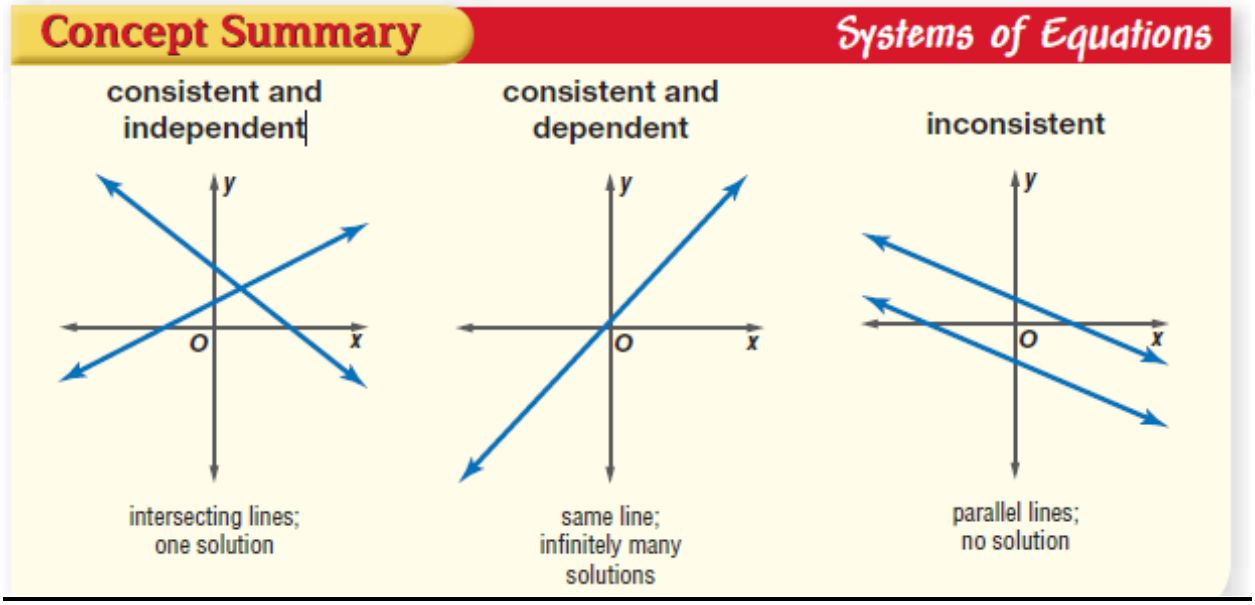
## *Unit 1.1 – Solving Systems of Equations by Graphing*

Learning Targets:

- I can solve systems of equations by graphing
- I can determine whether a system of equations is consistent and independent, consistent and dependent, or inconsistent.




**Solve the system by graphing:**

**Example 1**

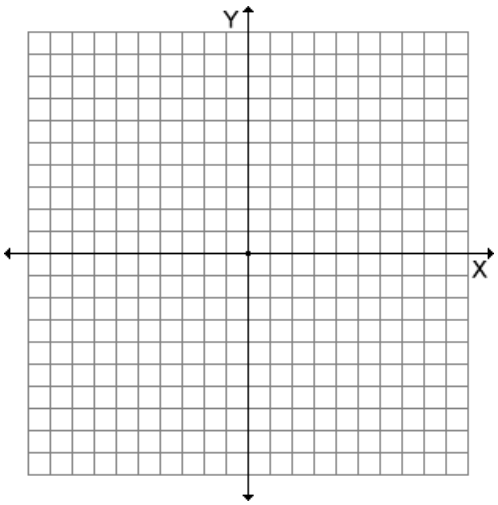
y = 2x + 3

y = -1/2x + 3

Consistent and independent?

Consistent and dependent?

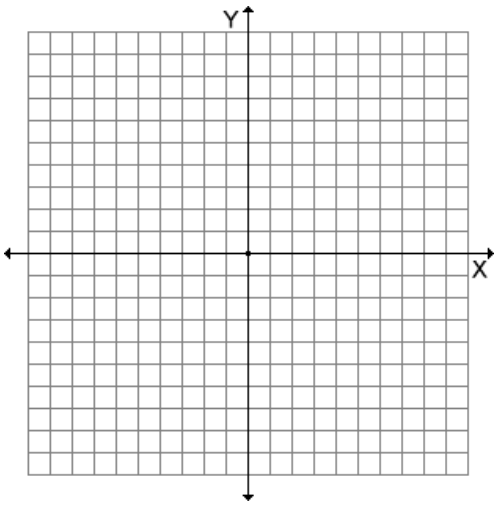
Inconsistent?



