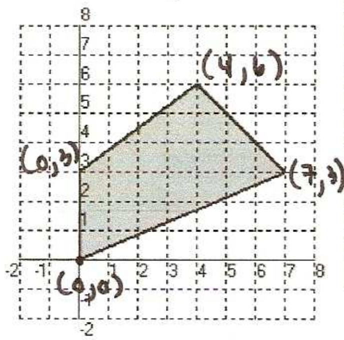
Algebra 2 Worksheet
Section 3.4

Name: Key

Period: ______

I. Find the values of x and y that maximize and minimize the objective function for the feasible region. Also find the maximum and minimum vales. SHOW YOUR WORK.

1. $P = 4x + 3y$



Maximum Value of 37 at (7 , 3).

Minimum Value of 0 at (0 , 0).

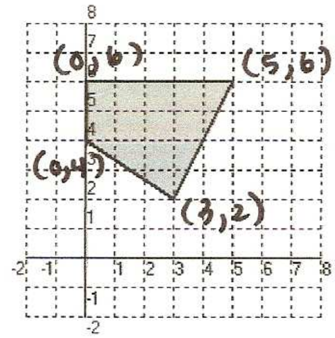
$P = 4(0) + 3(0) = 0$

$P = 4(0) + 3(3) = 9$

$P = 4(4) + 3(6) = 34$

$P = 4(7) + 3(3) = 37$

2. $C = 3x + 2y$



Maximum Value of 27 at (5 , 6).

Minimum Value of 8 at (0 , 4).

$C = 3(0) + 2(4) = 8$

$C = 3(0) + 2(6) = 12$

$C = 3(3) + 2(2) = 13$

$C = 3(5) + 2(6) = 27$

II. Graph the system of restrictions, identify the vertices of the feasible region, and find the vertex that maximizes the objective function. Also give the maximum value.

3. MINIMIZE $C = x + 3y$

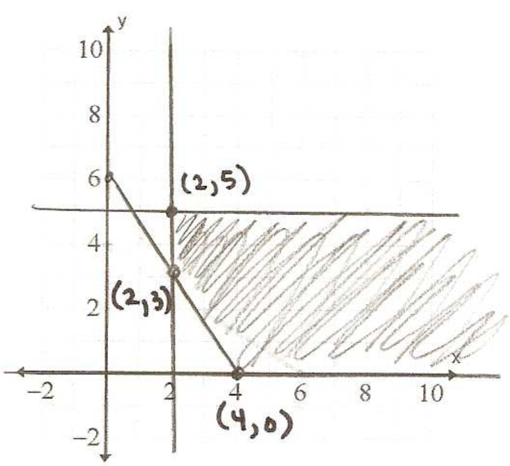
$$\begin{cases} 2x + 3y \geqq 12 \\ x \geq 2 \\ y \leqq 5 \end{cases}$$

Minimum ~~Maximum~~ Value of 4 at (4 , 0).

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

$C = 2 + 3(3) = 11$

$C = 2 + 3(5) = 17$



4. MAXIMIZE $P = 3x + 2y$

$$\begin{cases} x + 2y \leq 12 \quad y \leq -\tfrac{1}{2}x + 6 \\ 0 \leq x \leq 8 \\ 0 \leq y \leq 5 \end{cases}$$

Maximum Value of 28 at (8 , 2).

