

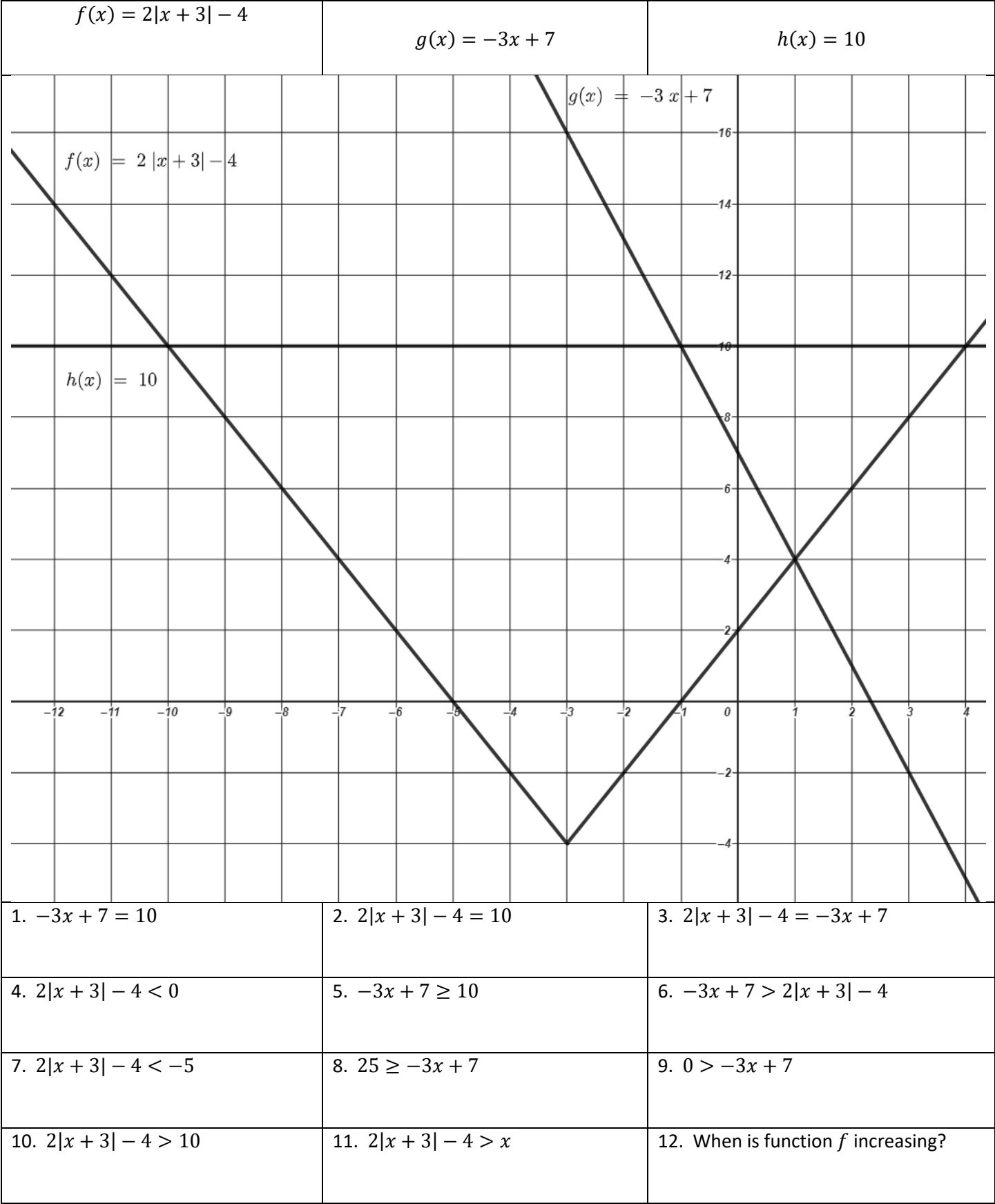
These next few questions were taken from your McGraw Hill online Book. Remember that solutions are all about truth!

