Integrated Algebra
Linear Programming Strategies 2

Name Key
Date

PRACTICE B. Write the constraints and objective function. Solve.

1. The Cruiser Bicycle Company makes two styles of bicycles: the Traveler, which sells for $300, and the Tourister, which sells $600.

   Each bicycle has the same frame and tires, but the assembly and painting time required for the Traveler is only 1 hour, while it is 3 hours for the Tourister.
   There are 300 frames and 360 hours of labor available for production. How many bicycles of each model should be produced to maximize revenue?

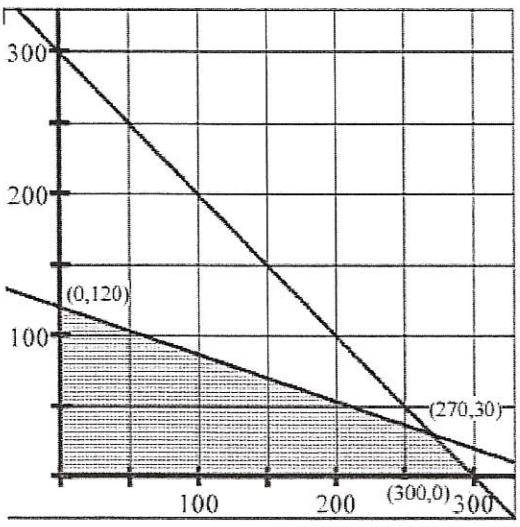
Let x = # of Travelers y = # of Touristers

Constraints:

	x		y		
assembly (hrs)	1x	+	3y	≤	360
# frames	1x	+	y	≤	300

Objective Function: $R = 300x + 600y$

Given that the graph below is the graph of your constraints, state the vertices. Then find the number of each model that would maximize revenue.



Vertices & Test

(0, 120) $R = 300(0) + 600(120) = 72{,}000$

(270, 30) $R = 300(270) + 600(30) = 81000 + 18000 = 99{,}000$

(300, 0) $R = 300(300) = 90{,}000$

(0, 0) 0

Solution in a sentence:

The Company would make a maximum profit of $99,000 if they make 270 Travelers & 30 Touristers.

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2. The area of a parking lot is 600 square meters.

A car requires 6 square meters.
A bus requires 30 square meters.

The attendant can handle only 60 vehicles.

If a car is charged $2.50 and a bus $7.50, how many of each should be accepted to maximize income?

Let x = # cars y = # buses

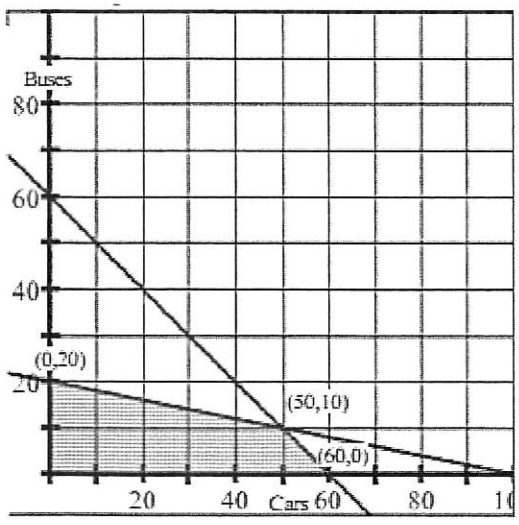
Constraints:

	x		y		total
square meters	$6x$	+	$30y$	≤ 600	
# vehicles	x	+	y	≤ 60	

$x \geq 0$
$y \geq 0$

Objective Function: $I = 2.50x + 7.50y$

If the graph below represents this problem, find the number of cars and the number of buses that would maximize income.



0, 20

50, 10 $200

60, 0

0, 0

Write the solution in a sentence:

They should accept 50 cars and 10 buses for a max income of $200.

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PRACTICE C

Write the constraints and objective function for each problem. Then graph and solve the problem.

1. 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?

