

Advanced Algebra Honors
Linear Programming Worksheet

Name: _____
Babich

- (1) Superbats Inc. manufactures two different types of wood baseball bats, the Homer-Hitter and the Big Timber. The Homer-Hitter takes 8 hours to trim and turn on the lathe and 2 hours to finish. Each Homer-Hitter sold makes a profit of \$17. The Big Timber takes 5 hours to trim and turn on the lathe and 5 hours to finish, and its profit is \$29. The total time available for trimming and lathing is 80 hours. The total available time for finishing is 50 hours.
- (a) What are your variables and what do they represent?
- (b) Write the objective quantity equation.
- (c) Write the system of inequalities that describes the constraints.
- (d) Graph the system of inequalities and find the vertices.
- (e) How many of each type should be produced in order to maximize their profit? What is the maximum profit?
- (2) One of the dolls that Dolls R Us manufactures is called the Talking Tommy doll. Another doll without the talking mechanism is called the Silent Sally doll. Eight Talking Tommy dolls can be produced in one hour. Twenty Silent Sally dolls can be made in the same time. Because of the demand, the company must produce at least twice as many Talking Tommy dolls as Silent Sally dolls. The company spends no more than 48 hours a week producing these two dolls. The profit on each Talking Tommy is \$3.00, and the profit for each Silent Sally is \$7.50.
- (a) What are your variables and what do they represent?
- (b) Write the objective quantity equation.
- (c) Write the system of inequalities that describes the constraints.
- (d) Graph the system of inequalities and find the vertices.
- (e) How many of each type should be produced in order to maximize profit? What is the maximum profit?
- (3) TV Electronics Inc. makes console and wide-screen televisions. The equipment in the factory allows for manufacturing at most 450 console televisions and 200 wide-screen televisions in one month. The chart below shows the cost of making each type of television, as well as the profit for each.

Television	Cost Per Unit	Profit Per Unit
Console	\$600	\$125
Wide-Screen	\$900	\$200

During the month of November, the company can spend \$360,000 to make these televisions.

- (a) What are your variables and what do they represent?
- (b) Write the objective quantity equation.
- (c) Write the system of inequalities that describes the constraints.
- (d) Graph the system of inequalities and find the vertices.
- (e) How many of each type should be produced in order to maximize profit? What is the maximum profit?

- (4) Stitches Inc. can make at most 30 jean jackets and 20 leather jackets in a week. It takes a worker 10 hours to make a jean jacket and 20 hours to make a leather jacket. The total number of hours by all of the employees can be no more than 500 hours per week. The profit on a jean jacket is \$20, and the profit on a leather jacket is \$50.
- What are your variables and what do they represent?
 - Write the objective quantity equation.
 - Write the system of inequalities that describes the constraints.
 - Graph the system of inequalities and find the vertices.
 - How many of each type should be produced in order to maximize profit? What is the maximum profit?
- (5) A farmer has asked you for advice on the best strategy for planting wheat and corn on her 500-acre farm. To make it through harvest time, each acre of wheat she plants will require 1 person-day of labor and other expenses of \$20. Each acre of corn she plants will require 5 person-days of labor and expenses of \$30. The farmer has \$11,400 and 1480 person-days of labor available, and she expects to make a profit of \$90 per acre of wheat and \$120 per acre of corn.
- What are your variables and what do they represent?
 - Write the objective quantity equation.
 - Write the system of inequalities that describes the constraints.
 - Graph the system of inequalities and find the vertices.
 - How many acres of each type of crop should she plant to maximize her profit? What is the maximum profit?
- (6) An automobile manufacturer makes cars and trucks in a factory that is divided up into two different shops. The first shop, which does the basic assembly, needs 5 worker-days per truck and 2 worker-days per car. The second shop, which does the finishing touches, needs 3 worker-days for both cars and trucks. The first shop has 180 worker-days available per week and the second shop has 135 worker-days available. The profit per car is \$500 and the profit per truck is \$700
- What are your variables and what do they represent?
 - Write the objective quantity equation.
 - Write the system of inequalities that describes the constraints.
 - Graph the system of inequalities and find the vertices.
 - How many of each type should be produced in order to maximize profit? What is the maximum profit?

