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Mathematics

Quarter 2 – Module 2: "Illustrating and Graphing Linear Inequalities in Two Variables"

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ADM

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Mathematics

Quarter 2 – Module 2: "Illustrating and Graphing Linear Inequalities in Two Variables"

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Introductory Message

This Self-Learning Module (SLM) is prepared so that you, our dear learners, can continue your studies and learn while at home. Activities, questions, directions, exercises, and discussions are carefully stated for you to understand each lesson.

Each SLM is composed of different parts. Each part shall guide you step-by-step as you discover and understand the lesson prepared for you.

Pre-tests are provided to measure your prior knowledge on lessons in each SLM. This will tell you if you need to proceed on completing this module or if you need to ask your facilitator or your teacher's assistance for better understanding of the lesson. At the end of each module, you need to answer the post-test to self-check your learning. Answer keys are provided for each activity and test. We trust that you will be honest in using these.

In addition to the material in the main text, Notes to the Teacher are also provided to our facilitators and parents for strategies and reminders on how they can best help you on your home-based learning.

Please use this module with care. Do not put unnecessary marks on any part of this SLM. Use a separate sheet of paper in answering the exercises and tests. And read the instructions carefully before performing each task.

If you have any questions in using this SLM or any difficulty in answering the tasks in this module, do not hesitate to consult your teacher or facilitator.

Thank you.

What I Need to Know

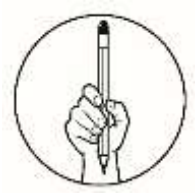
In this module, you will be learning the concepts of graphing linear inequalities in two variables. You are provided with varied activities to process the knowledge and skills learned and enhanced your understanding of the lesson. The scope of this module enables you to use it in many different learning situations. The lesson is arranged to follow the standard sequence of the course. But the order in which you read them can be changed to correspond with the textbook you are now using.

This module contains:

Lesson 1- Linear Inequalities in Two Variables and its Graphs

After going through this module, you are expected to:

1. illustrate linear inequalities in two variables;
2. graph linear inequalities in two variables; and
3. represent real-life situations using linear inequalities in two variables.



What I Know

Directions: Write the letter that corresponds to the correct answer. Use a separate answer sheet. After taking the test, take note of the item/s that you failed to answer correctly. Find the correct answer as you go through this module.

1. Which of the following is a linear inequality in two variables?

   A. $3x \leq 16$ C. $9q + 4 < 12$
   B. $3m - 4m > 5$ D. $11 + 2t \geq 3s$

2. What is the graph of linear inequalities in two variables?

   A. half-plane C. parabola
   B. half of a parabola D. straight line

3. How many solutions does a linear inequality in two variables have?

   A. 0 B. 2 C. 1 D. infinite

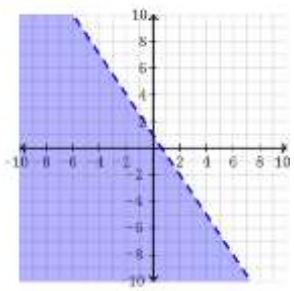
4. Which of the following inequalities is represented by the given graph?

   A. $2x + 2y > 2$

   B. $3x + 2y > 2$

   C. $3x + 2y < 2$

   D. $3x - 2y < 2$



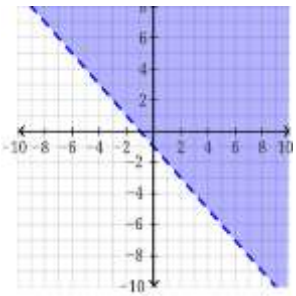
5. Which is the correct inequality for the shaded region?

   A. $y = -x - 1$

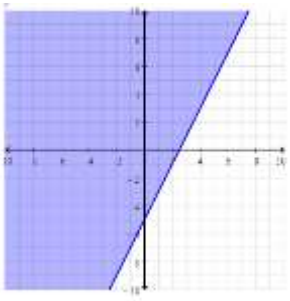
   B. $y > -x - 1$

   C. $y < -x + 1$

   D. $y > x - 1$



6. Given the graph of $y \geq 2x - 5$ below, which of the following ordered pairs satisfies the inequality?



A. $(2, -5)$

B. $(5,\ 2)$

C. $(-2, -7)$

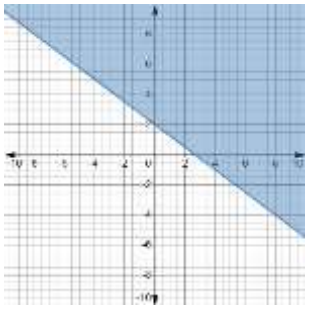
D. $(5, -7)$

7. For what possible values of x and y will make the inequality $2x + y > 6$ true?

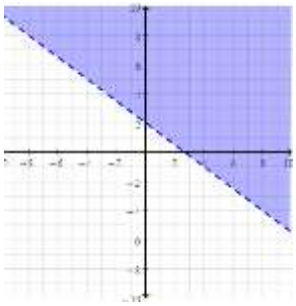
A. $(-3, 1)$ B. $(3, -2)$ C.$(1, 3)$ D. $(3, 2)$

8. Which of the following graphs represents $3x + 4y \geq 8$?

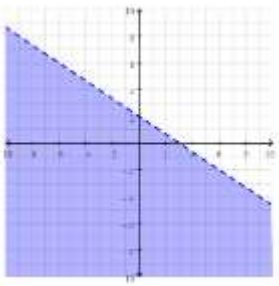
A.



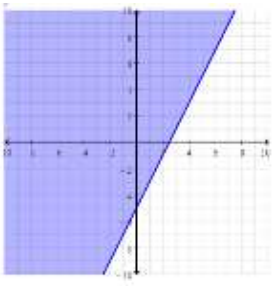
C.