Let x = # bats Let y = # falcons

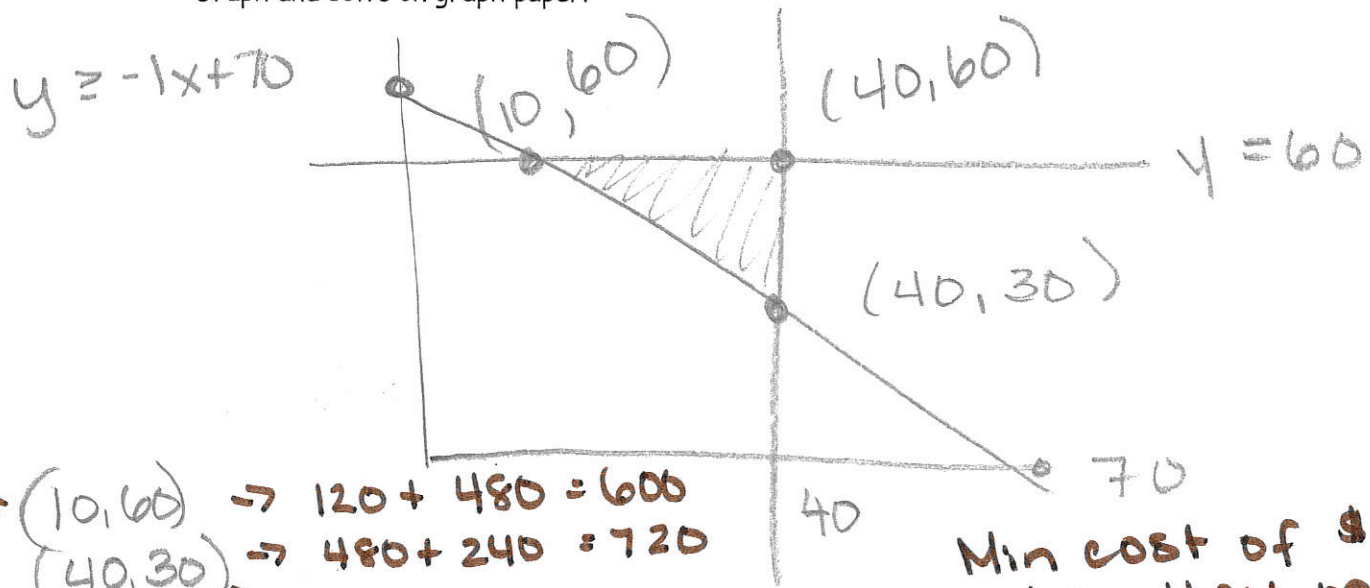
	bats	falcons		total
worker	x	+ y	≥	70
material	x		≤	40
		y	≤	60

Constraints:

1. $x + y \geq 70$
2. $x \leq 40$
3. $y \leq 60$
4. $x \geq 0$
5. $y \geq 0$

Objective function: $C = 12x + 8y$

Graph and solve on graph paper!



* (10,60) → 120 + 480 = 600
(40,30) → 480 + 240 = 720
(40,60) → 480 + 480 = 960

Min cost of $600 when they make 10 bats & 60 falcons

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2. A seafood restaurant owner orders at least 50 fish.

He cannot use more than 30 carp or more than 35 flounder.

Carp costs $4 each and flounder costs $3 each.

How many of each fish should he use to minimize his cost?

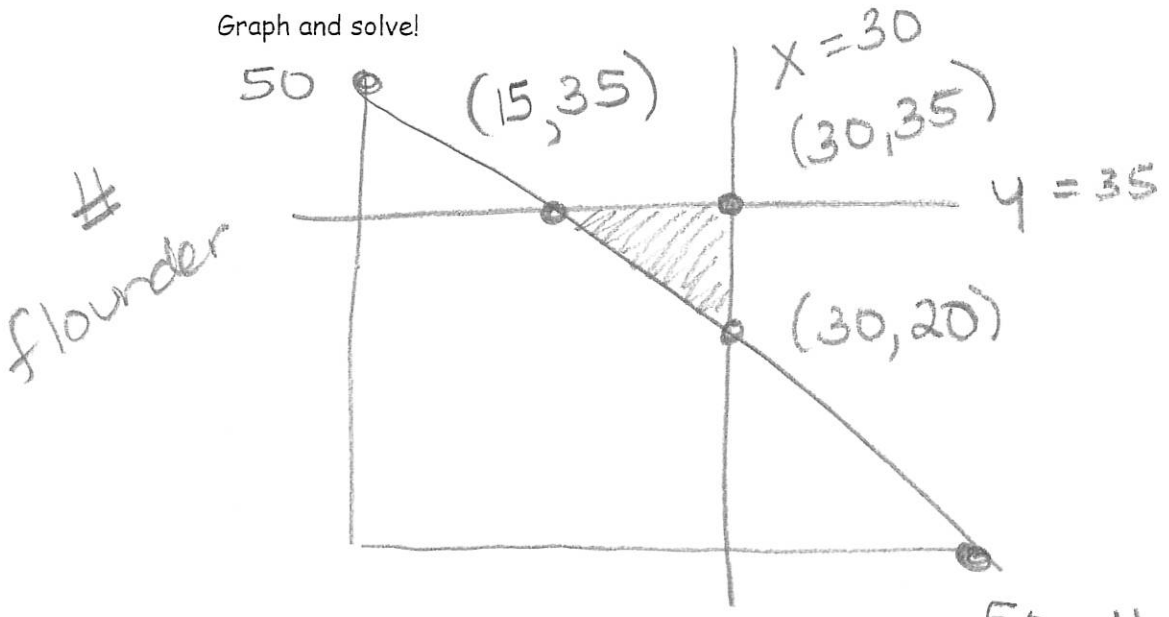
Let x = # carp let y = # flounder

Constraints:

1. $x \leq 30$
2. $y \leq 35$
3. $x + y \geq 50$
4. $x \geq 0$
5. $y \geq 0$

Objective function: $C = 4x + 3y$

Graph and solve!



(30,20) → 120 + 60 = 180

(30,35) = 120 + 105 = 225 x

(15,35) = 60 + 105 = 165 x

He should use 15 carp and 35 flounder for a min cost of $165.