

5.2 Too Big, or Not Too Big, That Is the Question

A Solidify Understanding Task



CC BY Tjjakool Yiyuan
<https://flic.kr/p/aLrYMT>

As Carlos is considering the amount of money available for purchasing cat pens and dog runs (see below) he realizes that his father's suggestion of boarding "the same number of each, perhaps 12 cats and 12 dogs" is too big. Why?

- *Start-up Costs:* Carlos and Clarita plan to invest much of the \$1280 they earned from their last business venture to purchase cat pens and dog runs. It will cost \$32 for each cat pen and \$80 for each dog run.
1. Find at least 5 more combinations of cats and dogs that would be "too big" based on this *Start-up Cost constraint*. Plot each of these combinations as points on a coordinate grid using the same color for each point.
 2. Find at least 5 combinations of cats and dogs that would be "not too big" based on this *Start-up Cost constraint*. Plot each of these combinations as points on a coordinate grid using a different color for the points than you used in #1.
 3. Find at least 5 combinations of cats and dogs that would be "just right" based on this *Start-up Cost constraint*. That is, find combinations of cat pens and dog runs that would cost exactly \$1280. Plot each of these combinations as points on a coordinate grid using a third color.
 4. What do you notice about these three different collections of points?
 5. Write an equation for the line that passes through the points representing combinations of cat pens and dog runs that cost exactly \$1280. What does the slope of this line represent?

SECONDARY MATH I // MODULE 5
SYSTEMS OF EQUATIONS AND INEQUALITIES - 5.2

Carlos and Clarita don't have to spend all of their money on cat pens and dog runs, unless it will help them maximize their profit.

6. Shade all of the points on your coordinate grid that **satisfy** the *Start-up Costs* constraint.
7. Write a mathematical rule to represent the points shaded in #6. That is, write an inequality whose **solution set** is the collection of points that satisfy the *Start-up Costs* constraint.

In addition to *start-up costs*, Carlos needs to consider how much space he has available, based on the following:

- *Space*: Cat pens will require 6 ft^2 of space, while dog runs require 24 ft^2 . Carlos and Clarita have up to 360 ft^2 available in the storage shed for pens and runs, while still leaving enough room to move around the cages.
8. Write an inequality to represent the solution set for the *space* constraint. Shade the solution set for this inequality on a different coordinate grid.

What do you think? What recommendation would you give to Carlos and Clarita regarding how many cats and dogs to plan on boarding, and what argument would you use to convince them that your recommendation is reasonable?

READY, SET, GO!

Name _____

Period _____

Date _____

READY

Topic: Determining if given values are solutions to a two variable equation.

Identify which of the given points are solutions to the following linear equations.

1. $3x + 2y = 12$

- a. (2, 4)
- b. (3, 2)
- c. (4, 0)
- d. (0, 6)

2. $5x - y = 10$

- a. (2, 0)
- b. (3, 0)
- c. (0, -10)
- d. (1, 1)

3. $-x + 6y = 10$

- a. (-4, 1)
- b. (-22, -2)
- c. (2, 2)
- d. (10, 0)

Find the value that will make each ordered pair be a solution to the given equation.

4. $x + y = 6$

- a. (2, ___)
- b. (0, ___)
- c. (___, 0)

5. $2x + 4y = 8$

- a. (2, ___)
- b. (0, ___)
- c. (___, 0)

6. $3x - y = 8$

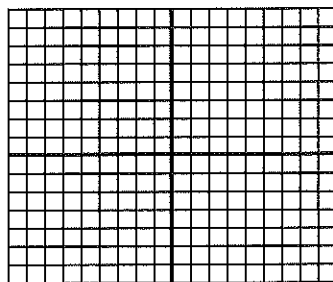
- a. (2, ___)
- b. (0, ___)
- c. (___, 0)

SET

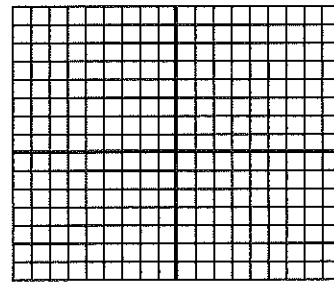
Topic: Graphing linear inequalities

Graph the following inequalities on the coordinate plane. Name one point that is a solution to the inequality and one point that is not a solution. Show algebraically and graphically that your points are correct.

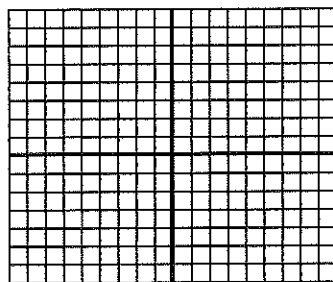
7. $y \leq 3x + 4$



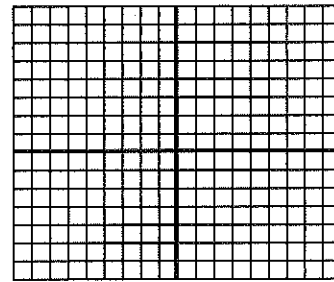
8. $y < 7x - 2$



9. $y > \frac{-3}{5}x + 2$



10. $y \geq -6$



GO

Topic: Solving inequalities

Follow the directions for each problem below. (Show your work!)

11. $10 - 3x < 28$

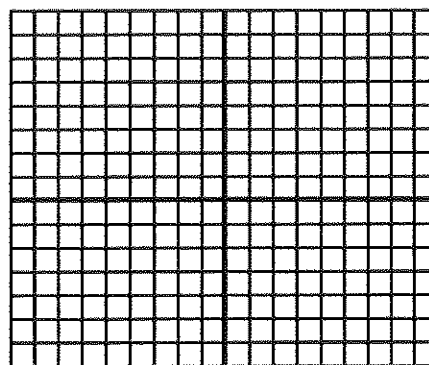
- a) Solve for x . Then graph the solution on the number line.



- b) Select an x -value from your graph of the solution of the inequality. Replace x in the original inequality $10 - 3x < 28$ with your chosen value. Does the inequality hold true?
- c) Select an x -value that is outside of the solution set on your graph. Replace x in the original inequality $10 - 3x < 28$ with your chosen value. Does the inequality still hold true?

12. $4x - 2y \geq 6$

- a) Solve for y .
- b) Rewrite your inequality as an equation. In other words, your solution will say $y =$, instead of $y \geq$ or $y \leq$. When you use the equal sign, the expression represents the equation of a line.



- c) Graph the line that goes with your equation.
- d) Name the y -intercept.
- e) Identify the slope.
- f) Select a point that is above the line. (,)
- g) Replace the x -value and y -value of your chosen point in the inequality $4x - 2y \geq 6$.
- h) Is the inequality still true?
- i) Select a point that is below the line. (,)
- j) Replace the x -value and y -value of your chosen point in the inequality $4x - 2y \geq 6$.
- k) Is the inequality still true?
- l) Explain which side of the line should be shaded.
- m) Decide whether the line should be solid or dotted. Justify your decision.