B.



D.



9. In the inequality $6a - 4b \geq 10$, what could be the possible values of a if $b = 2$?

A. $a \leq 1/3$ C. $a < 1/3$

B. $a \geq 3$ D. $a > 1/3$

10. Which of the following inequalities has (3, 1) as a solution?

A. $2x - y < 3$ C. $2x + y > 6$

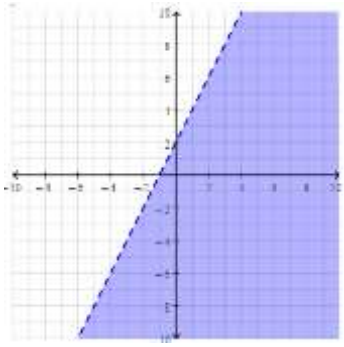
B. $2x + y < 3$ D. $2x - y > 6$

11. What can be said about the solutions of the inequality $x + 2y < 5$?

A. The solutions are on the line.
B. The solutions are located below the line.
C. The solutions are located above the line.
D. All of the above.

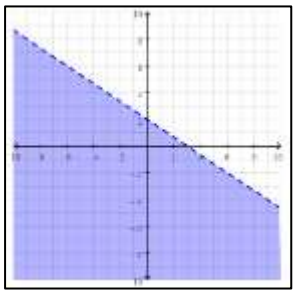
12. All of the following points are part of the solution set of an inequality as shown in the graph EXCEPT one. What is it?

A. (0,1)
B. (5,1)
C. $(-4, 6)$
D. (-3, -12)

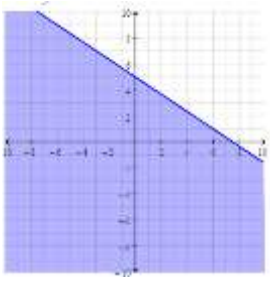


13. Which of the following graphs describes the linear inequality $2x + 3y \leq 15$?

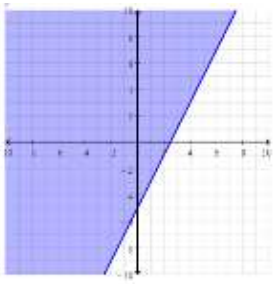
A.



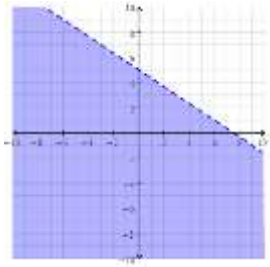
C.



B.



D.



14. Lian's age is four less than Cita's age. The sum of twice Cita's age and thrice Lian's age is at most 18. How old is Lian?

A. at most 2 years old
B. at most 6 years old
C. at most 18 years old
D. at most 21 years old

15. The total amount Shobie paid for two kilos of beef and three kilos of fish is less than $Php\,700$. Suppose a kilo of beef costs $Php\,250$. What will be the maximum cost of a kilo of fish? Round off the answer to the nearest whole number.

A. Php 60
B. Php 65
C. Php 66
D. Php 67

Lesson 1 Linear Inequalities in Two Variables and its Graphs

An online seller is selling washable face mask for 35 pesos each and face shield for 75 pesos each. How many of each does the seller need to sell to make at least 2 000 pesos?

Situations like the one above can be solved and presented using linear inequalities in two variables.

Let us begin our lesson by recalling some phrases of inequalities and properties of linear inequalities you had learned in your Grade 7 Mathematics.

What's In

Activity 1:

Directions: Match the mathematical sentences in Column A to the mathematical inequalities in Column B. Write the letter that corresponds to your answer on a separate sheet of paper.

Column A	Column B
1. A number decreased by 5 is greater than -9.	A. $x + 4 < 10$
2. A number increased by 4 is less than 10.	B. $x + 6 \geq 11$
3. Six more than a number is at least 11.	C. $a - 5 > -9$
4. Five less than a number is at most -3.	D. $x - 5 \leq -3$
5. Four times a number decreased by 5 is greater than or is equal to 11.	E. $2x + 7 < 15$
	F. $4x - 5 \geq 11$

Guide Questions:

a. How did you come up with your answers?
b. Did you encounter difficulty in rewriting mathematical sentences to mathematical inequality?
c. Do you have some patterns when to use the different inequality symbols?

Activity 2:

The following are the properties of inequalities that are helpful in solving linear inequalities. For a, b, c is any element of real numbers.

1. Addition property
   a. If $a < b$, then $a + c < b + c$
   b. If $a > b$, then $a + c > b + c$
2. Subtraction property
   a. If $a < b$, then $a - c < b - c$
   b. If $a > b$, then $a - c > b - c$
3. Multiplication property
   a. If $a < b$, and c is positive, then $ac < bc$
   b. If $a < b$, and c is negative, then $ac > bc$
4. Division property
   a. If $a < b$, and c is positive, then $\frac{a}{c} < \frac{b}{c}$
   b. If $a < b$, and c is negative, then $\frac{a}{c} > \frac{b}{c}$

Directions: Determine the properties of inequality that correspond to each of the following inequalities. Write your answer on a separate sheet of paper.

Property/ies of Inequality

1. $x - 10 < 3$
   $x - 10 + 10 < 3 + 10$ _____
   $x < 13$
2. $n + 21 > 15$
   $n + 21 - 21 > 15 - 21$ _____
   $n > -6$
3. $9 \geq y - 3$
   $9 + 3 \geq y - 3 + 3$ _____
   $12 \geq y$
   $y \leq 12$
4. $-2a + 5 \leq 25$
   $-2a + 5 - 5 \leq 25 - 5$ _____
   $-2a \leq 20$
   $\frac{-2a}{-2} \leq \frac{20}{-2}$

   $a \geq -10$ _____

5. $\frac{x}{3} - 3 \geq 13$
   $\frac{x}{3} - 3 + 3 \geq 13 + 3$ _____
   $3(\frac{x}{3} \geq 16)$ _____
   $x \geq 48$

Guide questions:

1. What are the basic properties of addition of inequalities? How about subtraction of inequalities? Multiplication of inequalities? Division of inequalities?