Example 2:

$3x - 3y = 9$

$y = -x + 1$




Consistent and independent?

Consistent and dependent?

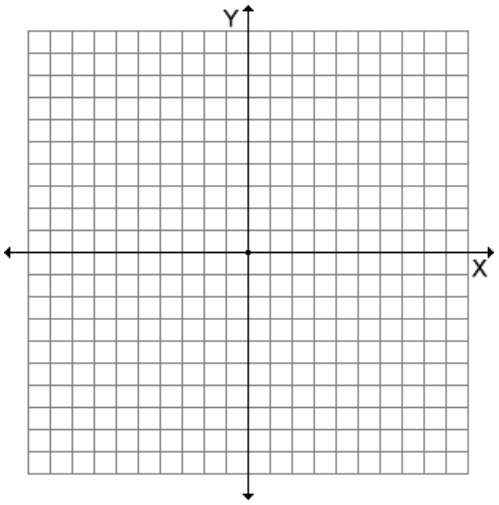
Inconsistent?

**Your Turn**

**Solve the system of equations by graphing.**

$x + 3y = 7$

$x - y = 3$



Graphing equations with your calculator! ☺

1. Make sure each equation is in y = mx + b form.
2. Enter equations in **y =** menu
3. Hit **ZOOM** then **"6"** for standard window
4. To find the intersection of your equations, hit:

**2nd "TRACE"**

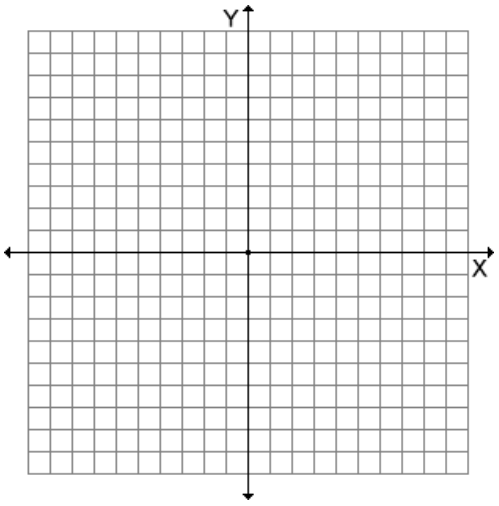
**#5 – "INTERSECT"**

**ENTER**

EXAMPLE #3 Solve the system by graphing

y = 2x + 3

y = 2x - 5




Consistent and Independent?

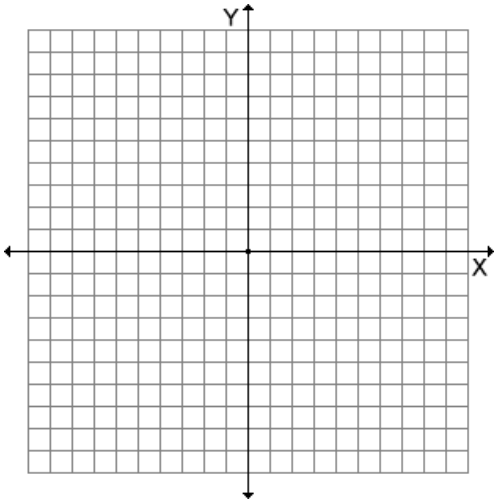
Consistent and Dependent?

Inconsistent?

EXAMPLE #4 Solve the system by graphing

$y = -2x + 7$

$4x + 2y = 14$




Consistent and Independent?

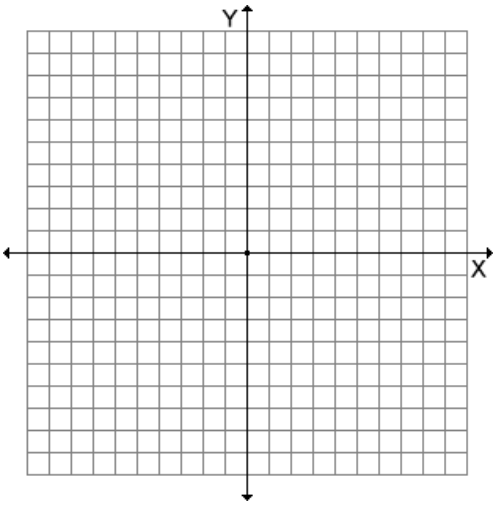
Consistent and Dependent?