1. What is the solution of this system of equations? $\begin{aligned}x + y + z &= 4 \\x - y + z &= 6 \\x + y - z &= 0\end{aligned}$ ☐ A) (3, -1, 6) ☐ B) (3, -1, 2) ☐ C) (6, 2, 2) ☐ D) (-3, 5, 2)	2. Solve $-3(x + 7) \leq -15$. ☐ A) $x \geq 5$ ☐ B) $x \leq 5$ ☐ C) $x \geq -2$ ☐ D) $x \leq -2$	3. Select all the equations that model the line shown on the graph. ☐ A) $y + 1 = \frac{1}{2}(x + 2)$ ☐ B) $y + 4 = \frac{1}{2}(x + 2)$ ☐ C) $y - 2 = \frac{1}{2}(x - 4)$ ☐ D) $y - 2 = \frac{1}{2}(x - 1)$ ☐ E) $y + 2 = \frac{1}{2}(x + 4)$ ☐ F) $y - 1 = \frac{1}{2}(x - 2)$
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Solve each without a calculator using algebraic methods or graphing by hand.

4. $2(x + 4) - 3 = 7x - 5$	5. $2(x + 5) \geq -6$	6. $3 x + 5 + 1 = 16$
7. $2 x - 3 - 5x > 18$	Challenge: $x + 3 = - x - 1 + 7$	

The graphs of 3 functions are given in both graphic and equation form. Solve each equation or inequality below. Use a method of your choice. If you get stuck, try answering the questions based on what you are seeing in the graphs. After that, challenge yourself by working some algebra techniques into your process.



Applications of Systems

Intro Example 1: NO CALCULATORS	
I am thinking of two numbers. The first plus the second is equal to 13. Write out at least ten pairs of values that make this statement true?	I am thinking of two numbers. The first minus the second is negative three. Write out at least ten pairs of values that make this statement true?
Write out as many solutions as possible when combining both of these statements: The first plus the second is equal to 13, and the first minus the second is negative three.	

Intro Example 2: You may use a calculator to assist with this.	
A landscaping company placed an order with a nursery. The order was for 13 bushes and 4 trees and totaled \$487. Write out at least three ways this order may have been placed based on various different prices for bushes and trees.	A landscaping company placed an order with a nursery. The order was for 6 bushes and 2 trees and totaled \$232. Write out at least three ways this order may have been placed based on various different prices for bushes and trees.
Now if both of these orders were placed on the same day, how much does this landscaping company charge for individual bushes and trees? An order for 13 bushes and 4 trees and totaled \$487 and an order for 6 bushes and 2 trees and totaled \$232. How much does the landscaping company charge for individual bushes and trees?	

* Solve each system of equations by graphing.

* Solve each system of equations by graphing.

$$\begin{cases} y = \frac{4}{3}x - 2 \\ y = \frac{2}{3}x - 4 \end{cases}$$

$$\begin{cases} y = \frac{5}{3}x - 1 \\ y = -x + 7 \end{cases}$$

$$\begin{cases} x + y = 1 \\ x - 2y = -8 \end{cases}$$

A full page of blank graph paper with a uniform grid of small squares. The grid consists of 20 columns and 20 rows of squares, creating a total of 400 small square units. The lines are thin and black, set against a white background. There are no margins or additional markings on the page.This is a blank sheet of graph paper featuring a uniform grid of small squares. The grid consists of 20 columns and 20 rows, creating a total of 400 squares. The lines are thin and black, set against a white background. There are no margins, text, or other markings on the page.[illegible]

4.	5.	6.
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$$\begin{cases} y = \frac{5}{3}x - 1 \\ y = -x + 7 \end{cases}$$