2. What happens to the direction of the inequality symbol if we multiply/divide same negative number to both sides of the inequality?

What's New

Consider the situation about the online seller who is selling washable face masks for 35 pesos each and face shields for 75 pesos each. Complete the table below by finding the number of face masks, face shields that would satisfy the given condition that would have a total amount of at least 2 000 pesos.

No. of face masks	**Amount**	**No. of face shields**	**Amount**	**Total**
1	$P35$	1	$P75$	$P110$
5	$P175$	4		
8		7	$P525$	$P805$
10	$P350$	9		$P1\,025$
15		12	$P900$	
20	$P700$	17		
25		20	$1\,500$	$P2\,375$

Guide questions:

1. How many possible number of face masks and face shields an online seller can sell to get an amount of at least $P2\,000$ based on the data above?
2. How did you come up with the number of face masks and the number of face shields which will amount at least $P2\,000$?
3. Did you encounter difficulty in determining them? Why?
4. Does the total amount decrease/increase as the number of items decreases/increases?
5. Are there other possible numbers of face masks and face shields that would still yield to an amount of at least $P2000$? How many combinations can you get?

What is It

In your previous activity, the solution represents linear inequality in two variables. It can be written as follows.

$$(amount\ per\ face\ mask)(number\ of\ face\ masks)$$
$$+ (amount\ per\ face\ shield)(number\ of\ face\ shields) \geq Php\ 2\,000$$

Replacing the number of face mask by variable x and the number of face shields by variable y, then it becomes,

$$35x + 75y \geq 2\,000$$

The mathematical statement, $3x + 75y \geq 2\,000$, is an example of linear inequality in two variables.

Recall that a **linear inequality in two variables** is an inequality that can be written in one of the following forms:

$Ax + By < C$,

$Ax + By > C$,

$Ax + By \geq C$, and

$Ax + By \leq C$,

Where A, B, C are real numbers and A and B are both not equal to zero.

Note that these forms can also be written in slope-intercept form of linear inequality as the following:

$y < mx + b$,

$y > mx + b$,

$y \leq mx + b$, and

$y \geq mx + b$, where m is the slope and b is the y- intercept.

One of the ways to determine the possible solutions of a linear inequality in two variables is through graphing.

For the inequality, the graph is a region or a half-plane and the line defines the boundary of the shaded region. The shaded region represents the solution sets of the linear inequality. This indicates that any ordered pair in the shaded region serves as the solutions. If the inequality involves $<$ or $>$ (*is less than or is greater than*), the line drawn is a dashed or broken line, which means the points on the line are not included in the solution. However, if the inequality involves $\leq$ *or* $\geq$, (*is less than or equal to or is greater than or equal to*) the line drawn is a solid line, this means that the points on the line are included in the

solution. Consider the following graphs to better understand the visual presentation of linear inequalities.

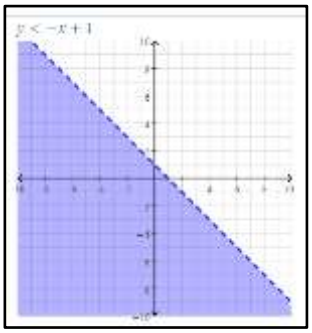


Figure 1. $x + y < 1$

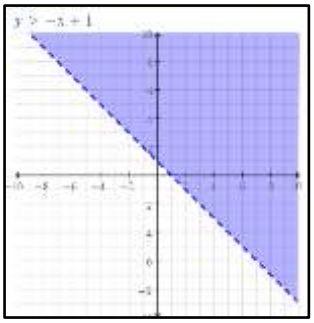


Figure 2. $x + y > 1$

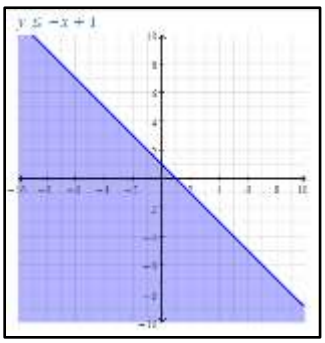


Figure 3. $x + y \leq 1$

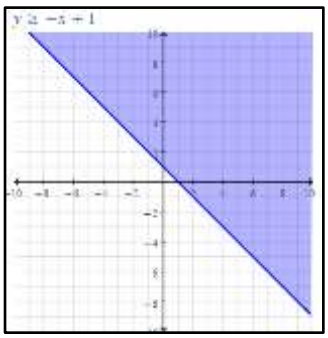


Figure 4. $x + y \geq 1$

Notice that in Figures I and 2 the line is a dashed or broken line. This means that the points on this line are not included in the solution. Figures 3 and 4 used solid line. This means that the points on the line are included in the solution. The shaded region in Figure 1 and 3 are in the same location, the same with Figure 2 and 4.

To graph linear inequality in two variables the following steps are helpful.

Step 1: Transform the inequality into the slope-intercept form.

Step 2: Get the slope and y-intercept

Step 3: Locate the y – intercept in the coordinate plane. From it, plot the other points

(at least two points) using the slope.

Step 4: Connect at least two points to draw a line.

Note: (a) use dashed or broken line when the inequality uses the symbols < and >. This means that the points on this line are not included in the solution set. (b) use solid line when the inequality uses the symbols ≥ and ≤. This means that the points on this line are part of the solution set.