Inconsistent?

Graph the system of equations and describe it as *consistent and independent*, *consistent and dependent*, or *inconsistent*.

$9x - 6y = -6$

$6x - 4y = -4$



Big Idea:

Describe the differences between…

Consistent and Independent:

Consistent and Dependent:

Inconsistent:

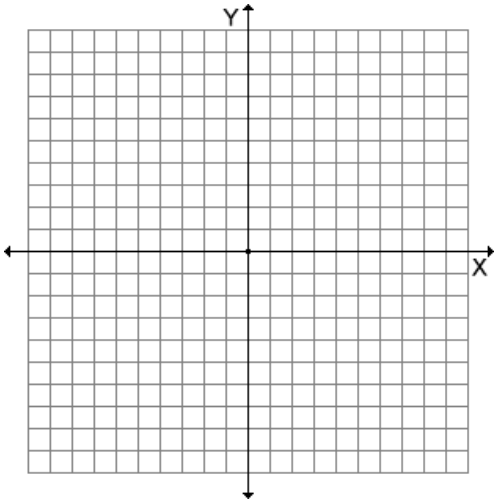
## *Unit 1.2 – Solving Systems of Equations Algebraically-Substitution*

Warm – Up:

Graph the system of equations and describe it as *consistent and independent*, *consistent and dependent*, or *inconsistent*.

$x + y = 5$

$2x = y - 11$




Learning Targets:

- I can solve systems of equations by substitution.

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**What to do when using substitution:**

**1. Substitute to get _____ equation with _____variable**

**2. Solve the equation for the _____.**

**3. Substitute to find the _____.**

**Ex. 1 Solve this system:**

**y = 3x + 8**

**5x + 2y = 5**

**Ex. 2: Solve this system:**

**2x + y = 7**

**5x – 3y = -21**

**Example 3: Solve this system:**

**x + 4y = 26**

**x – 5y = -10**

**Your Turn:**

**x – 3y = 2**

**x + 7y = 12**

**Example: 4**

**2x + 2y = 8**

**x = 2 – y**

**<u>Solve the following problems:</u>**

**y – x = 4**

**3x + 2y = 18**

**y = -2x + 3**

**4x + 2y = 6**

Big Idea: When should you use substitution?

Warm – Up:

Solve the following system of equations by substitution:

$$2j - 3k = 3$$

$$j + k = 14$$

Learning Targets:

- I can solve systems of equations by elimination.

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**Steps to using ELIMINATION:**

1. **Start with x and y on the same side of the equation.**

   **(Ax + By = C)**

2. **Turn the problems into an _____ or _____ problem.**
3. **Add like terms…one of the variables should be _____.**
4. **Solve to find the _____ variable**
5. **Substitute to find the other _____.**

## Example 1: Solve

**-3x + 4y = 12**

**3x – 6y = 18**

## Example 2: Your turn! Solve

**4x – 3y = 12**

**2x + 3y = 6**

## Example 3:

Some friends go to the movies. They purchase 2 popcorns and 3 sodas and pay $25.50. The next weekend they go again and purchase 5 popcorns and 3 sodas for $43.50. How much does the popcorn cost?

**Example 4**

Use the elimination method to solve the system of equations.

$2x + 3y = 12$

$5x - 2y = 11$

**Use the elimination method to solve the system of equations.**

$x + 3y = 7$

$2x + 5y = 10$

You do these last few…

| | | |
|---|---|---|
| $u + v = 7$ | $m - n = -9$ | $3p - 5q = 6$ |
| $2u + v = 11$ | $7m + 2n = 9$ | $2p - 4q = 4$ |

Big Idea: When would it be an appropriate time to use elimination to solve a system of equations?

# *Unit 1.4 – Solving Systems of Inequalities by Graphing*

Warm – Up:

Solve each system of equations by using substitution or elimination.

$8x + 3y = -5$

$10x + 6y = -13$

$s + 3y = 4$

$s = 1$

Learning Targets:

- I can solve systems of inequalities by graphing.
- I can determine the coordinates of the vertices of a region formed by the graph of a system of inequalities.

