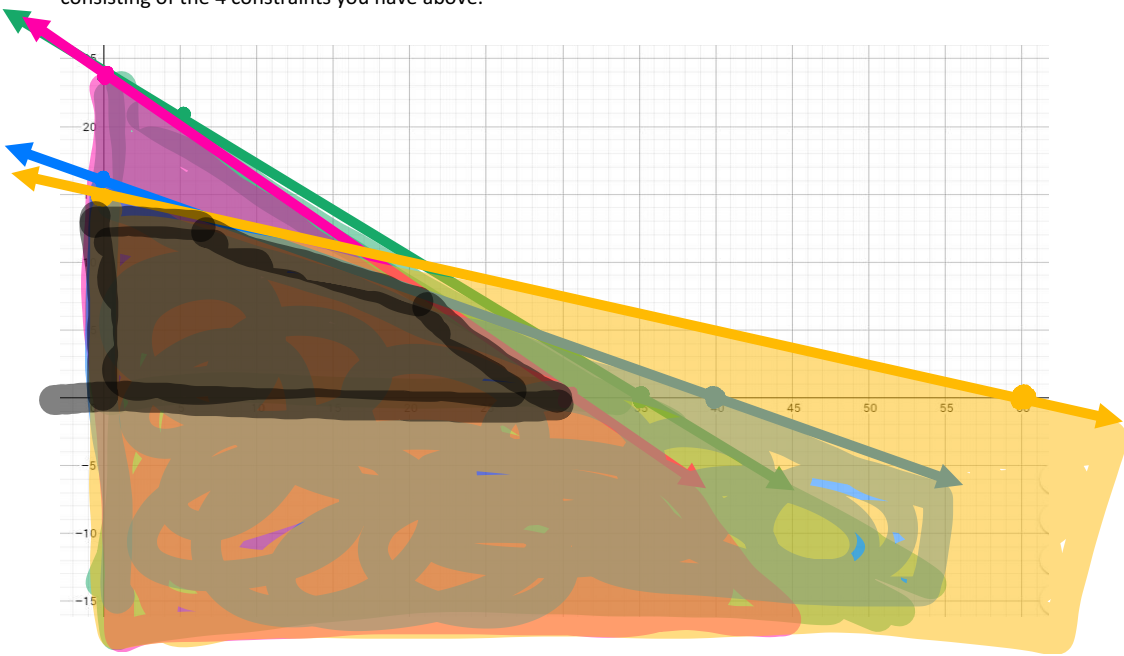
(35,1) (30,2) (5,10) (10,10) (10,5)

4. Find at least 5 combinations of cats and dogs that would satisfy one of the constraints, but not the other. For each combination, explain how you know it works for one of them but not the other?

(40,3) (35,5) (40,5) (0,16) (50,1)

5. Now take the two inequalities above and the two inequalities from the front page that you created and rewrite them all together below here. Be sure to label each inequality as ***start-up***, ***space***, ***feeding time*** and ***pampering time***. $12x + 20y \leq 480$ $y \leq -\frac{3}{5}x + 24$ $16x + 20y \leq 480$ $y \leq -\frac{4}{5}x + 24$ $y \leq -\frac{2}{5}x + 16$ $y \leq -\frac{1}{4}x + 15$

6. Shade a region of the coordinate grid that would represent the solution set to the system of inequalities consisting of the 4 constraints you have above.



7. Find at least 5 combinations of cats and dogs that would satisfy all the constraints above. How do you know these work? (25, 4) (10, 6) (0, 5) (15, 5) (20, 1)

8. Find at least 5 combinations of cats and dogs that would satisfy some of the constraints but not all of them. How do you know that each of these would work for some but not others? (60, 0) (20, 11) (35, 5) (5, 20) (25, 9)

9. Using the highlighter on the grid above, highlight/shade the region that would be the possible number of cats and dogs. **Think**, can you have **negative** cats and/or dogs? So where will your reasonable answer be? Highlight/shade that area.

10. How is the region you just highlighted different that the region you shaded in #6?

1) $y=2x-3$

$y=-x+3$

x y

a) (-2, 5)

b) (2, 1)

c) (4, 5)

$2(-2)-3=5$

$-7=5$

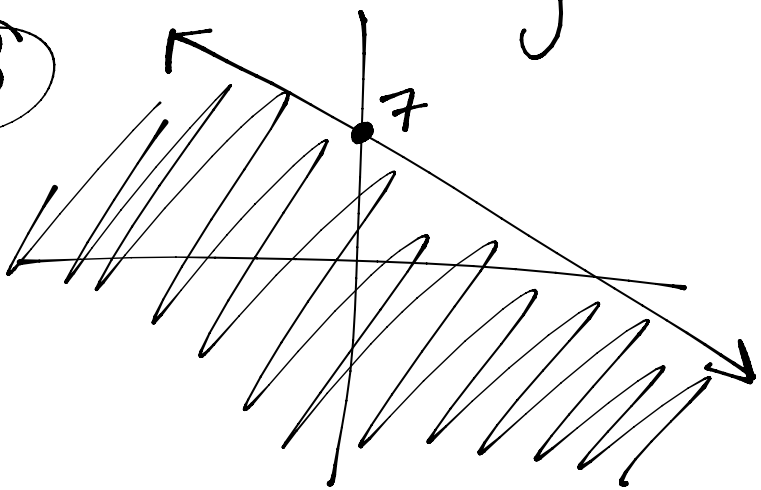
$2(2)-3=1$

$1=1$ ✓

$-(2)+3=1$

$1=1$ ✓

8)



$y \leq -1x+7$

12) $3(h-4)=-3$

$3(3-4)=-3$

$3(-1)=-3$

$-3=-3$ yes