Step 5: Notice that the line divided the plane into two half planes. To determine which half-plane will be shaded, take any point (a test point) from the

two half planes. If the point (ordered pair) satisfies the given inequality, shade the half plane where the point is located.

Step 6: Show the graph of the inequality.
To fully understand the steps, let us graph the following inequalities.

Example 1: Graph $2x + 3y < 6$

Solution:

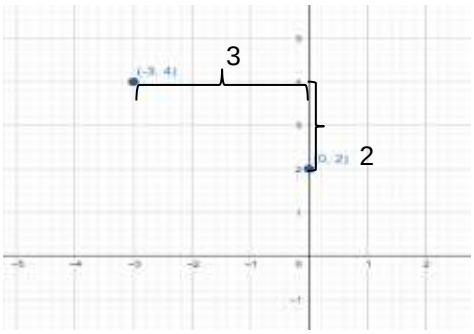
Step 1. Transform the inequality into slope-intercept form.

$2x + 3y$	$<$	6	Given
$2x + (-2x) + 3y$	$<$	$(-2x) + 6$	Add $-2x$ to both sides (additive inverse)
$3y$	$<$	$-2x + 6$	Simplification
$\frac{3y}{3}$	$<$	$-\frac{2}{3}x + \frac{6}{3}$	Divide both sides 3
y	$<$	$-\frac{2}{3}x + 2$	Slope – intercept form

Step 2. Get the slope and y-intercept

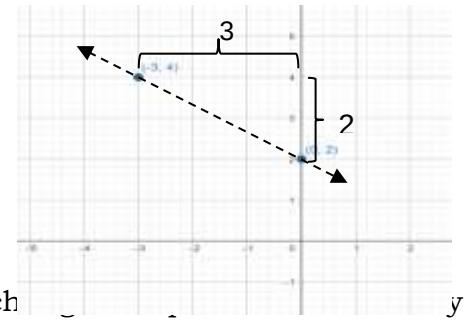
Slope (m) = $-2/3$ y-intercept (b) = 2

Step 3. Locate the y – intercept in the coordinate plane. From it, locate the other point using the slope



Since the slope is $-\frac{2}{3}$, using the definition of the slope which is rise over run, this means that from the y-intercept with ordered pair (0,2), rise by 2 units and run by 3 units to the left since the slope is negative. So, the second point is $(-3, 4)$.

Step 4. Connect the two points by a line. Since the symbol used is <, then use broken line.

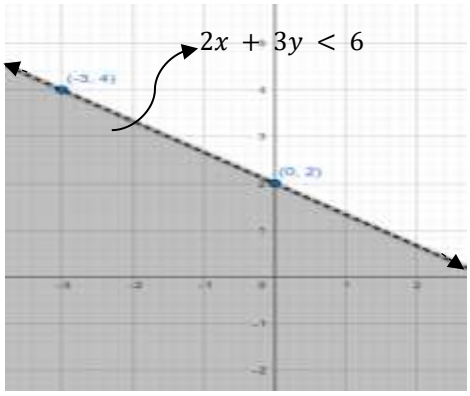


Step 5. Determine which y testing points below the line or above the line that satisfies the given inequality.

Below the line				Above the line			
Chosen Point: $(0,0)$. This means that $x = 0$ and $y = 0$.				Chosen Point: $(-1,4)$. This means that $x = -1$ and $y = 4$.			
$2x + 3y$	$<$	6	Given	$2x + 3y$	$<$	6	Given
$2(0) + 3(0)$	$<$	6	Substituting the value of x and y	$2(-1) + 3(4)$	$<$	6	Substituting the value of x and y
$0 + 0$	$<$	6	Simplification	$-2 + 12$	$<$	6	Simplification
0	$<$	6	Simplification	10	$<$	6	Simplification
This is True				This is False			

Thus, the region or part to be shaded is below the line.

Step 6. Show the graph of the inequality.



The graph shows that all the points on the shaded region are part of the solution set of the given inequality. Since it is a broken line, then the points on this line are NOT included in the solution set.

Example 2: Graph $3x + 4y > 12$

Solution:

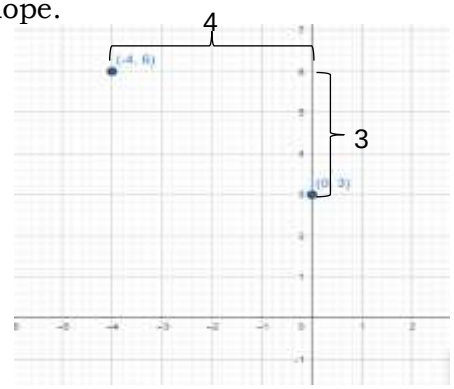
Step 1. Transform the inequality into slope-intercept form.

$3x + 4y$	$>$	12	Given
$3x + (-3x) + 4y$	$>$	$-3x + 12$	Add $-3x$ to both sides
$4y$	$>$	$-3x + 12$	Simplification
$\frac{4y}{4}$	$>$	$\frac{-3}{4}x + \frac{12}{4}$	Divide both sides by 4
y	$>$	$-\frac{3}{4}x + 3$	Slope – intercept form

Step 2. Get the slope and y-intercept

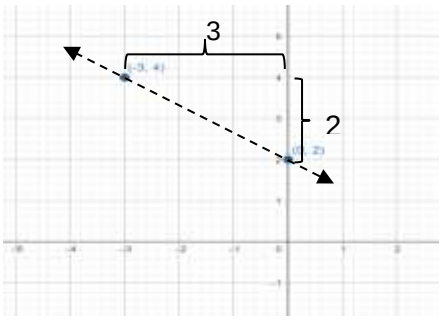
Slope (m) = $-\frac{3}{4}$ y-intercept (b) = 3

Step 3. Locate the y – intercept in the coordinate plane. From it, locate the other point using the slope.