$$\begin{cases} 4x + 3y = 0 \\ y - x = 7 \end{cases}$$

$$\begin{cases} y = 2x - 4 \\ 7x - 5y = 14 \end{cases}$$

$$\begin{cases} 2x - 5y = 29 \\ -x + 2y = -11 \end{cases}$$

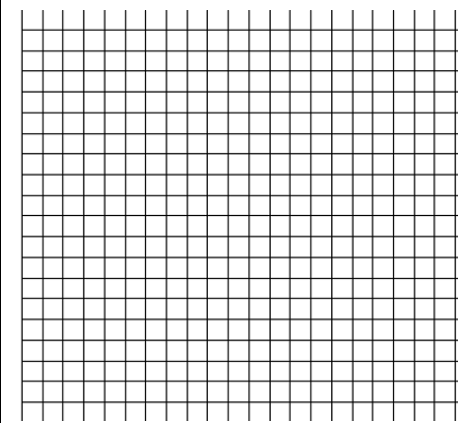
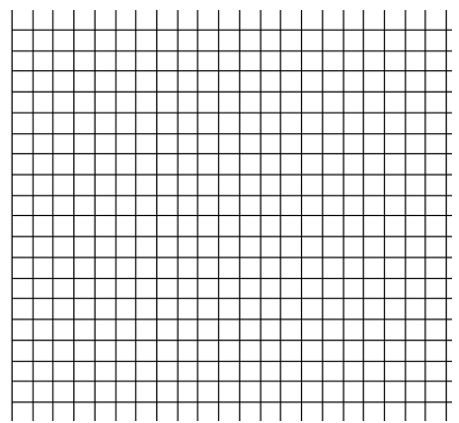
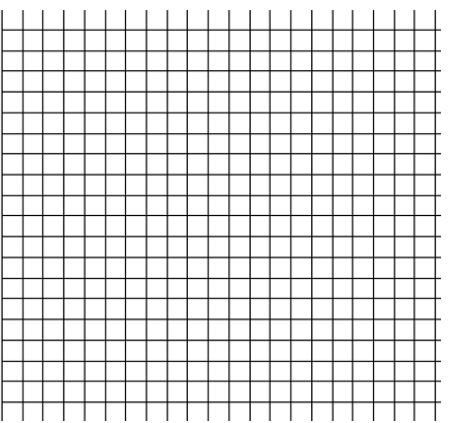
x	y	x	y
-12		-12	
-9		-9	
-6		-6	
-3		-3	
0		0	
3		3	
6		6	
9		9	
12		12	
15		15	

x	y	x	y
-12		-12	
-9		-9	
-6		-6	
-3		-3	
0		0	
3		3	
6		6	
9		9	
12		12	
15		15	

x	y	x	y
-13		-13	
-8		-8	
-3		-3	
2		2	
7		7	
12		12	
17		17	
22		22	
27		27	
32		32	

[illegible]

* Solve each system of equations by graphing.

8. $\begin{cases} y = \frac{2}{3}x - 4 \\ y = \frac{2}{3}x + 1 \end{cases}$	9. $\begin{cases} 4x + 3y = 0 \\ y - x = 7 \end{cases}$	10. $\begin{cases} y = \frac{1}{2}x - 1 \\ x - 2y = 2 \end{cases}$
		

Steps for Elimination Process

1. Line Up Terms (x, y, =, constant)
2. Multiply one or both equations by constants so that a variable has the same, but opposite value.
3. Add equations and solve for remaining unknown.
4. Use this solution to find the other unknown and write your solution as an ordered pair.

* Solve each system of equations using Elimination.

11. $\begin{cases} x + y = 1 \\ x - 2y = -8 \end{cases}$	12. $\begin{cases} 4x + 3y = 0 \\ y - x = 7 \end{cases}$	13. $\begin{cases} y = 2x - 4 \\ 7x - 5y = 14 \end{cases}$
14. $\begin{cases} 2x - 5y = 29 \\ -x + 2y = -11 \end{cases}$	15. $\begin{cases} y = \frac{2}{3}x - 4 \\ y = \frac{2}{3}x + 1 \end{cases}$	16. $\begin{cases} y = \frac{1}{2}x - 1 \\ x - 2y = 2 \end{cases}$

Systems of Linear Equations

Substitution

Steps for Substitution Process

1. Solve for one of the variables in one of the equations.
2. Substitute this value into the other equation to eliminate a variable.
3. Solve this equation for the unknown.
4. Use this solution to find the other unknown and write your solution as an ordered pair.

* Solve each system of equations by using substitution.

17. $\begin{cases} y = \frac{2}{3}x - 4 \\ y = \frac{2}{3}x + 1 \end{cases}$	18. $\begin{cases} y = \frac{1}{2}x - 1 \\ x - 2y = 2 \end{cases}$
19. $\begin{cases} 4x + 3y = 0 \\ y - x = 7 \end{cases}$	20. $\begin{cases} x + y = 1 \\ x - 2y = -8 \end{cases}$
21. $\begin{cases} y = 2x - 4 \\ 7x - 5y = 14 \end{cases}$	22. $\begin{cases} 2x - 5y = 29 \\ -x + 2y = -11 \end{cases}$

Applications of Systems of Linear Equations

* Solve each application using a system of equations and a solution method of your choice. Please show and/or explain your methods.

