Algebra 2
1.4 – Linear Programming Practice

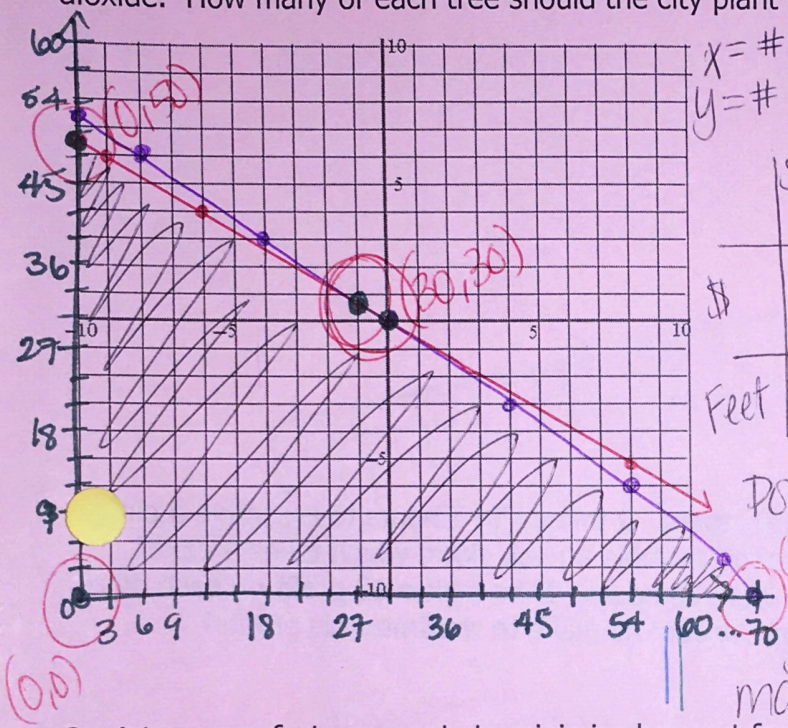
Name: Key

Date: _____ Per: _____

Fix Graphs

Write the inequalities and function needed to answer the problem. Graph the inequalities and list the found vertices. Answer the problem.

1. Trees in urban areas help keep air fresh by absorbing carbon dioxide. A city has $2100 to spend on planting spruce and maple trees. The land available for planting is 45,000 square feet. Spruce trees cost $30 to plant and require 600 square feet of space. Maple trees cost $40 to plant and require 900 square feet of space. Spruce trees absorb 650 lb/yr of carbon dioxide and maple trees absorb 300 lb/yr of carbon dioxide. How many of each tree should the city plant to maximize carbon dioxide absorption?



x = # of spruce trees
y = # of maple trees

Function: $f(x,y) = 650x + 300y$

	Spruce trees x	Maple trees y
$	30x	40y ≤ 2100
Feet	600x	900y ≤ 45000

Points → (0,0) (0,50) (30,30) + (70,0) *

Constraints

$y \le \frac{-3}{4}x + 525$

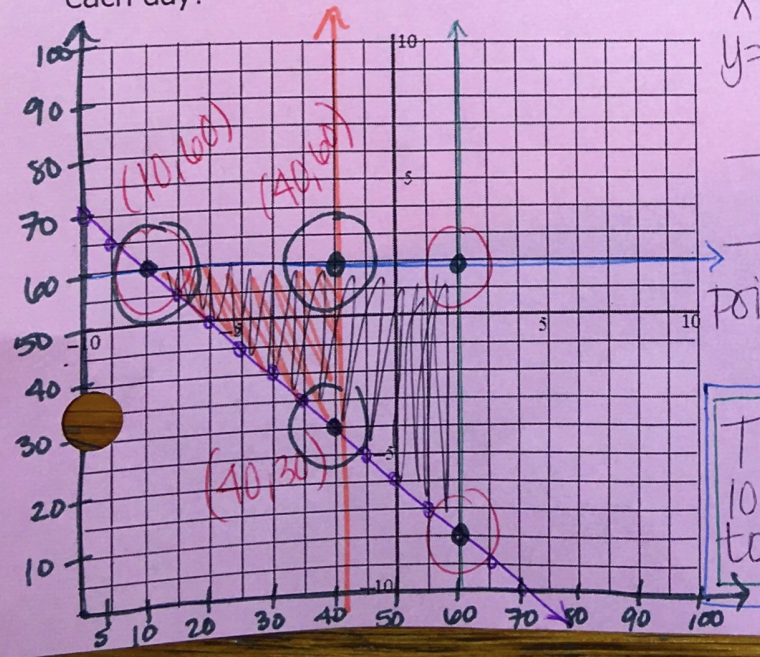
$y \le \frac{-2}{3}x + 50$

$x \ge 0$

$y \ge 0$

The city should plant 70 spruce trees + 0 maple trees to maximize carbondioxide to 45,500.

