AGS 1 Name: ______________________ Period: _____ Date: ___________

Notes 6.7 – Solving Systems

Warmup

Aiden bought some spiral notebooks and some composition books for the new semester. He bought a total of 13 items. Each spiral cost $1.08 and each composition book was $1.37. He spent a total of $16.36. How many of each did he buy?

n = # of spiral notebooks

c = # of comp books

$n + c = 13$

$1.08n + 1.37c = 16.36$

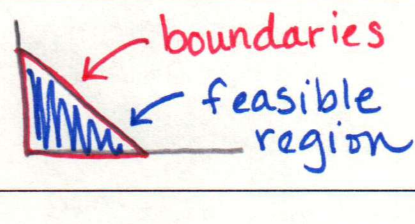
$1.08[n + c = 13]$

$$\begin{aligned} 1.08n + 1.08c &= 14.04 \\ -\,[1.08n + 1.37c &= 16.36] \\ \hline -.29c &= -2.32 \\ \frac{-.29c}{-.29} &= \frac{-2.32}{-.29} \\ c &= 8 \end{aligned}$$

$$\begin{aligned} n + 8 &= 13 \\ -8 \quad & \quad -8 \\ n &= 5 \end{aligned}$$

$\boxed{\text{5 spiral notebooks, 8 comp books}}$

Lesson

Word	Meaning/Notation	Example
Constraint	A condition that must be met, something that limits inputs and outputs	You only have $10 to spend on lunch.
Boundary	The edge of the feasible region (all possible solutions)	

Scenario 1: Scenario 1: Cat pens will require 6 square feet of space, while dog runs require 24 square feet of space. The building has up to 360 square feet of space that can be used for dog runs and cat pens.

Smallest number of dog runs: 0, you cannot have negative dog runs

Largest number of dog runs: 15 $360 \div 24$ = most you can fit

Give the possible number of dog runs in interval notation: [0,15]

Smallest number of cat pens: 0, you cannot have negative cat pens

Largest number of cat pens: 60 $360 \div 6$ = most you can fit

Give the possible number of cat pens in interval notation: [0,60]

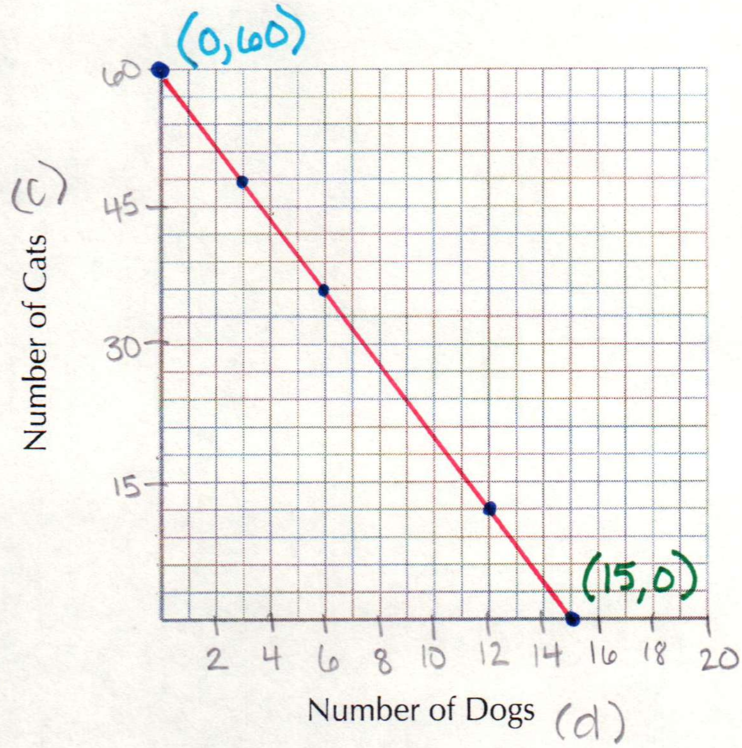
List 3 combinations that do not fit within the constraints.

15 dogs + 60 cats   20 dogs + 0 cats   5 dogs + 60 cats

List 3 combinations that will fit within the constraints.

10 dogs + 10 cats   5 dogs + 0 cats   15 dogs + 0 cats

Plot the constraints on the graph.



Draw a line that connects the maximum dogs to the maximum cats.

This is the boundary.

List 3 combinations that are exactly on the line.

6 dogs + 36 cats

12 dogs + 12 cats

3 dogs + 48 cats

Write an equation for the line you drew.

$24d + 6c = 360$

$$m = \frac{60-0}{0-15} = \frac{60}{-15} = -4$$

$$\boxed{y = -4x + 60}$$

Scenario 2: They have determined that they have $1280 dollars to spend preparing the building to hold pets. They have learned that each dog run will cost $80 and each cat pen will cost $32.