1. I am thinking of two numbers. The first plus the second is equal to 13. The first minus the second is negative three. What are the two numbers?	2. I'm thinking of two numbers. The first added to the second is ten. Two times the first minus the second is equal to negative sixteen. What are the two numbers?
3. The admission fee at a small fair is \$1.50 for children and \$4.00 for adults. On a certain day, 2200 people enter the fair and \$5050 is collected. How many children and how many adults attended?	4. A landscaping company placed two orders with a nursery. The first order was for 13 bushes and 4 trees, and totaled \$487. The second order was for 6 bushes and 2 trees, and totaled \$232. The bills do not list the per-item price. What were the costs of one bush and of one tree?
5. Michael buys two bags of chips and three boxes of pretzels for \$5.13. He then buys another bag of chips and two more boxes of pretzels for \$3.09. Find the cost of each bag of chips and each box of pretzels.	6. At a restaurant four people order fried crab claws and four people order a cup of gumbo, with a total bill of \$31. If only two people had ordered the crab claws and one person ordered the gumbo, the bill would have been \$12.25. How much is each order of fried crab claws and each cup of gumbo?

Solving Systems of Linear Equations with Matrices

* Write the matrix to solve the linear system. Use your calculator to convert the matrix to Reduced Row Echelon Form. Write out this matrix, and identify the solution. (If you would like to compare your answers, these were the Table questions 4-8 from page 1 of your packet.)

1. $\begin{cases} 2x - 5y = 29 \\ -x + 2y = -11 \end{cases}$	2. $\begin{cases} 4x + 3y = 0 \\ y - x = 7 \end{cases}$	3. $\begin{cases} y = 2x - 4 \\ 7x - 5y = 14 \end{cases}$	4. $\begin{cases} y = \frac{5}{3}x - 1 \\ y = -x + 7 \end{cases}$
5. Solve the system. Write the matrix to solve the linear system. Use your calculator to convert the matrix to Reduced Row Echelon Form. Write out this matrix, and identify the solution. $\begin{cases} x + y + z = -8 \\ 2x - y + 3z = -9 \\ 5x + 2y - z = 2 \end{cases}$			

Write the system of equations that represent the application below, write a matrix that can be used to solve the application, and then solve using your calculator.

16. John inherited \$25,000 and invested part of it in a money market account, part in municipal bonds, and part in a mutual fund. After one year, he received a total of \$1,620 in simple interest from the three investments. The money market paid 6% annually, the bonds paid 7% annually, and the mutual fund paid 8% annually. There was \$6,000 more invested in the bonds than the mutual funds. Find the amount John invested in each category.	17. Billy's Restaurant ordered 200 flowers for Mother's Day. They ordered carnations at \$1.50 each, roses at \$5.75 each, and daisies at \$2.60 each. They ordered mostly carnations, and 20 fewer roses than daisies. The total order came to \$589.50. How many of each type of flower was ordered?
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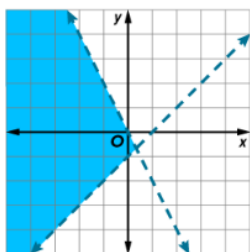
Module 2 – Lesson 6: Extra Example 1

Select the correct solution of the system of inequalities.

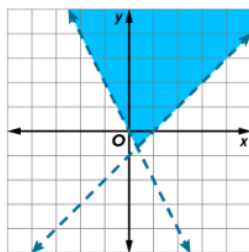
$$y > x - 1$$

$$y > -2x$$

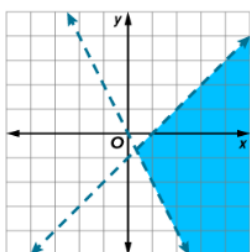
☐ A



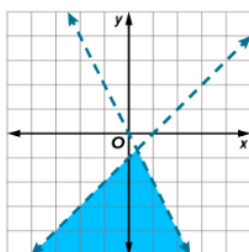
☐ B



☐ C



☐ D



Module 2 – Lesson 6: Extra Example 2

Select the correct solution of the system of inequalities.

