Intermediate Algebra A
Unit 1 Review LT 1.3

Name Baxter
Period___Date_____

Learning Target 1.3: I can use the theory of linear programming to optimize a real world situation.

Linear Programming – Level 1 (earns a C on LT 1.3)

A carpenter makes tables and chairs. Each table can be sold for a profit of $30 and each chair for a profit of $10. The carpenter can afford to spend up to 42 hours per week working and takes three hours to make a chair and six hours to make a table. The carpenter has a small shop and has limited room for storage. He has only 40 cubic feet available for storage. Chairs take 5 cubic feet of storage and the tables are collapsible and only take 4 cubic feet of storage.

a. Identify the variables:

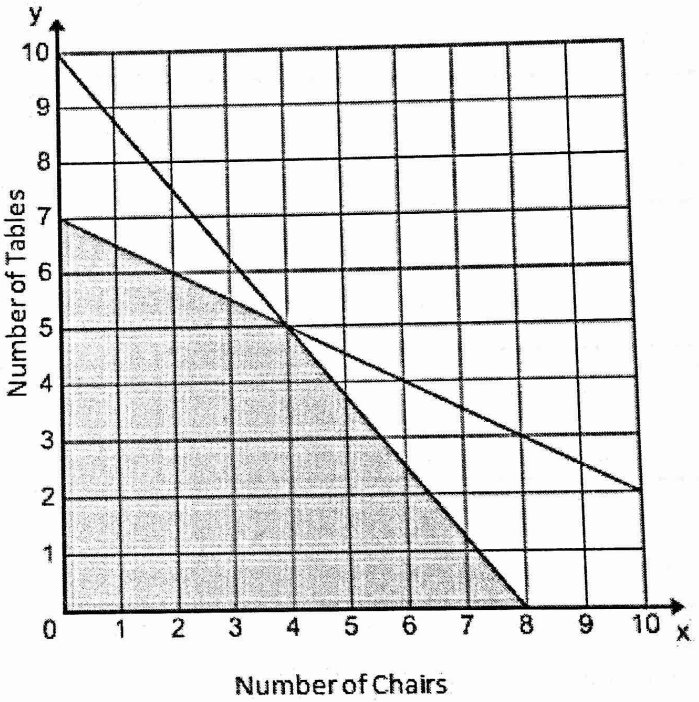
x = # of chairs
y = # of tabels

b. Write an objective function for the profit:

P = 30x + 10y

c. List the vertices and find the profit

Vertex	Profit
(0,0)	0
(8,0)	240
(0,7)	70
(4,5)	170



Constraints:
Storage: $5x + 4y \leq 40$
Time: $3x + 6y \leq 42$

d. Make a recommendation for the carpenter (how many of each should he make and what is his maximum profit)

8 chairs 0 tables for a profit of $240

Linear Programming – Level 2 (earns a B on LT 1.3)

Piñatas are made to sell at a craft fair. It takes 2 hours to make a mini piñata and 3 hours to make a regular-sized piñata. The owner of the craft booth will make a profit of $12 for each mini piñata sold and $24 for each regular-sized piñata sold. If the craft booth owner has no more than 30 hours available to make piñatas and wants to have at least 12 piñatas total to sell, how many of each size piñata should be made to maximize profit?