Since the slope is $-\frac{3}{4}$, this means that from the y-intercept with ordered pair (0,3), rise by 3 counts and run by 4 counts to the left since the slope is negative. So, the second point is $(-4,6)$.

Step 4. Connect the two points by a line. Since the symbol used is >, then use broken line.



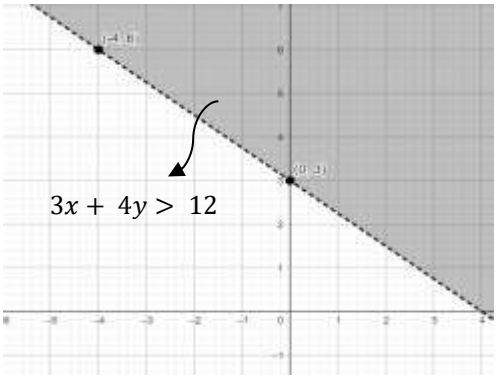
Step 5. Determine which region or part to be shaded by testing points below the line or above the line that satisfies the given inequality.

Below the line	Above the line
Chosen Point: (0,0). This means that $x = 0$ and $y = 0$.	Chosen Point: (0,4). This means that $x = 0$ and $y = 4$.

$3x + 4y$	$>$	12	Given	$3x + 4y$	$>$	12	Given
$3(0) + 4(0)$	$>$	12	Substituting the value of x and y	$3(0) + 4(4)$	$>$	12	Substituting the value of x and y
$0 + 0$	$>$	12	Simplification	$0 + 16$	$>$	12	Simplification
0	$>$	12	Simplification	16	$>$	12	Simplification
This is False				This is True			

Thus, the region or part to be shaded is above the line.

Step 6. Show the graph of the inequality.



The graph shows that all the points on the shaded region are part of the solution set of the given inequality. Since it is a broken line, then the points on this line are NOT included in the solution set.

Example 3: Graph $5x + 2y \leq 0$

Solution:

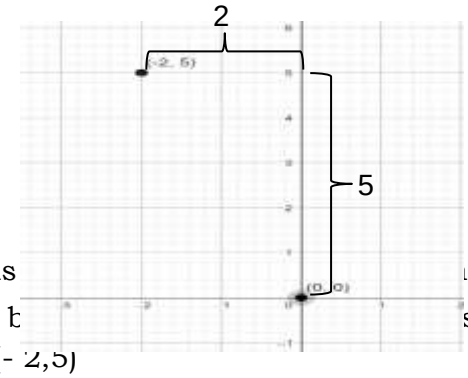
Step 1. Transform the inequality into slope-intercept form.

$5x + 2y$	$\leq$	0	Given
$5x + (-5x) + 2y$	$\leq$	$-5x + 0$	Add $-5x$ to both sides (additive inverse)
$2y$	$\leq$	$-5x$	Simplification
$\frac{2y}{2}$	$\leq$	$\frac{-5}{2}x$	Divide both sides by 2
y	$\leq$	$-\frac{5}{2}x$	Slope – intercept form

Step 2. Get the slope and y-intercept

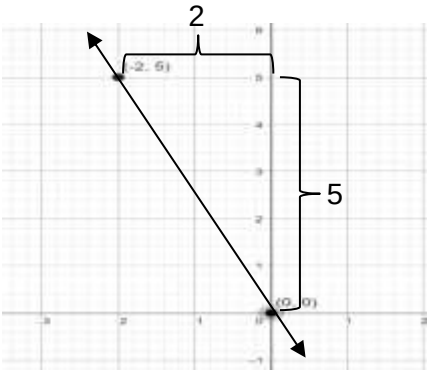
Slope (m) = $-\frac{5}{2}$ y-intercept (b) = 0

Step 3. Locate the y – intercept in the coordinate plane. From it, locate the other point using the slope



Since the slope is ...t (0, 0), rise by 5 counts upward and run b... slope is negative. So, the second point is (- 2,5)

Step 4. Connect the two points by a line. Since the symbol used is ≤, then use solid line. This means that all the points on this line are part of the solution set.



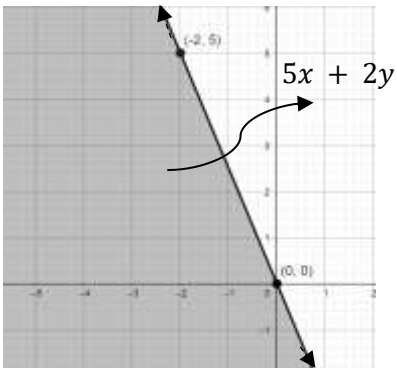
Step 5. Determine which region or part to be shaded by testing points below the line or above the line that satisfies the given inequality.

Below the line Chosen Point: (-1,1). This means that x = -1 and y = 1.				Above the line Chosen Point: (0,2). This means that x = 0 and y = 2.			
$5x + 2y$	≤	0	Given	$5x + 2y$	≤	0	Given
$5(-1) + 2(1)$	≤	0	Substituting the value of x and y	$5(0) + 2(2)$	≤	0	Substituting the value of x and y
$-5 + (2)$	≤	0	Simplification	$0 + (4)$	≤	0	Simplification
-3	≤	0	Simplification	4	≤	0	Simplification
This is True				This is False			

Thus, the region or part to be shaded is below the line.

Show the graph of the inequality.

Step 6.



The graph shows that all the points on the shaded region are part of the solution set of the given inequality. Since it is a solid line, then the points on this line are **included** in the solution set.