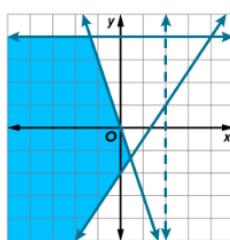
$$y \geq 1.5x - 2$$

$$y \geq -3x$$

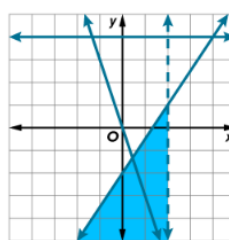
$$x < 2$$

$$y \leq 4$$

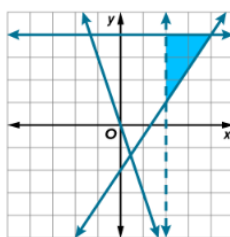
☐ A



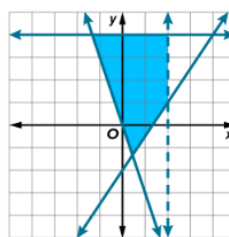
☐ B



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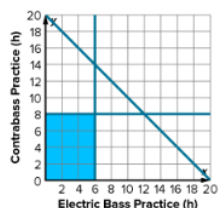
Module 2 – Lesson 6: Extra Example 3



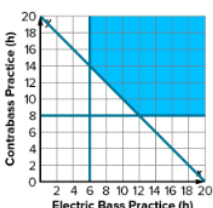
MUSIC PRACTICE Noelle plays electric bass guitar in her school's jazz band and contrabass in a community orchestra. She needs to practice her electric bass guitar for at least 6 hours per week and her contrabass for at least 8 hours per week, but she cannot spend more than 20 hours each week practicing.

Select the graph of the system of inequalities that represents Noelle's weekly practice time.

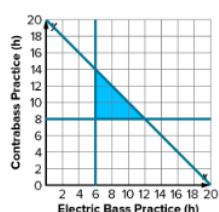
☐ A



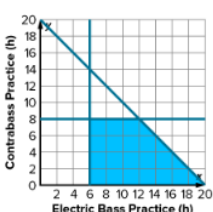
☐ B



☐ C



☐ D



Notes:

Linear Programming - An Application of Linear Systems

Some Definitions:

Maximum –
Minimum –
Constraints –
Feasible –
Objective –
Vertex/Vertices –

Find the maximum and minimum values of each objective function for the given constraints.

1. $P = 5y + 3x$

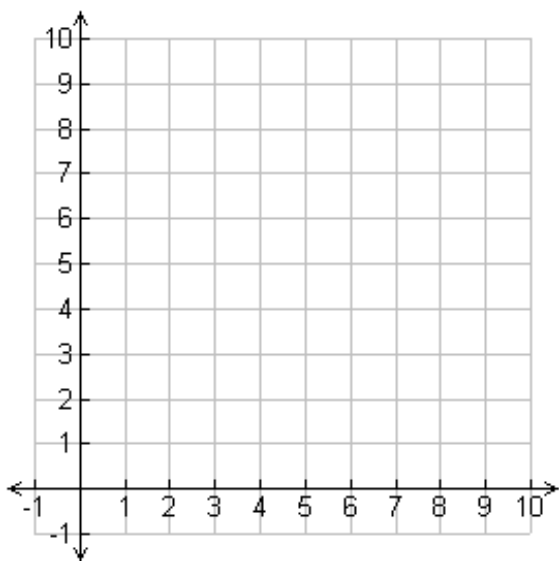
Constraints:

$$x + y \leq 6$$

$$x - y \leq 4$$

$$x \geq 0$$

$$y \geq 0$$



2. $P = 4x + 7y$

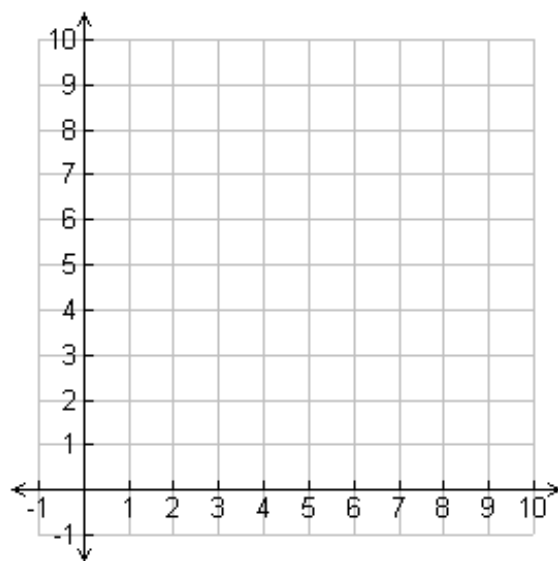
Constraints:

$$x + y \leq 8$$

$$y - x \leq 2$$

$$x \geq 0$$

$$y \geq 0$$



3. A ski manufacturer makes two types of skis and has a fabricating department and a finishing department. A pair of downhill skis requires 6 hours to fabricate and 1 hour to finish. A pair of cross-country skis requires 4 hours to fabricate and 1 hour to finish. The fabricating department has 108 hours of labor available per day. The finishing department has 24 hours of labor available per day. The company makes a profit of \$40 on each pair of downhill skis and a profit of \$30 on each pair of cross-country skis.

Use the given information to:

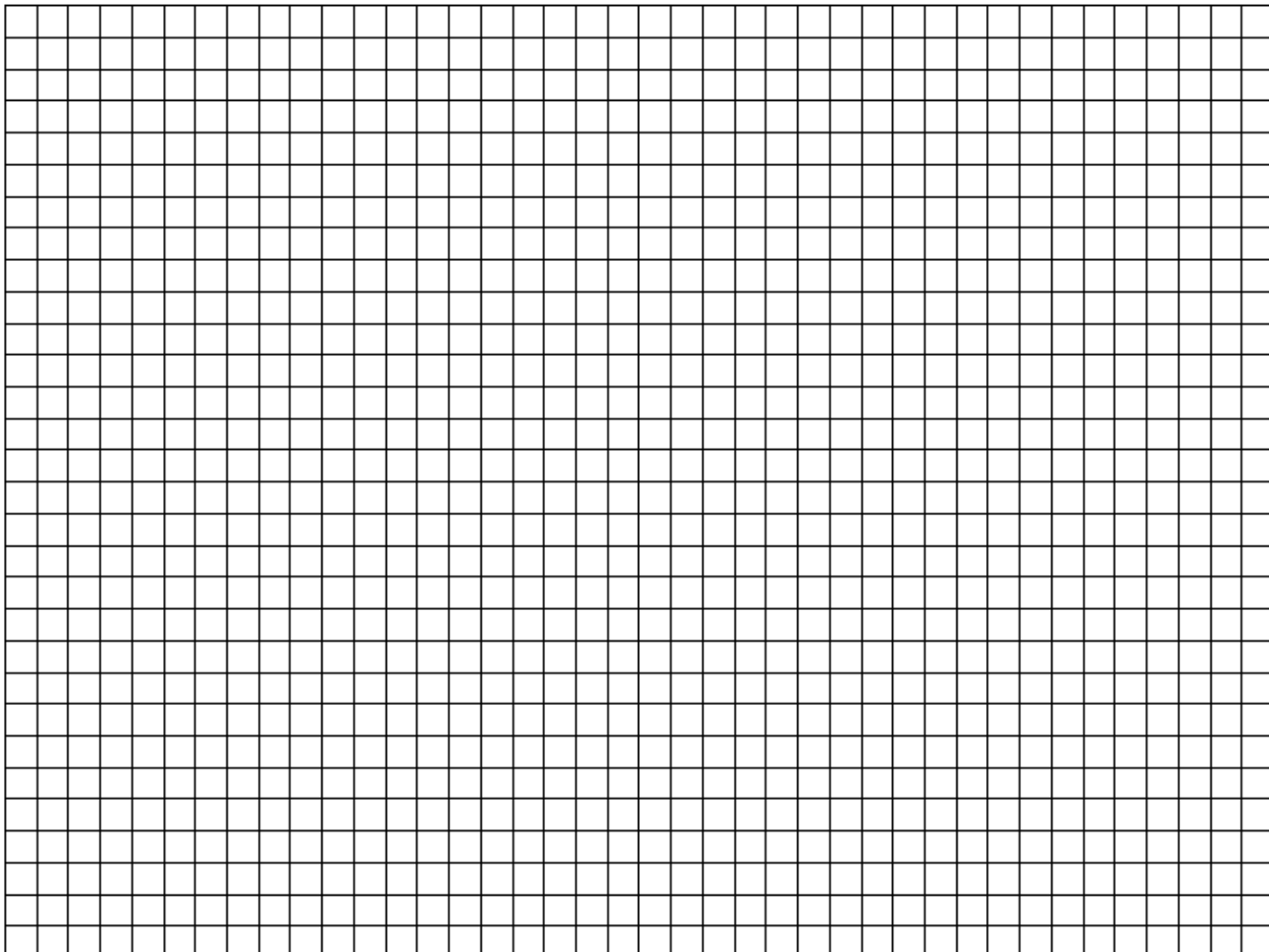
- Graph the system of inequalities.
- Shade the feasible region.
- Determine the maximum value of the objective equation..(showing work) to help the company choose how best to produce downhill and cross-country skis to maximize their profit.