Smallest number of dog runs: 0

Largest number of dog runs: 16 $1280 \div 80 =$

Give the possible number of dog runs in interval notation: $[0, 16]$

Smallest number of cat pens: 0

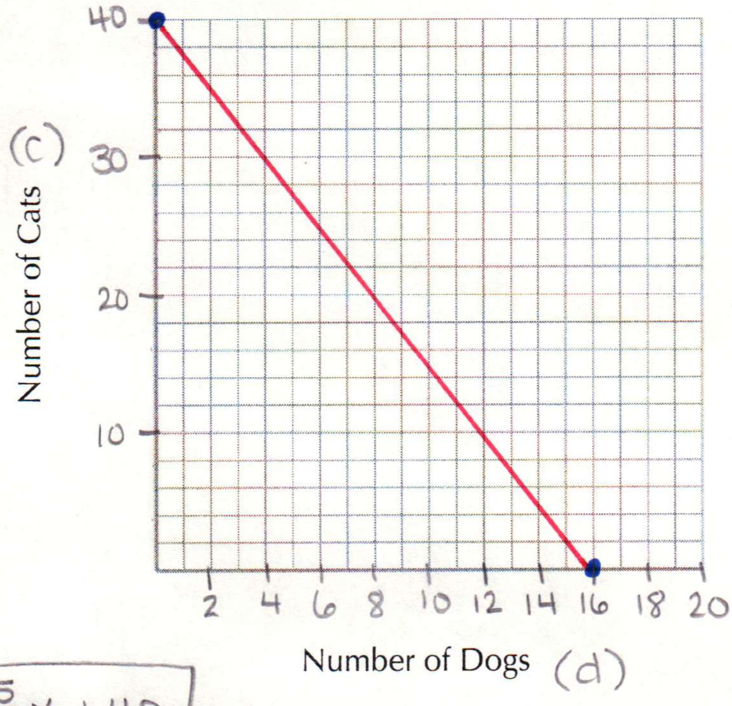
Largest number of cat pens: 40 $1280 \div 32 =$

Give the possible number of cat pens in interval notation: $[0, 40]$

List 3 combinations that do not fit within the constraints.

List 3 combinations that will fit within the constraints.

Plot the constraints on the graph.



Draw a line that connects the maximum dogs to the maximum cats.

This is the boundary.

List 3 combinations that are exactly on the line.

Write an equation for the line you drew.

$80d + 32c = 1280$

$\boxed{y = -\frac{5}{2}x + 40}$

Compare your constraints between the 2 scenarios. What are three possible combinations that satisfy both constraints.

Any answer must be in the feasible region for both graphs.

How to Graph Inequalities

Step 1: Solve for y

$$3x + 2y \le 8$$

$$-3x \qquad -3x$$

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

$$\boxed{y \le -\frac{3}{2}x + 4}$$

Step 2: Determine whether to use a solid line or a dashed line.

Use a dashed line when you have $<$ *or* $>$.

Use a solid line when you have $\le$ *or* $\ge$.

↳ like an equation

Step 3: Graph the line.

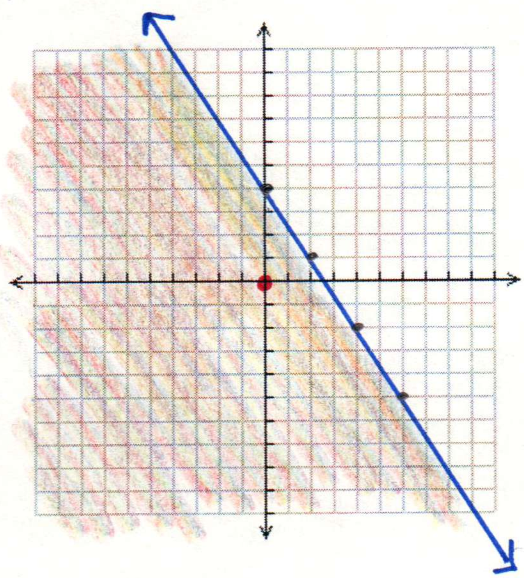
Remember to use a solid or dashed line.

$y \le -\frac{3}{2}x + 4$

↑

solid

$\le$ is below



Step 4: Figure out which side to shade.

Try a point that does not lie on the line in the inequality. ** Hint use (0, 0) when possible.

If the point makes the inequality true, shade that side.

If the point does not make the inequality true, shade the other side.

$3(0) + 2(0) \le 8$

$0 \le 8$

true

$\boxed{(0,0)}$ is a solution

Generally: If you have $<$ *or* $\le$, shade below.
If you have $>$ *or* $\ge$, shade above.

When is the hint above true?

Only when it is written in $y = mx + b$ form.