## Quick Review of Inequalities

**<** -

**>** -

**≤** -

**≥** -

**< OR >** -

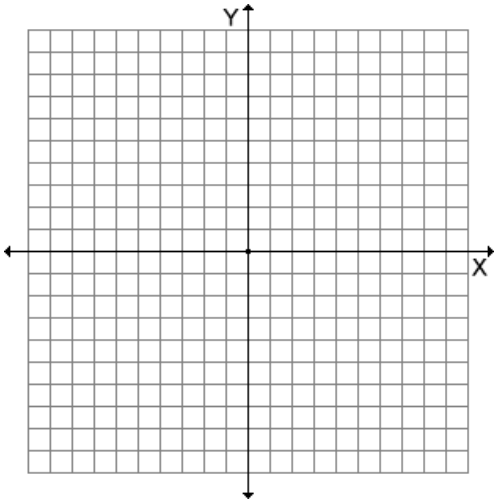
**≤ OR ≥** -

**Remember when to shade above or below the line?**

**Example 1: Solve the system of inequalities by graphing.**

**$y \geq 2x - 3$**

**$y < -x + 2$**

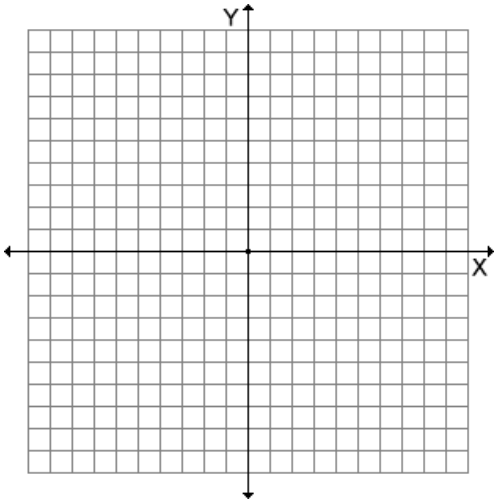



**Your turn:**

**Solve each system of inequalities by graphing.**

**$y \leq 3x - 3$**

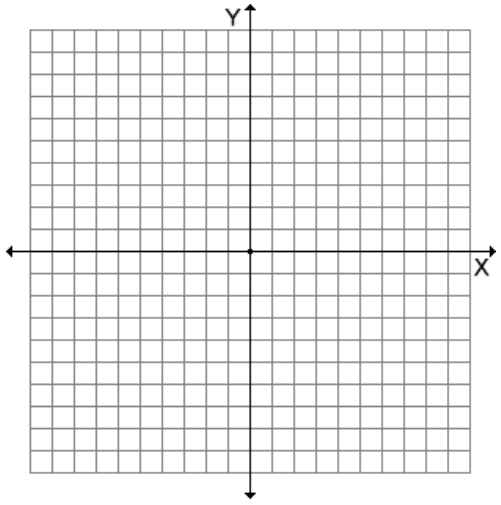
**$y > x + 1$**



## Example 2:

**$y \geq -3/4x + 1$**

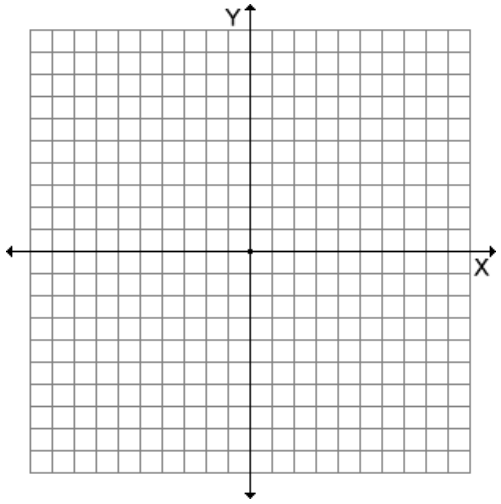
**$y \leq -3/4x - 2$**



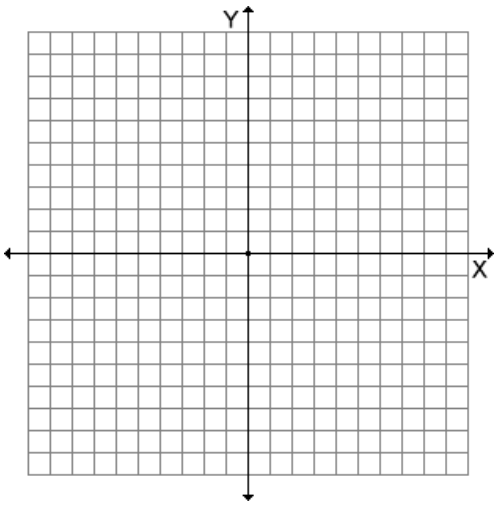

## Your turn:

**$y < 1/2x + 2$**

**$y > 1/2x + 4$**



Find the coordinates of the vertices of the figure formed by **$2x - y \geq -1$, $x + y \leq 4$, and $x + 4y \geq 4$.**