Let $x = \# \text{ downhill skis}$

Let $y = \# \text{ cross country skis}$

$$\begin{cases} 6x + 4y \leq 108 \\ 1x + 1y \leq 24 \\ x \geq 0 \\ y \geq 0 \end{cases}$$

$$P = 40x + 30y$$



4. Trenton, Michigan, a small community, is trying to establish a public transportation system of large and small vans. It can spend no more than \$100,000 for both sizes of vehicles and no more than \$500 per month for maintenance. The community can purchase a small van for \$10,000 and maintain it for \$100 per month. The large vans cost \$20,000 each and can be maintained for \$75 per month. Each large van carries a maximum of 15 passengers, and each small van carries a maximum of 7 passengers.

Begin the setup of this problem that would help the community decide which combination of vans would allow for the largest capacity of passengers. Fill in the blank spaces below.

Let $x =$ _____

Let $y =$ _____

Hint: One of the inequalities below considers the cost of buying the vehicles. Another inequality considers monthly maintenance.

$$\left\{ \begin{array}{l} \text{_____} \\ \text{_____} \\ \text{_____} \\ \text{_____} \end{array} \right.$$

Objective Equation:

Capacity $C =$ _____

5. A farmer has 90 acres available for planting millet and alfalfa. Seed costs \$4 per acre for millet and \$6 per acre for alfalfa. Labor costs are \$20 per acre for millet and \$10 per acre for alfalfa. The expected income is \$110 per acre for millet and \$150 per acre for alfalfa. The farmer intends to spend no more than \$480 for seed and \$1400 for labor.

Use the given information to:

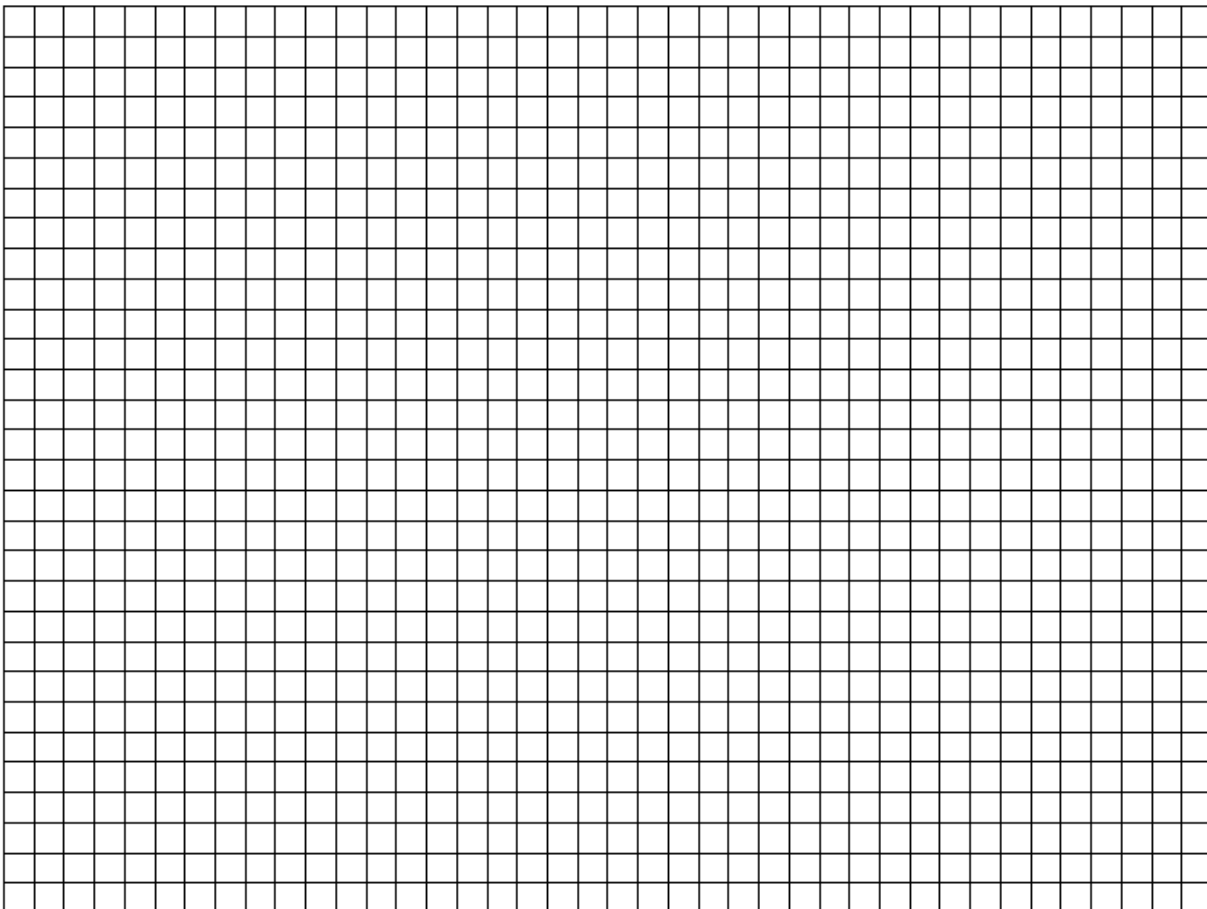
- Graph the system of inequalities.
- Shade the feasible region.
- Determine the correct combination of planting crops that will maximize the farmer's profits.

Let $x = \# \text{ of acres of millet}$

Let $y = \# \text{ of acres of alfalfa}$

$$\begin{cases} x + y \leq 90 \\ 4x + 6y \leq 480 \\ 20x + 10y \leq 1400 \\ x \geq 0 \\ y \geq 0 \end{cases}$$

$$I = 110x + 150y$$



6. A company produces windows and doors. A profit of \$5 is realized on each window, and profit is \$3 on each door. The company has 18 hours available for manufacturing in Plant A. Each window requires 3 hours, and each door 2 hours to manufacture. Plant B has 7.5 hours available for assembly. Each window requires 1.5 hours to assemble, and each door requires 0.75 hours.

Begin the setup of this problem that would help the company choose how best to produce doors and windows to maximize their profit.

Let $x =$ _____

Let $y =$ _____

Hint: One of the inequalities below considers the manufacturing aspect of the company, and the other considers the assembly.

$$\left\{ \begin{array}{l} \text{_____} \\ \text{_____} \\ \text{_____} \\ \text{_____} \end{array} \right.$$

Objective Equation:

$P =$ _____

PROJECTILE An object is thrown straight upward. The velocity of the object 3 second after being thrown is 134 feet per second. The velocity of the object 5 seconds after being thrown is 70 feet per second. Which equation models the velocity of the object v , in feet per second, at a time t seconds after being thrown? Assume that the velocity changes at a constant rate.

- ☐ A) $v = 32t + 38$
- ☐ B) $v = -32t + 230$
- ☐ C) $v = 64t - 58$
- ☐ D) $v = -64t + 326$

Solve $|3x - 9| - 10 \geq 8$ by graphing.

- ☐ A) $\{x | -3 \leq x \leq 9\}$
- ☐ B) $\{x | x \leq -3 \text{ or } x \geq 9\}$
- ☐ C) $\{x | x < -3 \text{ or } x > 9\}$
- ☐ D) $\{x | -3 < x < 9\}$

Which graph represents this system of inequalities?

$$\begin{cases} 2x - 3y \geq 6 \\ x < -2 \end{cases}$$