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o Answer the questions and write your answers in the spaces provided. Show your work when appropriate.

1)

a) VARIABLES:

$x =$ Homer Hitter

$y =$ Big Timber

b) OBJECTIVE QUANTITY:

$P = 17x + 29y$

c) CONSTRAINTS:

$8x + 5y \leq 80$

$2x + 5y \leq 50$

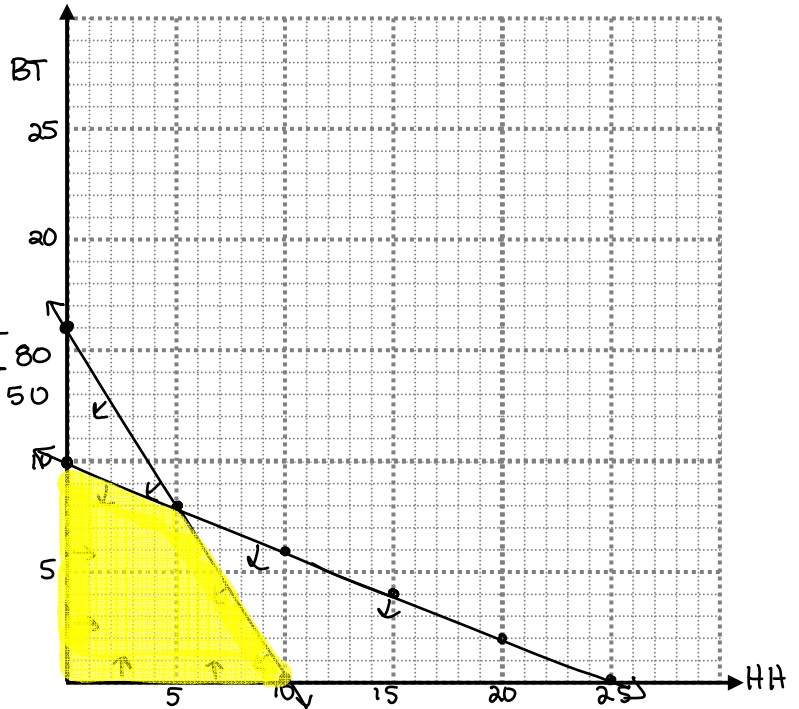
$x \geq 0$

$y \geq 0$

$y \leq -\frac{8}{5}x + 16$

$y \leq -\frac{2}{5}x + 10$

	H	B
T	8	$5 \leq 80$
F	2	$5 \leq 50$



5 Homer Hitters & 8 Big Timbers
for \$317

d) GRAPH →

e) (0,10) 290

(0,0) 0

(10,0) 170

(5,8) 317

2)

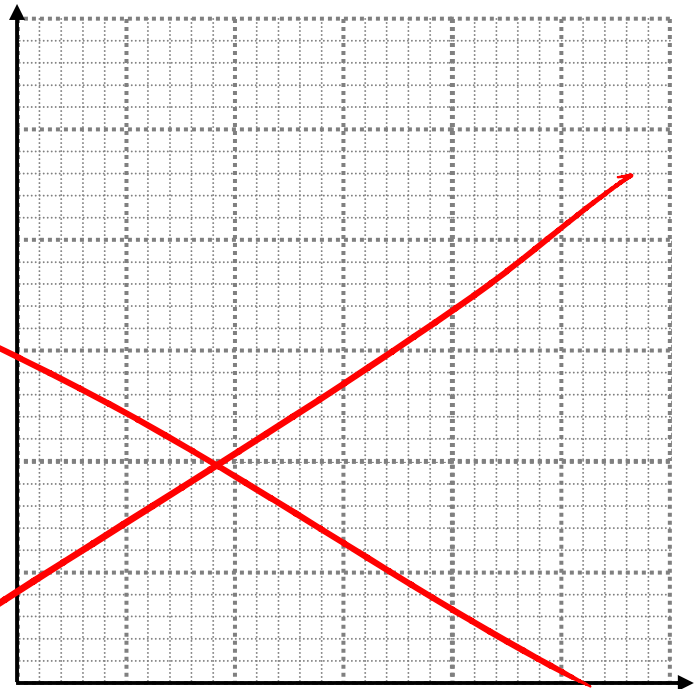
a) VARIABLES:

$x =$ _____

$y =$ _____

b) OBJECTIVE QUANTITY:

c) CONSTRAINTS:



d) GRAPH →

e) _____

3)

a) VARIABLES:

$x =$ Console

$y =$ Wide screen

b) OBJECTIVE QUANTITY:

$P = 125x + 200y$

c) CONSTRAINTS:

$0 \leq x \leq 450$

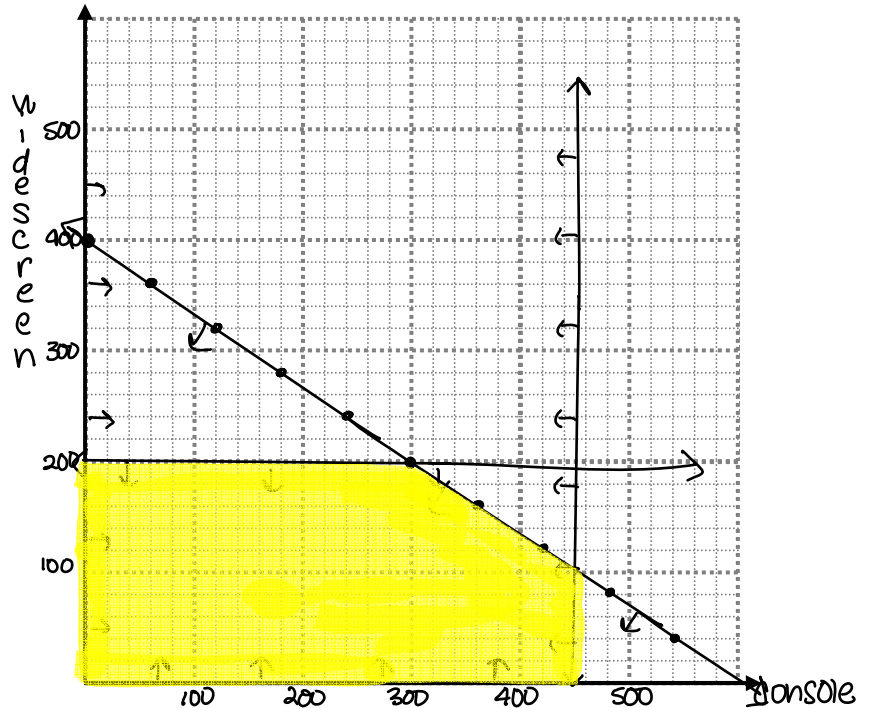
$0 \leq y \leq 200$

$600x + 900y \leq 360,000$

$y \leq -\frac{2}{3}x + 400$

d) GRAPH \longrightarrow

e) (0, 200)	40,000
(0, 0)	0
(450, 0)	56,250
(450, 100)	76,250
(300, 200)	77,500



300 consoles and 200 widescreens for \$77,500

4)

a) VARIABLES:

$x =$ jean jackets

$y =$ leather jackets

b) OBJECTIVE QUANTITY:

$P = 20x + 50y$

c) CONSTRAINTS:

$0 \leq x \leq 30$

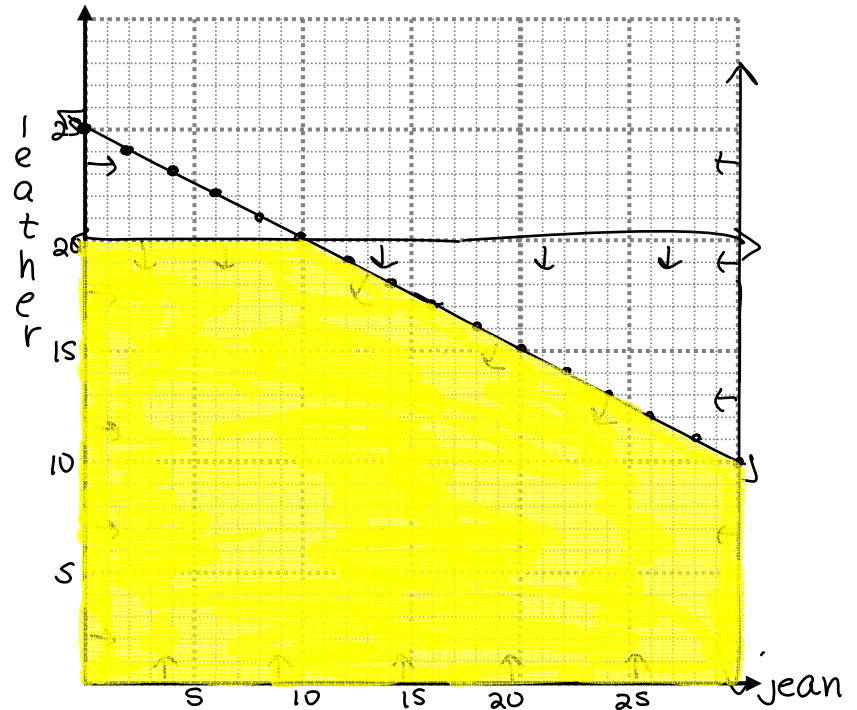
$0 \leq y \leq 20$

$10x + 20y \leq 500$

$y \leq -\frac{1}{2}x + 25$

d) GRAPH \longrightarrow

e) (0, 20)	1000
(0, 0)	0
(30, 0)	600
(30, 10)	1100
(10, 20)	1200



10 jean jackets & 20 leather jackets for \$1200

5)

a) VARIABLES:

$x =$ acres of wheat

$y =$ acres of corn

b) OBJECTIVE QUANTITY:

$$P = 90x + 120y$$

c) CONSTRAINTS:

$$x + y \leq 500$$

$$x + 5y \leq 1480$$

$$20x + 30y \leq 11400$$

$$x \geq 0$$

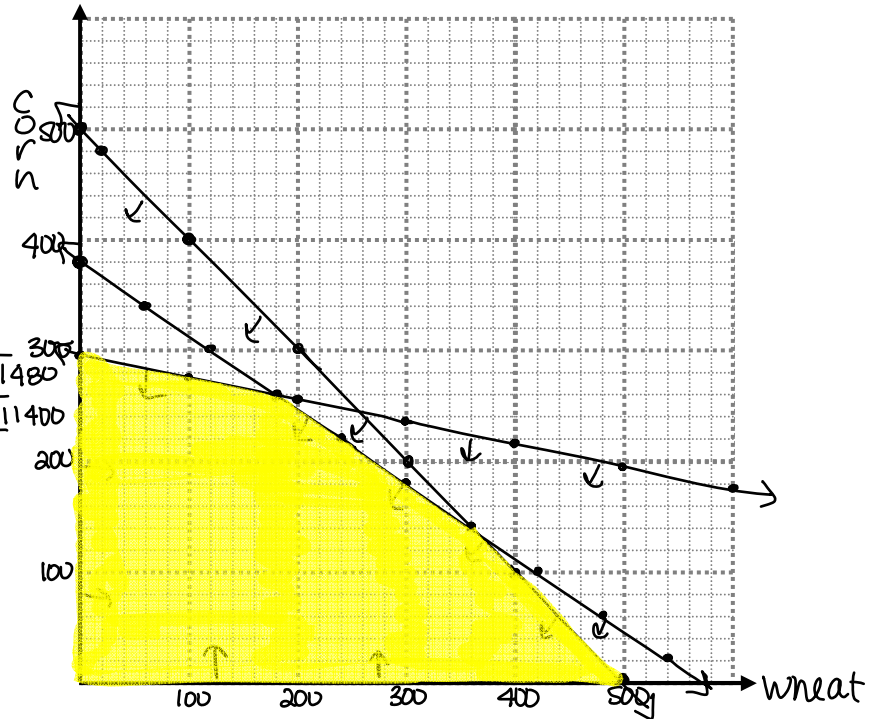
$$y \geq 0$$

$$y \leq -x + 500$$

$$y \leq -\frac{1}{5}x + 296$$

$$y \leq -\frac{2}{3}x + 380$$

	w	c	
L	1	5	1480
E	20	30	11400



d) GRAPH →

e) (0, 300)	36,000
(180, 260)	47,400
(360, 140)	49,200
(500, 0)	45,000

360 acres of wheat & 140 acres of corn for \$49,200

6)

a) VARIABLES:

$x =$ trucks

$y =$ cars

b) OBJECTIVE QUANTITY:

$$P = 700x + 500y$$

c) CONSTRAINTS:

$$5x + 2y \leq 180$$

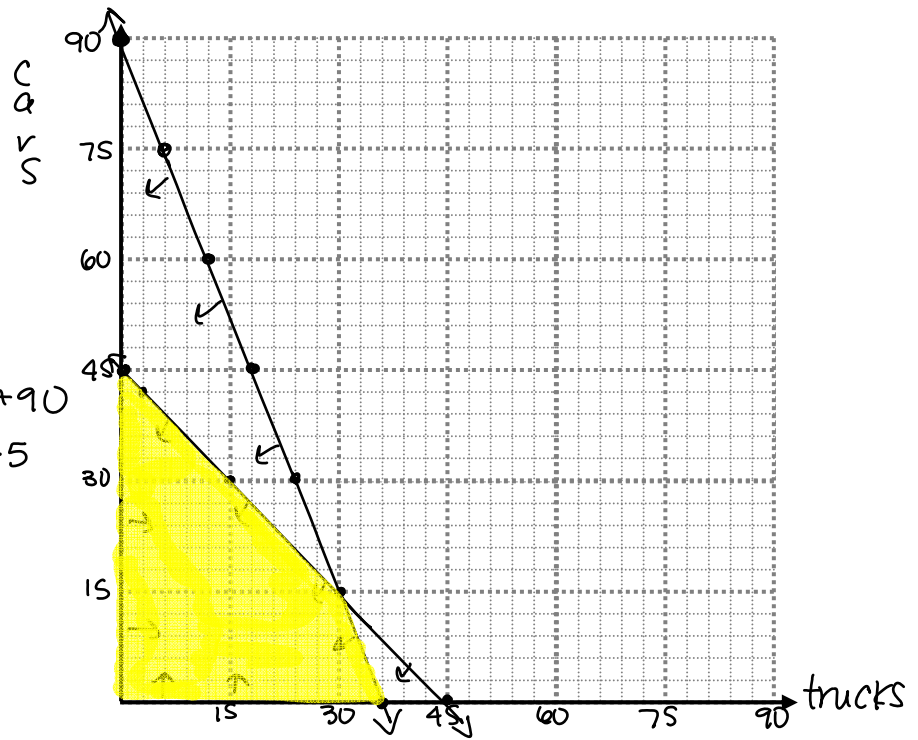
$$3x + 3y \leq 135$$

$$x \geq 0$$

$$y \geq 0$$

$$y \leq -\frac{5}{2}x + 90$$

$$y \leq -x + 45$$



d) GRAPH →

e) (0, 45)	22,500
(0, 0)	0
(36, 0)	25,200
(30, 15)	28,500

30 trucks & 15 cars for \$28,500