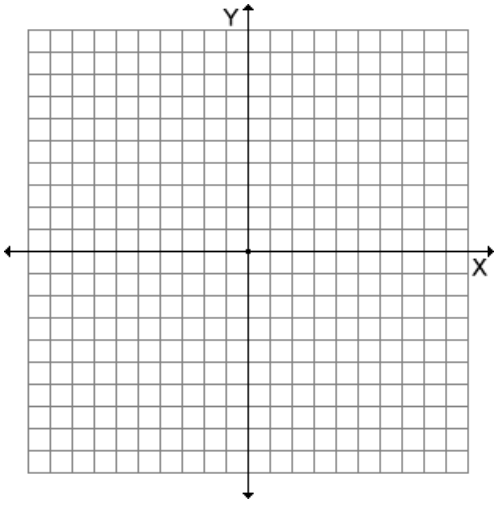



Your turn:

$x + 2y \geq 1$

$x + y \leq 3$

$-2x + y \leq 3$




Big Idea:

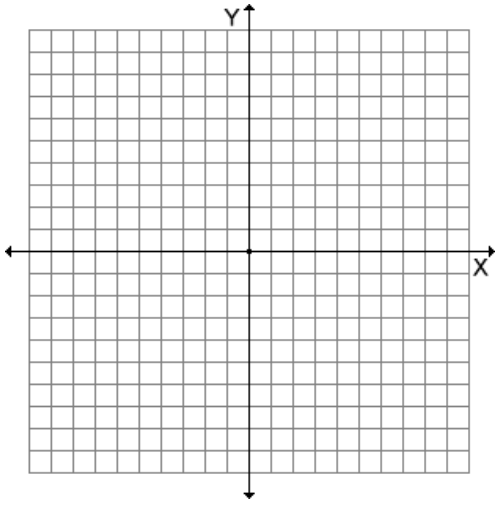
Explain what it means to find the vertices of a system of inequalities.

# *Unit 1.5 – Linear Programming*

## Warm – Up:

Graph and find the vertices of the following system of inequalities.

$y \geq -4$ $y \leq 2x + 22$ $x + y \leq 6$




## Learning Targets:

- I can determine the coordinates of the vertices of a region formed by the graph of a system of inequalities.
- I can find the maximum and minimum values of a function over a region.

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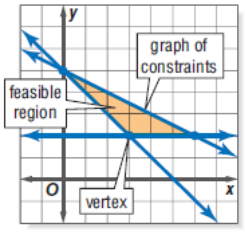
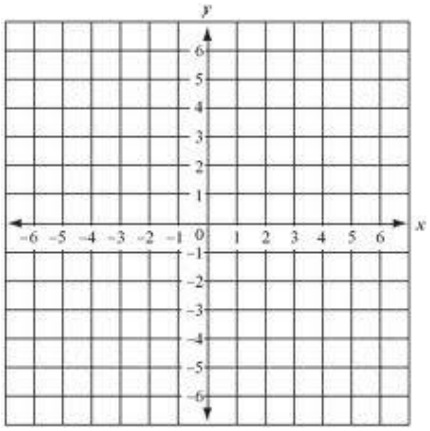
## Vocabulary

| TERM: | DEFINITION: |
|---|---|
| **Constraints** | |
| **Feasible Region** | |
| **Bounded** | |



**Example 1:**

**Graph the following system of inequalities. Name the coordinates of the vertices of the feasible region. Find the maximum and minimum values of the function** $f(x,y) = 3x - 2y$ **for this region.**