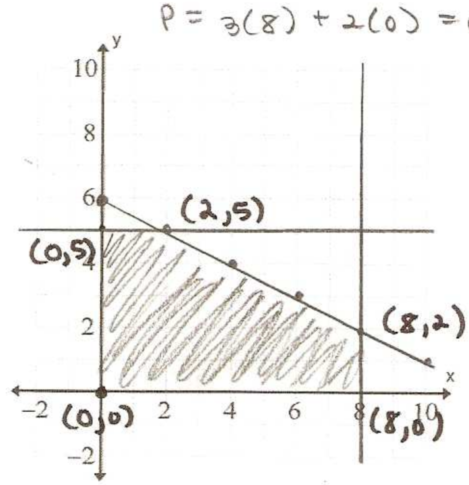
$P = 3(0) + 2(0) = 0$

$P = 3(0) + 2(5) = 10$

$P = 3(2) + 2(5) = 16$

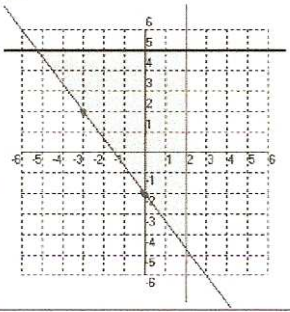
$P = 3(8) + 2(2) = 28$

$P = 3(8) + 2(0) = 0$



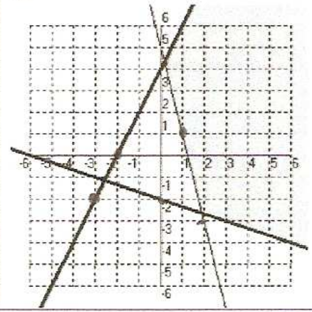
III. Which restrictions are graphed? For each feasible region, list the restrictions. All lines are solid.

5.



$$\begin{cases} y \le 5 \\ x \le 2 \\ y \ge -\frac{4}{3}x - 2 \end{cases}$$

6.



$$\begin{cases} y \le 2x + 4 \\ y \ge -4x + 5 \\ y \ge -\frac{1}{3}x - 2 \end{cases}$$

IV. Define two variables and list 4 restrictions for the problem. Then identify the objective function. **DO NOT SOLVE.**

7. A model maker agrees to produce at least 5 prototypes of a new puzzle. The puzzle can be produced in plastic or metal. It takes 2 hours to produce the plastic model and 3 hours to produce the metal model. The model maker has at most 18 hours to devote to this project. The plastic model costs $7 to produce and the metal model costs $5 to produce. Find how many of each prototype he should make to minimize his cost.

Define your variables:

$x =$ # plastic prototypes

$y =$ # metal prototypes

List your restrictions:

1. $x + y \ge 5$
2. $x \ge 0$
3. $y \ge 0$
4. $2x + 3y \le 18$

Identify your objective function:

$C = 7x + 5y$

8. A baker makes bran muffins and corn muffins that are sold by the box. The baker can sell at most 20 boxes of bran muffins and 15 boxes of corn muffins per day. It takes 1 hour to make a box of bran muffins and 1 hour to make a box of corn muffins. The baker has 30 hours per week to bake muffins. The profit on a box of bran muffins is $1.25 per box. The profit on the corn muffins is $1.35 a box. Determine how many boxes of each he should bake to maximize profits.

Define your variables:

$x =$ # boxes bran muffins

$y =$ # boxes corn muffins

List your restrictions:

1. $x \le 20$
2. $y \le 15$
3. $x \ge 0, y \ge 0$
4. $x + y \le 30$

Identify your objective function:

$P = 1.25x + 1.35y$

V. Put it all together. Define two variables, list the restrictions for the problem, and identify the objective function. THEN SOLVE.

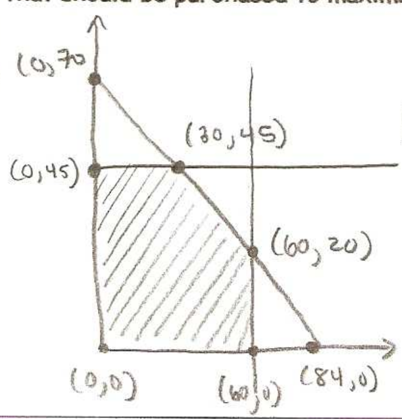
9. A supermarket wants to purchase automatic hand-held price labelers. ~~The first type~~ Type A labeler can label 7 items per minute and costs $5. ~~The second type of label~~ Type B labeler can label 10 items per minute and costs $6. The manufacturer can supply at most 60 of type A and 45 of type B of these labelers. The supermarket wants to limit its costs to $420. Determine how many of each type of labeler that should be purchased to maximize the number of items that can be processed.

$x =$ # Type A labelers

$y =$ # Type B labelers

$$\begin{cases} 5x + 6y \le 420 \\ 0 \le x \le 60 \\ 0 \le y \le 45 \end{cases}$$

$P = 7x + 10y$



$P = 7(0) + 10(0) = 0$

$P = 7(0) + 10(45) = 450$

$\boxed{P = 7(30) + 10(45) = 660}$

$P = 7(60) + 10(20) = 620$

$P = 7(60) + 10(0) = 420$

$\boxed{\text{30 Type A and 45 Type B}}$