Example 4: Graph $2x + 5y \geq 15$

Solution:

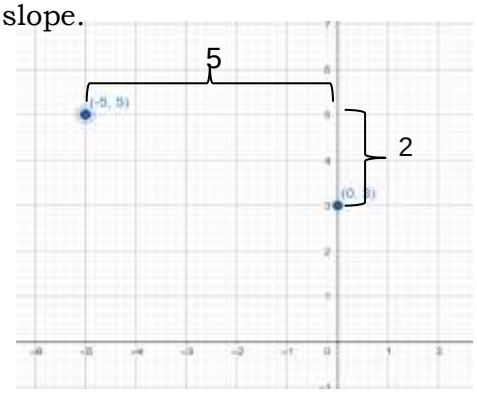
Step 1. Transform the inequality into slope-intercept form.

$2x + 5y$	$\geq$	15	Given
$2x + (-2x) + 5y$	$\geq$	$-2x + 15$	Add $-2x$ to both sides (additive inverse)
$5y$	$\geq$	$-2x + 15$	Simplification
$\frac{5y}{5}$	$\geq$	$-\frac{2}{5}x + \frac{15}{5}$	Divide both sides 5
y	$\geq$	$-\frac{2}{5}x + 3$	Slope – intercept form

Step 2. Get the slope and y-intercept

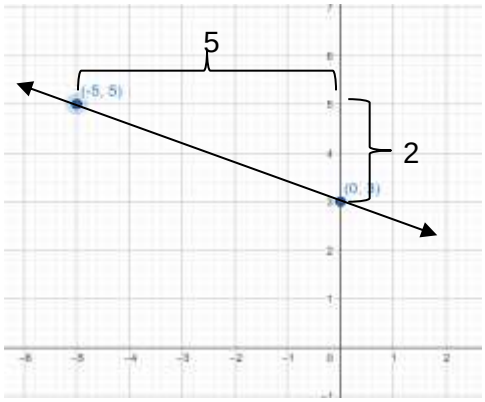
Slope $(m) = -\frac{2}{5}$ y-intercept $(b) = 3$

Step 3. Locate the y – intercept in the coordinate plane. From it, locate the other point using the slope.



Since the slope is $-\frac{2}{5}$, this means that from point (0, 3), rise by 2 counts upward and run by 5 counts to the left since the slope is negative. So, the second point is (-5,5)

Step 4. Connect the two points by a line. Since the symbol used is ≥, then use solid line. This means that all the points on this line are part of the solution set.

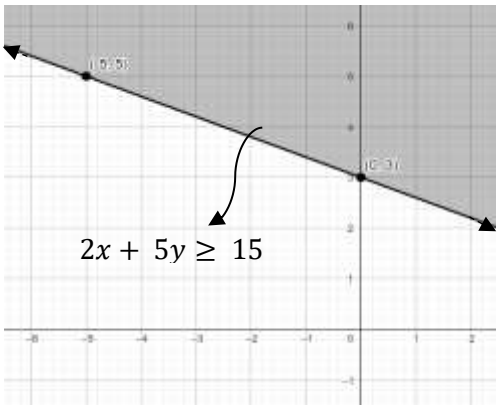


Step 5. Determine which region or part to be shaded by testing points below the line or above the line that satisfies the given inequality.

Below the line Chosen Point: $(0,0)$. This means that $x = 0$ and $y = 0$.				Above the line Chosen Point: $(0,4)$. This means that $x = 0$ and $y = 4$.			
$2x + 5y$	$\geq$	15	Given	$2x + 5y$	$\geq$	15	Given
$2(0) + 5(0)$	$\geq$	15	Substituting the value of x and y	$2(0) + 5(4)$	$\geq$	15	Substituting the value of x and y
$0 + 0$	$\geq$	15	Simplification	$0 + 20$	$\geq$	15	Simplification
0	$\geq$	15	Simplification	20	$\geq$	15	Simplification
This is False				This is True			

Thus, the region or part to be shaded is above the line.

Step 6. Show the graph of the inequality.



The graph shows that all the points on the shaded region are part of the solution set of the given inequality. Since it is a solid line, then the points on this line are INCLUDED in the solution set.

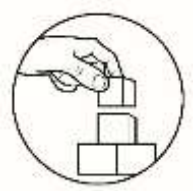
The table below shows the summary of examples 1 to 4.

Inequalities	Boundary Line	Slope – intercept form	Shaded Region
$2x + 3y < 6$	Broken Line	$y < -\frac{2}{3}x + 2$	Below the line
$3x + 4y > 12$	Broken Line	$y > -\frac{3}{4}x + 3$	Above the line
$5x + 2y \leq 0$	Solid Line	$y \leq -\frac{5}{2}x$	Below the line
$2x + 5y \geq 15$	Solid Line	$y \geq -\frac{2}{5}x + 3$	Above the line

Notice that when the inequality symbol used is $>$ or $<$, the boundary line is broken line. When the inequality symbol used is $\geq$ or $\leq$, the boundary line is solid line. In the examples above, test points are used to determine whether the solutions lie above or below the line. However, linear inequalities can also be graphed without using test points provided that they are written in any of these forms: $y < mx + b$, $y > mx + b$, $y \leq mx + b$, or $y \geq mx + b$.

This can be presented in the table below:

Inequalities	**Solutions**
$y < mx + b$	The half-plane below the line $y = mx + b$.
$y > mx + b$	The half-plane above the line $y = mx + b$.
$y \leq mx + b$	The half-plane on or below the line $y = mx + b$.
$y \geq mx + b$	The half-plane on or above the line $y = mx + b$.



What's More

Activity 1 "My Borderline"

Directions: Determine the boundary and the shaded region of each linear inequality in two variables by putting a check mark (✓) on a proper column that corresponds to your answer. Write your answer in a separate sheet of paper.