$x \leq 5$

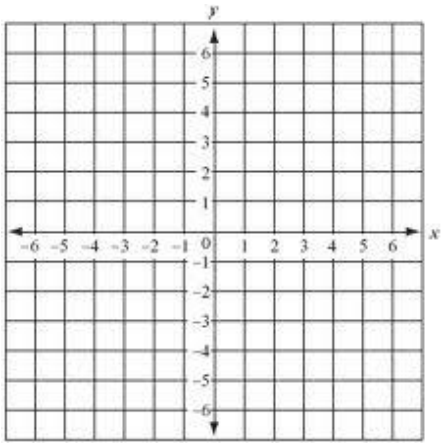
$y \leq 4$

$x + y \geq 2$

| (x , y) | 3x – 2y | f(x , y) |
|---|---|---|
| | | |
| | | |
| | | |

**Your Turn:**

**Graph the following system of inequalities. Name the coordinates of the vertices of the feasible region. Find the maximum and minimum values of the function** $f(x ,y) = 4x - 3y$ **for this region.**



$x \leq 4$

$y \leq 5$

$x + y \geq 6$

| (x , y) | 4x – 3y | f(x , y) |
|---|---|---|
| | | |
| | | |
| | | |

**Example 3: Graph the following system of inequalities. Name the coordinates of the vertices of the feasible region. Find the maximum and minimum values of the function *f(x , y) = 3x + y* for this region**.

$x \geq 1$

$y \geq 0$

$2x + y \leq 6$

| (x , y) | 3x + y | f(x , y) |
|---|---|---|
| | | |
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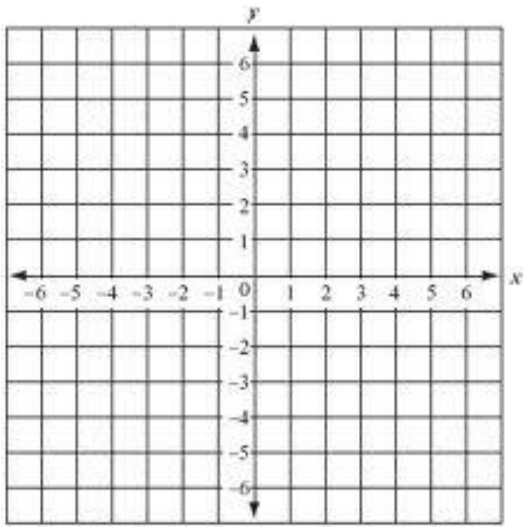
| | | |



**Graph the following system of inequalities. Name the coordinates of the vertices of the feasible region. Find the maximum and minimum values of the function *f(x,y) = x + 2y* for this region.**

$x + 3y \leq 6$

$-x - 3y \leq 9$

$2y - x \geq -6$

| (x , y) | x + 2y | f(x , y) |
|---|---|---|
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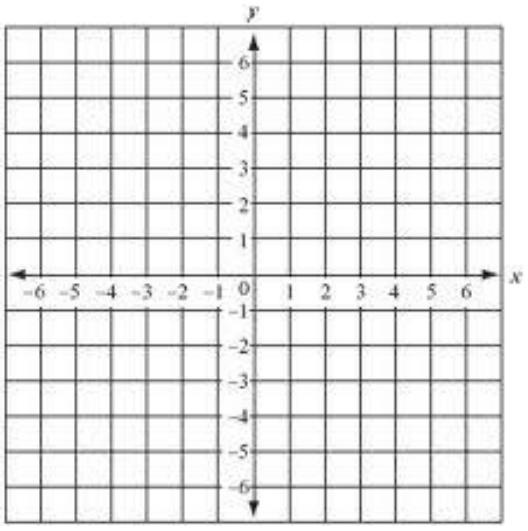
| | | |



Before your assignment…

**Remember the steps involved:**

1.

2.

# *Unit 1.6 – Linear Programming*

Learning Targets:

- I can solve real-world problems using linear programming.

## Steps to solving linear programming problems.

**Key Concept** — *Linear Programming Procedure*

| | |
|---|---|
| **Step 1** | Define the variables. |
| **Step 2** | Write a system of inequalities. |
| **Step 3** | Graph the system of inequalities. |
| **Step 4** | Find the coordinates of the vertices of the feasible region. |
| **Step 5** | Write a function to be maximized or minimized. |
| **Step 6** | Substitute the coordinates of the vertices into the function. |
| **Step 7** | Select the greatest or least result. Answer the problem. |

**Example 1:**

Landscaping: A landscaping company has crews who mow lawns and prune shrubbery. The company schedules 1 hour for mowing jobs and 3 hours for pruning jobs. Each crew is scheduled for no more than 2 pruning jobs per day. Each crew's schedule is set up for a maximum of 9 hours per day. On the average, the charge for mowing a lawn is $40 and the charge for pruning shrubbery is $120. Find a combination of mowing lawns and pruning shrubs that will maximize the income the company receives per day from one of its crews.