2. A toy manufacturer wants to minimize her cost for producing two lines of toy airplanes. Because of the supply of materials, no more than 40 Flying Bats can be built each day, and no more than 60 Flying Falcons can be built each day. There are enough workers to build at least 70 toy airplanes each day. It costs $12 to manufacture a Flying Bat and $8 to build a Flying Falcon. What is the minimum possible cost each day?



x = # of bats
y = # of Falcons

Function: $12x + 8y$

Bats x	Falcons y

Points: (10,60) (40,60) (40,30)

Constraints

$x \le 40$ • $x \ge 0$

$y \le 60$ • $y \ge 0$

$x + y \ge 70$

↳ $y \ge -x + 70$

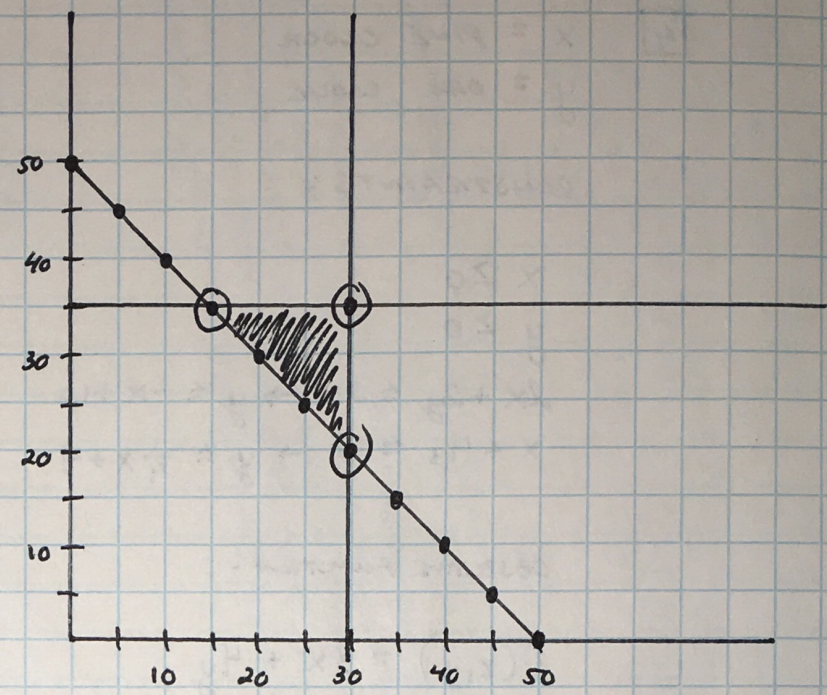
The manufacturer should make 10 flying bats + 60 flying falcons to minimize cost to $600.

3

x = AMBERJACK
y = FLOUNDER

CONSTRAINTS:

$x \geq 0 \quad x \leq 30$
$y \geq 0 \quad y \leq 35$
$x + y \geq 50 \rightarrow y \geq -x + 50$



OBJECTIVE FUNCTION:

$f(x,y) = 4x + 3y$

$(30, 20) = 4(30) + 3(20) = 180$

$(30, 35) = 4(30) + 3(35) = 225$

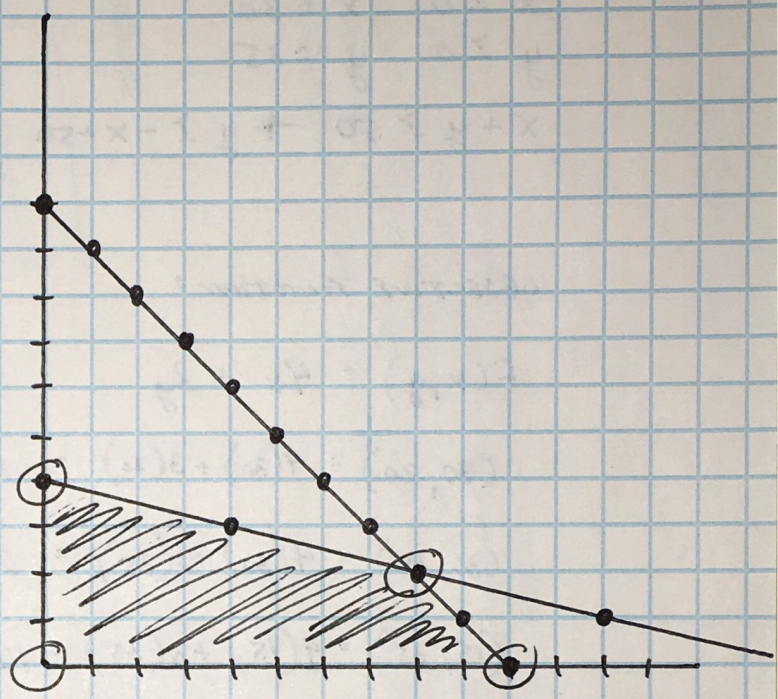
$(15, 35) = 4(15) + 3(35) = 165$

HE SHOULD USE 15 AMBERJACK AND 35 FLOUNDER FISH TO MINIMIZE HIS COST AT \$165.

$\boxed{4}$ x = PINE CLOCK
y = OAK CLOCK

CONSTRAINTS:

$x \geq 0$
$y \geq 0$
$2x + 2y \leq 20 \rightarrow y \leq -x + 10$
$x + 4y \leq 16 \rightarrow y \leq -\frac{1}{4}x + 4$



OBJECTIVE FUNCTION:

$f(x,y) = 3x + 4y$

$(0,0) = 3(0) + 4(0) = 0$

$(0,4) = 3(0) + 4(4) = 16$

$(10,0) = 3(10) + 4(0) = 30$

$(8,2) = 3(8) + 4(2) = 40$

JUAN SHOULD MAKE 8 PINE CLOCKS AND 2 OAK CLOCKS TO MAXIMIZE HIS PROFIT AT \$40.

	ASSEMBLY	VARNISH
PINE	$2x$	$1x$
OAK	$2y$	$4y$
	≤ 20	≤ 16