Linear inequality in two variables	Boundary Line		Shaded Region	
	Solid	Dashed	Below	Above
1. $y > x + 3$				
2. $y > x - 3$				
3. $y \leq x + 5$				
4. $2x + y < 6$				
5. $4y + 6x \geq 11$				

Guide Questions:

1. Which of the given linear inequalities is easy to answer? Why?
2. How did you know if the boundary line is dashed/broken?
3. When do we say that the boundary line is solid?
4. How do you determine the half-plane of the graph to be shaded?
5. Which linear inequalities have a shaded region above the boundary line? Below the boundary line?

Activity 2: "Did I Satisfy you?"

Directions: Consider the following ordered pairs, which of them satisfy linear inequalities in two variables? Test all the points in the given linear inequalities. Write your answer on a separate sheet of paper.

1. $x + 3y > 3$	$(-3, 4)$	$(5, 5)$	$(-5, 8)$	$(3, -5)$
2. $x > -3y + 4$	$(6, -1)$	$(1, 5)$	$(0, 5)$	$(2, 3)$
3. $2x - 3y \leq 1$	$(4, 1)$	$(1, 1)$	$(0, 0)$	$(5, -3)$
4. $10 < -5x + 2y$	$(-3, 1)$	$(-5, 4)$	$(-2, -2)$	$(4, 4)$
5. $4x + 3y \geq 12$	$(-4, -3)$	$(5, 4)$	$(5, -1)$	$(1, -6)$

Guide Questions:

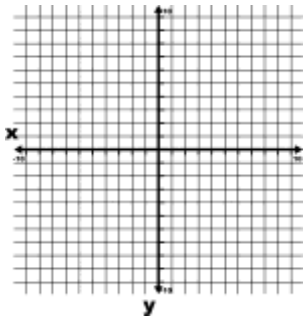
1. How did you know that ordered pair satisfies the linear inequality in two variables?

2. What can you conclude about the points that satisfy the linear inequalities?
3. What can you conclude about the points that do not satisfy the linear inequalities?

Activity 3: "Graph Me"

Directions: Graph the following linear inequalities. Write your answer in a graphing paper. Use any coloring materials to shade the infinite solutions of the inequalities.

1. $y > x - 3$
2. $2x + 3y < 12$
3. $3x + y \leq 4$
4. $-5x \geq 9 + 3y$



Guide questions:

a. How did you graph the given inequalities?
b. Which of the inequalities have broken line? Have solid line?
c. Which of the inequalities have shaded region below the boundary line? Above the boundary line?

What I Have Learned

Reflect on the activities you have done in this lesson by completing the following statements. Write your thoughts on your notebook.

- I learned that I…
- I was surprised that I…
- I noticed that I…
- I discovered that I…
- I was pleased that I…

What I Can Do

Directions: Compose a jingle citing a situation in real-life where linear inequalities in two variables are presented. Do this on a separate sheet of paper.

RUBRIC: Real-life Situation on Linear Inequalities in Two variables

CRITERIA	4	3	2	1
Clarity of the situation.	The situation is clear and realistic.	The situation is clear and not realistic.	The situation is not too clear and not realistic.	The situation is not clear and the used of linear inequalities in two variables is not illustrated.
Appropriate use of mathematical concept	The mathematical concepts of linear inequalities in two variables are appropriate and properly illustrated.	The mathematical concepts of linear inequalities in two variables are appropriate and not properly illustrated	The mathematical concepts of linear inequalities in two variables are not too appropriate and not properly illustrated	The mathematical concepts not appropriate and not illustrated.
Grammar	No spelling and/or grammar mistakes.	Minimal spelling and/or grammar mistakes.	Noticeable spelling and grammar mistakes.	Unacceptable number of spelling and/or grammar mistakes.

Assessment

Directions: Read and understand each question carefully and choose the letter of the correct answer. Use a separate sheet of paper.

1. Which of the following is a linear inequality in two variables?

   A. $x + y = 2$
   B. $x + 5 > 8$
   C. $3m + 5n < 10$
   D. $3q - 2q \neq 6$

2. Which of the following inequalities illustrates "the sum of x and y is at most 15"?

   A. $x + y = 15$
   B. $x + y > 15$
   C. $x + y \leq 15$
   D. $x + y \geq 15$

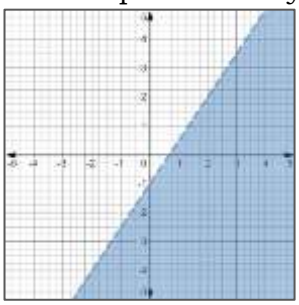
3. Which of the following inequalities has $(5, 1)$ as a solution?

   A. $3x + y \leq 3$
   B. $3x - y \leq 3$
   C. $3x - y < 15$
   D. $3x + y < 15$

4. For what possible values of x and y will make the inequality $5x + 3y > 12$ true?

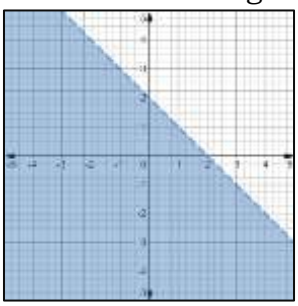
   A. (0, 3)
   B. (3, -1)
   C. (1, -3)
   D. (3, 0)