a. Define the variables

x = # of mini piñatas

y = # of Regular piñatas

b. Write the objective function used to maximize the profit

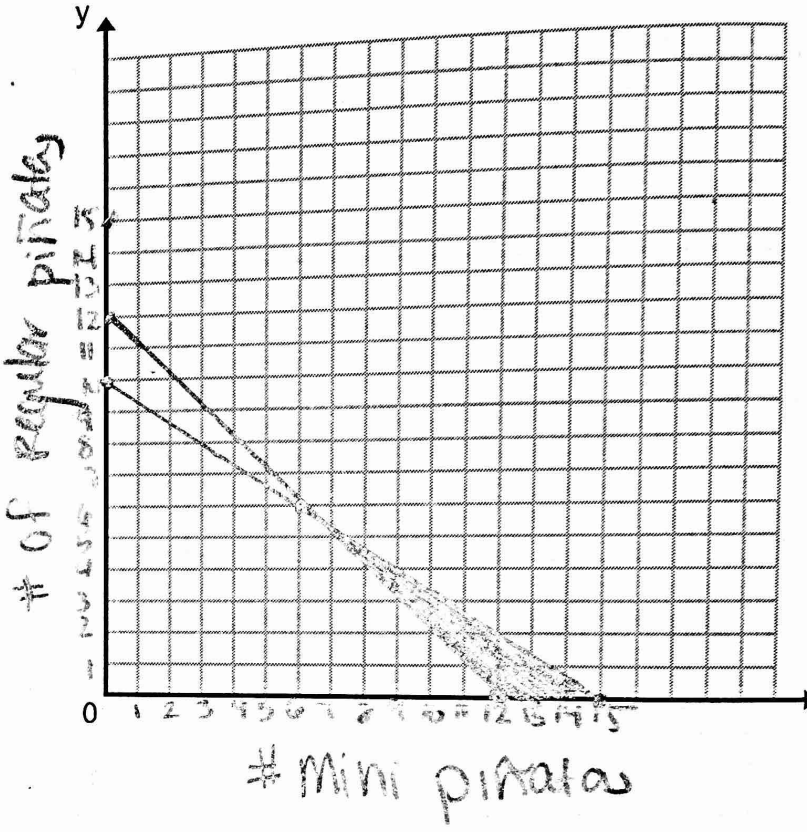
$12x + 24y = P$

c. Constraints

Total Number of Piñatas:

$x + y \geq 12$

Time: $2x + 3y \leq 30$



d. Graph the constraints and shade the feasible region.

e. List the vertices and find the profit for each vertex

Vertex	Profit
(12,0)	144
(15,0)	180
(6,6)	216

6 mini piñatas and 6 Regular piñatas for Profit $216

Name_____
Period___Date_____

f. **Make a recommendation (how many of each type should be made and what is the maximum profit)**

Linear Programming – Level 3 (earns an A on LT 1.3)

A farmer has 10 acres to plant wheat and rye. He has to plant at least 7 acres total. However, he has only $1200 to spend and each acre of wheat costs $200 to plant and each acre of rye costs $100 to plant. Moreover, the farmer has to get the planting done in 12 hours and it takes an hour to plant an acre of wheat and 2 hours to plant an acre of rye. The profit is $500 per acre of wheat and $300 per acre of rye.

How much of each type of plant should the farmer plant to maximize profit? What is the farmer's maximum profit?

X- # of acres of Wheat

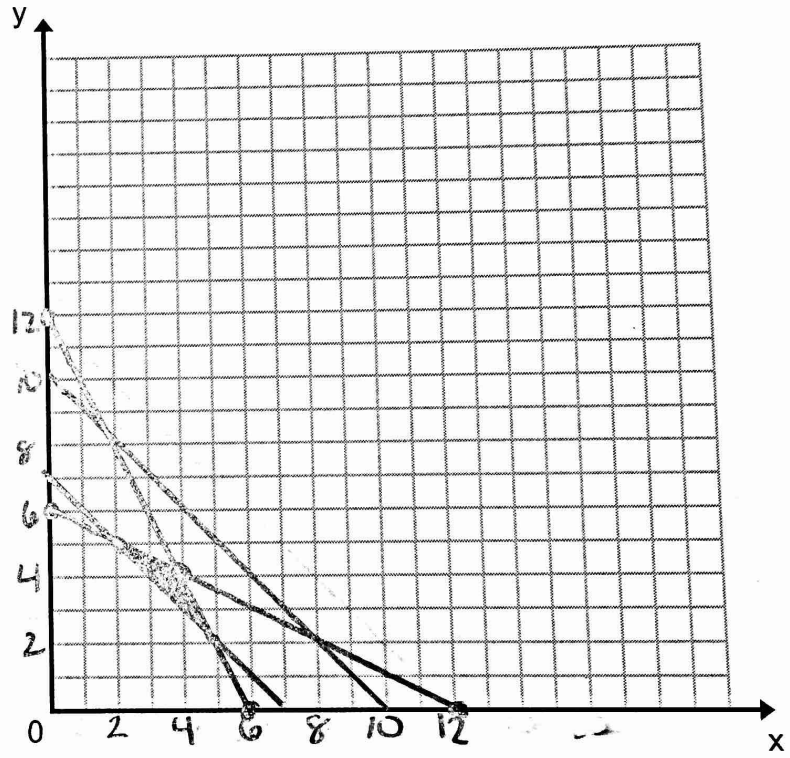
Y- # of acres of Rye

$x+y \geq 7$

$x+y \leq 10$

$1{,}200 \geq 200x + 100y$ (6,0) & (0,12)

$12 \geq x + 2y$



$P = 500x + 300y$

(2,5) $500(2)+300(5) = 2500$

(5,2) $500(5)+300(2) = 3100$ Wheat

(4,4) $500(4)+300(4) = 3200$

4 acres of wheat 4 acres of Rye for profit of $3,200