

USDA - ICP

1. Marsha is buying plants and soil for her garden. The soil cost \$4 per bag, and the plants cost \$10 each. She wants to buy at least 5 plants and can spend no more than \$100. Identify the constraints and write a system of linear inequalities to model the situation.

Constraints: \$4⁰⁰ per bag of soil, \$10 per plant
Spend \leq \$100, \geq 5 plants,

$x = \#$ bags of soil
 $y = \#$ plants

Inequalities:

$$y \geq 5$$

$$4x + 10y \leq 100$$

2. Jonah is going to the store to buy candles. Small candles cost \$2.50 and large candles cost \$5.00. He needs to buy at least 20 candles, and he cannot spend more than \$80. Identify the constraints and write a system of linear inequalities that represent the situation.

Constraints: total cost \leq \$80⁰⁰, \geq 20 candles, \$2.50 per small candle,
\$5⁰⁰ per large candle.

Inequalities:

$$2.50x + 5y \leq 80$$

$$x + y \geq 20$$

$x = \#$ of small cndls
 $y = \#$ l. candles

3. John is packing books into boxes. Each box can hold either 28 small books or 7 large books. He needs to pack at most 35 boxes and at least 350 books. Identify the constraints and write a system of linear inequalities to represent the situation. John has way more small books than large books so he would prefer to have more boxes of small books than boxes of large books.

Constraints: 28 small books per box, 7 large books per box,
 \geq 350 books total, \leq 35 boxes total, more boxes of

Inequalities:

$$x + y \leq 35$$

$$28x + 7y \geq 350$$

$$y < x$$

small books than
boxes of large books

$x = \#$ boxes of small bks

$y = \#$ boxes of lg bks

$$x > y$$

4. Mary babysits for \$4 per hour. She also works as a tutor for \$8 per hour. She is only allowed to work 13 hours per week, at most. She wants to make at least \$65. Write and graph a system of inequalities to represent this situation.

Constraints: \$4/hr babysitting, \$8/hr tutoring, ≤ 13 hrs/wk, $\geq \$65$ /wk

Inequalities: $x + y \leq 13$

$$4x + \frac{8y}{8} \geq \frac{65}{8}$$

$x = \#$ hours babysitting
 $y = \#$ hours tutoring

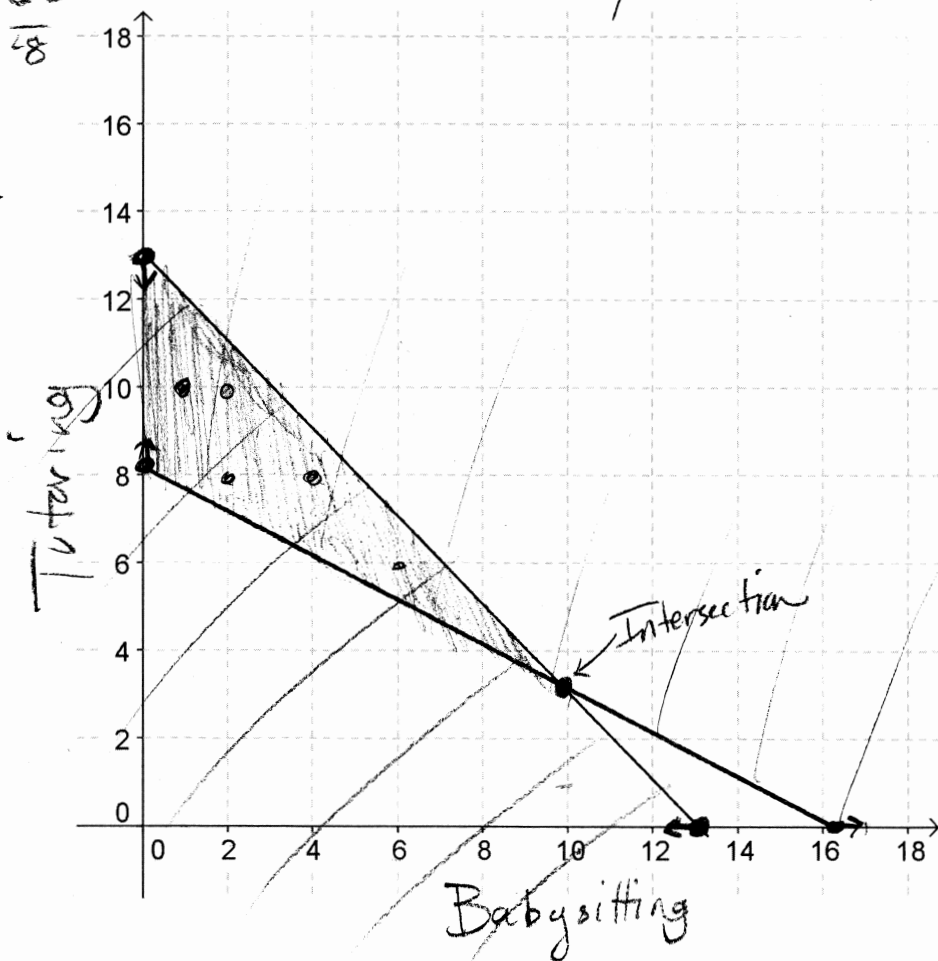
Graph:

$$x \geq 16.25$$

$$y \geq 8.125$$

Create a table of possible solutions:

# hours babysitting	# hours tutoring
4	8
2	8
6	6
2	10
1	10



Describe the solution region using the vocabulary term half plane.

The solution region is the intersection (or overlap) of the two half planes that contain the points that work to make both inequalities true at the same time.

Solve for the intersection. Then explain what it means in the context of this problem.

where is the line $x + y = 13$ the same as the line $4x + 8y = 65$
 $\hookrightarrow x = 13 - y$ $9.75(4) = 39$ $3.25(8) = 26$

$$4(13 - y) + 8y = 65$$

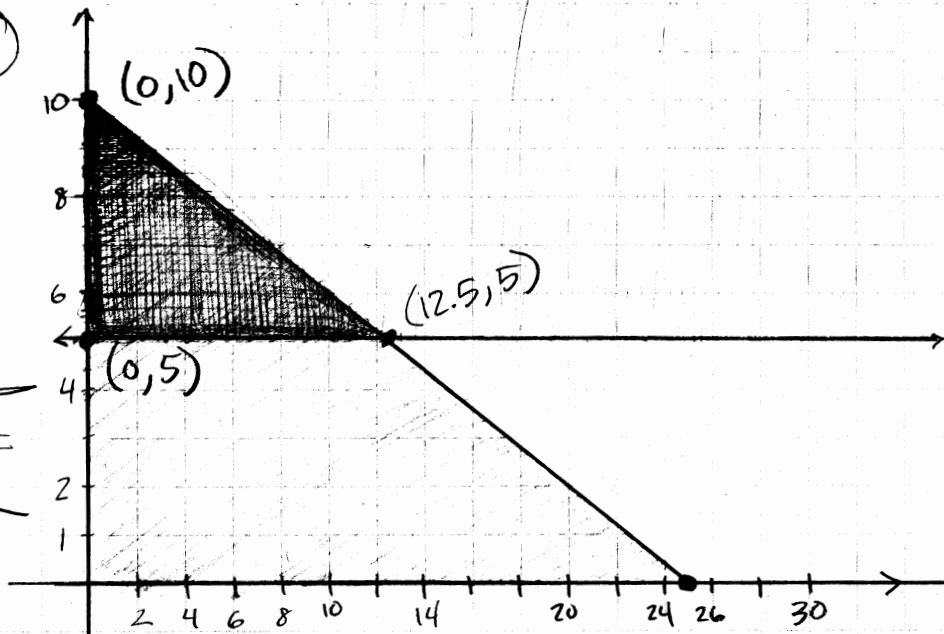
$$52 - 4y + 8y = 65$$

$$4y = 13 \quad y = 3.25$$

$$x = 9.75$$

$(9.75, 3.25) = 9.75$ hours babysitting & 3.25 hours tutoring gives Mary a total of 13 hours and a total of \$65 earned.