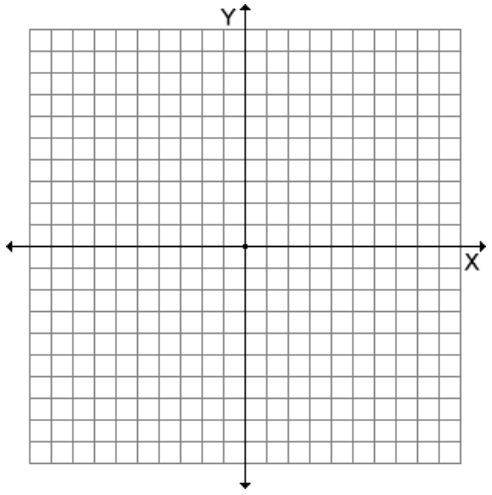
Step 1: Define the variables.

m =

p =

Step 2: Write a system of inequalities.

Step 3: Graph the system of inequalities.




Step 4: Find the coordinates of the vertices of the feasible region.

Step 5: Write a function to be maximized or minimized.

*f(m,p) =*

Step 6: Substitute the coordinates of the vertices into the function.

| **(m,p)** | **40m + 120p** | **f(m,p)** |
|---|---|---|
| | | |
| | | |
| | | |
| | | |

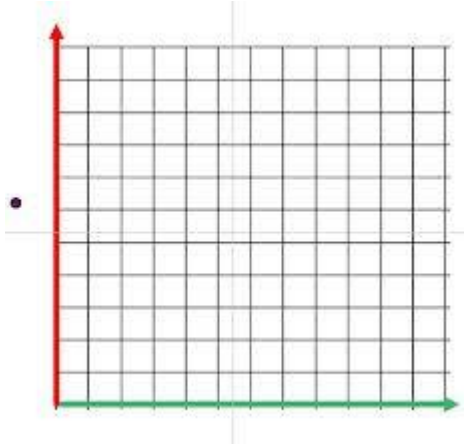
Step 7: Select the greatest amount.

**VETERINARY MEDICINE** As a receptionist for a veterinarian, one of Dolores Alvarez's tasks is to schedule appointments. She allots 20 minutes for a routine office visit and 40 minutes for a surgery. The veterinarian cannot do more than 6 surgeries per day. The office has 7 hours available for appointments. If an office visit costs $55 and most surgeries cost $125, find a combination of office visits and surgeries that will maximize the income the veterinarian practice receives per day.

Step 1: Define the variables.

Step 2: Write a system of inequalities.

Step 3: Graph the system of inequalities.



Step 4: Find the coordinates of the vertices of the feasible region.

Step 5: Write a function to be maximized or minimized.

Step 6: Substitute the coordinates of the vertices into the function.

| | | |
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| | | |

Step 7: Select the greatest or least result. (Answer the problem)

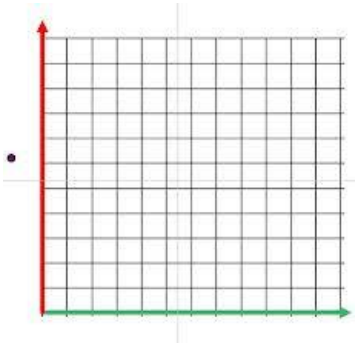
**Your Turn:**

Landscaping: A landscaping company has crews who rake leaves and mulch. The company schedules 2 hours for mulching jobs and 4 hours for raking jobs. Each crew is scheduled for no more than2 raking jobs per day. Each crew's schedule is set up for a maximum of 8 hours per day. On the average, the charge for raking a lawn is $50 and the charge for mulching is$30. Find a combination of raking leaves and mulching that will maximize the income the company receives per day from one of its crews.

Step 1: Define the variables.

Step 2: Write a system of inequalities.

Step 3: Graph the system of inequalities.



Step 4: Find the coordinates of the vertices of the feasible region.

Step 5: Write a function to be maximized or minimized.

Step 6: Substitute the coordinates of the vertices into the function.

| | | |
|---|---|---|
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Step 7: Select the greatest or least result. (Answer the problem)