5. Which of the following inequalities is represented by the given graph?

   A. $2x + 2y > 2$
   B. $3x + 2y < 2$
   C. $3x - 2y > 2$
   D. $3x - 2y < 2$

6. Which is the correct inequality for the shaded region?

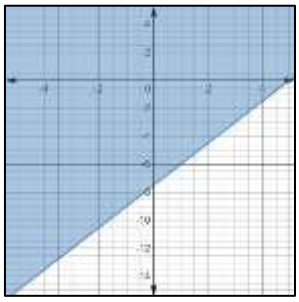
   

   A. $y = -x - 2$
   B. $y > -x - 2$
   C. $y < -x + 2$
   D. $y > x - 2$

7. Which of the following points satisfies the inequality $y < 2x - 3$?

   A. (5, 2)
   B. (2, 2)
   C. (2, 5)
   D. (0, 5)

8. Which of the following inequalities is represented by the graph?



A. $2x + 3y \geq 15$

B. $2x + 3y \leq 15$

C. $3x - 2y \geq 15$

D. $3x - 2y \leq 15$

9. Transform $3x - 2y < 7$ into slope- intercept form.

A. $y < \frac{3}{2}x + \frac{7}{2}$

B. $y < \frac{3}{2}x + \frac{7}{2}$

C. $y > \frac{3}{2}x - \frac{7}{2}$

D. $y > \frac{2}{3}x - \frac{7}{3}$

10. In the inequality $4a + 3b < 12$, what could be the possible values of a if $b = 2$?

A. $a > \frac{2}{3}$

B. $a > -\frac{3}{2}$

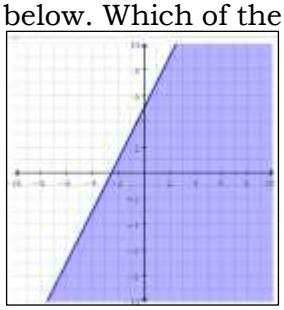
C. $a < \frac{2}{3}$

D. $a < \frac{3}{2}$

11. What can be said about solutions of the inequality $x + 2y > 5$?

A. The solutions are located below the line.
B. The solutions are located above the line.
C. The solutions are on the line.
D. All of the above.

12. The graph of $y \leq 2x + 5$ is shown below. Which of the following ordered pairs does not satisfy the inequality?



A. $(2, -5)$

B. $(5, 2)$

C. $(-2, 7)$

D. $(5, -7)$

13. To graph $2x + y \geq 4$, we begin by graphing the boundary line of the inequality, what is the slope (m) and y-intercept (b) of the inequality?

A. $m = -2,\ b = -1$

B. $m = -2,\ b = 4$

C. $m = 2,\ b = -4$

D. $m = 2,\ b = -1$

14. Bam bought 4 mangoes and 7 guavas. The total amount she paid was at least $P230$. If x represents the cost of each mango and y the cost for each guava, which of the following mathematical statements represents the given situation?

A. $4x + 7y \geq 230$

B. $4x + 7y \leq 230$

C. $4x + 7y > 230$

D. $4x + 7y < 230$

15. The total amount Menerva paid for three kilos of avocado and four kilos of strawberries is at least $P2\,500$. Suppose a kilo of avocado costs $P100$. What what will be the minimum cost of a kilo of strawberries? Round off the answer to the nearest peso.

A. *P*549
B. *P*550
C. *P*551
D. *P*600

Additional Activities

Direction: Read the problem below and answer the questions that follow. Write your answer on a separate sheet of paper.

Lovely paid a total amount of *P*600 for 10 kilos of rice and 3 kilos of fish.

1. What mathematical inequality represents the total amount paid by Lovely? Define the variables used.
2. Suppose a kilo of rice costs *P*35. What could be the greatest cost of a kilo of fish to the nearest peso?
3. Suppose Lovely paid more than *P*600 and each kilo of rice costs *P*34. What could be the least amount she will pay for 3 kilos of fish to the nearest peso?

Answers Key

What I Know

1. D
2. A
3. D
4. C
5. B
6. C
7. D
8. A
9. B
10. C
11. B
12. C
13. C
14. A
15. D

What's In

Activity 1

1. C
2. A
3. B
4. G
5. F

Activity 2

1. Addition Property
2. Subtraction Property
3. Addition Property
4. Subtraction Property; Division Property
5. Addition Property; Multiplication Property

What's New

No. of Face Masks (x)	Amount	No. of Face shields (y)	Amount	Total
1	35	1	75	110
5	175	4	**300**	**475**
8	**280**	7	525	805
10	350	9	**675**	1 025
15	**525**	12	900	**1425**
20	700	17	**1275**	**1975**
25	**875**	20	1 500	2 375

What's More

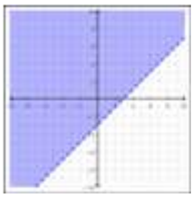
Activity 1: My Borderline

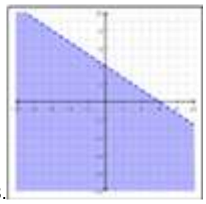
Inequality	Boundary		Shaded region	
	Solid	Dashed	Below	Above
1. $y > x + 3$		✓		✓
2. $y > x - 3$		✓		✓
3. $y \leq x + 5$	✓		✓	
4. $2x + y < 6$		✓	✓	
5. $4y + 6x \geq 11$	✓			✓

Activity 2

1. (-3,4), (5,5), (-5,8)
2. (1,5), (2,3), (0,5)
   (1,1), (0,0)
3. (-3,1), (-5,4)
4. (5,4), (5, -1)

Activity 3


1.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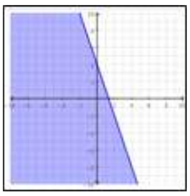
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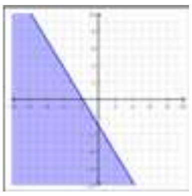
4.

Assessment

1. C
2. C
3. C
4. D
5. C
6. C
7. A
8. D
9. C
10. D
11. B
12. C
13. B
14. A
15. B

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Oronce, Orlando A., Manilyn O. Mendoza, e-math 8(Recto Avenue, Manila, Philippines, Rex Book Store 2013) 213.

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