①
y = # plants



$$y \geq 5$$

$$4x + 10y \leq 100$$

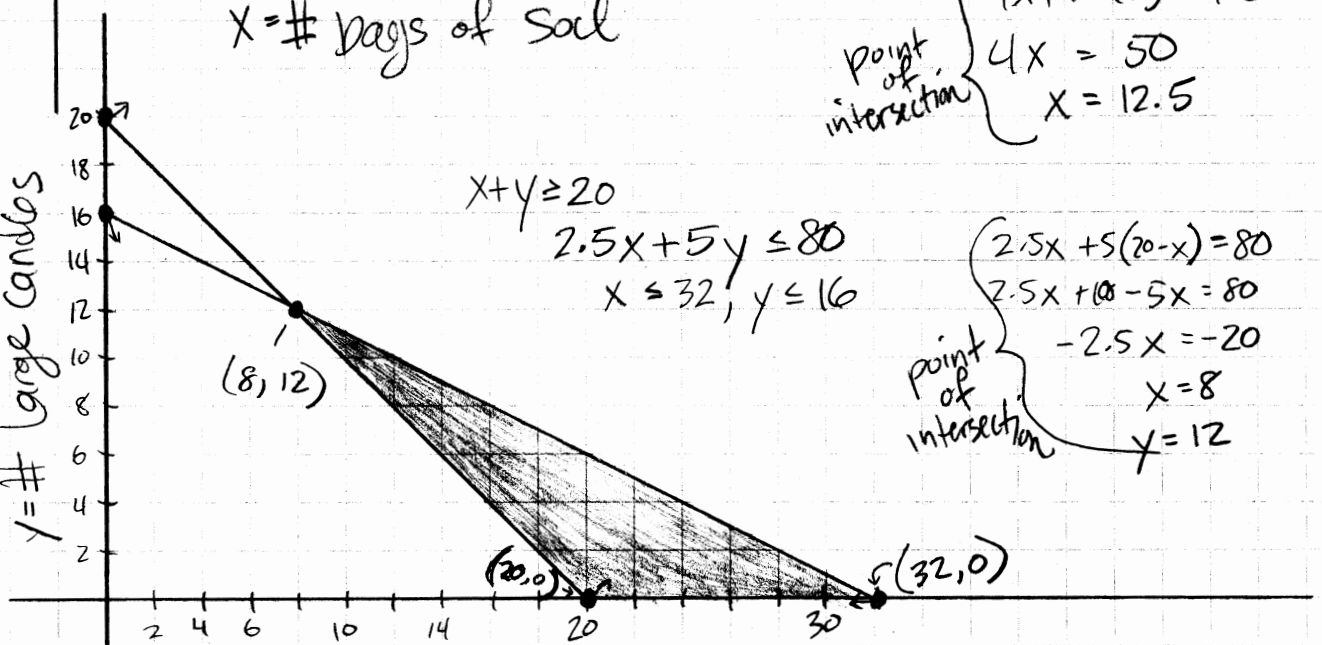
$$x \leq 25, y \leq 10$$

x = # bags of soil

point of intersection

$$\begin{cases} 4x + 10(5) = 100 \\ 4x = 50 \\ x = 12.5 \end{cases}$$

②
y = # large candies



$$x + y = 20$$

$$2.5x + 5y \leq 80$$

$$x \leq 32, y \leq 16$$

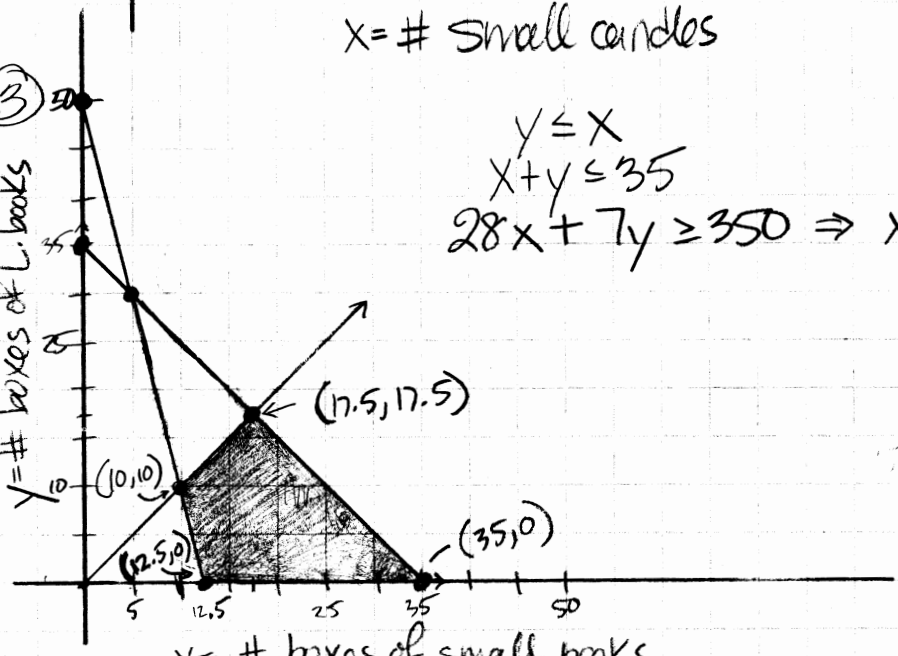
point of intersection

$$\begin{cases} 2.5x + 5(20-x) = 80 \\ 2.5x + 100 - 5x = 80 \\ -2.5x = -20 \\ x = 8 \\ y = 12 \end{cases}$$

x = # small candies

dls

③
y = # boxes of L books



$$y \leq x$$

$$x + y \leq 35$$

$$28x + 7y \geq 350 \Rightarrow x \geq 12.5, y \geq 50$$

x = # boxes of small books

y = "

x > y

books
L bks
KS