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DEPARTMENT OF EDUCATION

Mathematics

Quarter 1 – Module 14: "Illustrating Systems of Linear Equations in Two Variables"

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Mathematics

Quarter 1 – Module 14:
"Illustrating Systems of Linear Equations in Two Variables''

DEPARTMENT OF EDUCATION

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

This module covers key concepts of linear equations in two variables. It focuses on the illustrating systems of linear equations in two variables. In this module, the students will describe mathematical expressions and mathematical equations. 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- Illustrating Systems of Linear Equations in Two Variables.

Objectives: After going through this module, you are expected to:

1. define a system of linear equations in two variables;
2. identify the three types of system of linear equations in two variables; and
3. represent real-life situations using systems of linear equations in two variables.

What I Know

Directions: Choose the letter of the correct answer and write it on a separate sheet of paper.

1. Which of the following is true about the system of linear equations in two variables?

    I. Any set of linear equations.
    II. A set of two or more linear equations in two variables.
    III. A system of linear equations may have only one solution, infinitely many solutions, or no solution at all.
    IV. A system of linear equations in two variables can be solved algebraically or graphically.

    A. I and II
    B. II and III
    C. I, II, and III
    D. II, III, and IV

2. Which of the following pair of equations could NOT be considered a system of linear equation in two variables?

    A. $\begin{cases} 7x - y = 8 \\ 2x + 4y = 8 \end{cases}$
    B. $\begin{cases} y = x - 8 \\ \frac{5}{2}x + 4y = 8 \end{cases}$
    C. $\begin{cases} -x + 6y = 2 \\ 7x = y - 12 \end{cases}$
    D. $\begin{cases} 4x^2 - 3x - 4 = 0 \\ xy^2 = -9 \end{cases}$

3. Which system of linear equation is equivalent to $\begin{cases} y = 4x - 2 \\ \frac{1}{2}x - 5 = y \end{cases}$?

    A. $\begin{cases} 4x - y = 2 \\ x + 2y = 5 \end{cases}$
    B. $\begin{cases} 4x - y = -2 \\ x + 2y = 10 \end{cases}$
    C. $\begin{cases} 4x - y = 2 \\ x - 2y = 10 \end{cases}$
    D. $\begin{cases} 4x + y = -2 \\ x - 2y = 5 \end{cases}$

4. Which system of linear equation is the same as $\begin{cases} \frac{3}{2}x - 4y = 1 \\ 5x - \frac{1}{2}y = 10 \end{cases}$?

    A. $\begin{cases} 3x - 8y = 2 \\ 10x - y = 20 \end{cases}$
    B. $\begin{cases} 3x + 8y = 2 \\ 10x + 4y = 5 \end{cases}$
    C. $\begin{cases} 8x - 3y = 2 \\ x - 10y = 5 \end{cases}$
    D. $\begin{cases} 3x + 2y = -8 \\ 4x - y = 20 \end{cases}$

5. Which of the following is a system of linear equations in two variables?

A. $\begin{cases} -y = 4 \\ x - 3y = 4 \end{cases}$

B. $\begin{cases} 2x - y = 4 \\ 2x = -2 \end{cases}$

C. $\begin{cases} 5 - 2y = 4 \\ -3x + y = -2 \end{cases}$

D. $\begin{cases} x + 3 = y \\ 2x + 2y = 6 \end{cases}$

6. Which of the following system of linear equation in two variables is consistent and independent?

A. $\begin{cases} 3x - 2y = 1 \\ x + 2y = 5 \end{cases}$

B. $\begin{cases} x - 2y = 1 \\ x - 2y = 5 \end{cases}$

C. $\begin{cases} x + 3y = 5 \\ 3x + 9y = 15 \end{cases}$

D. $\begin{cases} x - y = 1 \\ x - y = -5 \end{cases}$

7. Which of the following systems of linear equation in two variables is consistent and dependent?

A. $\begin{cases} x + 2y = 5 \\ x + 2y = -3 \end{cases}$

B. $\begin{cases} 3x - 2y = 6 \\ 15x - 10y = 30 \end{cases}$

C. $\begin{cases} x + 3y = -5 \\ 3x + 9y = 15 \end{cases}$

D. $\begin{cases} x - y = 1 \\ x + y = 4 \end{cases}$

8. Which of the following system of linear equations is inconsistent?

A. $\begin{cases} 5x + 2y = 10 \\ 2x + 5y = 10 \end{cases}$

B. $\begin{cases} 4x - 3y = 12 \\ 12x - 9y = -36 \end{cases}$

C. $\begin{cases} 2x + y = 4 \\ 2x + 3y = 2 \end{cases}$

D. $\begin{cases} 5x + y = -3 \\ 15x + 3y = -9 \end{cases}$

9. Which of the following equations can be paired with $x + 2y = 8$ to make a consistent and independent system of equations?

A. $-3x - 6y = -24$

B. $7x + 14y = -16$

C. $3x - 2y = 4$

D. $2x + 4y = 16$

10. Which of the following equations can be paired with $3x - 2y = 5$ to make a consistent and dependent system of linear equations?

A. $-15\text{x} + 10\text{y} = -25$

B. $6x - 4y = -10$

C. $\text{x} + 2\text{y} = 1$

D. $12x + 8y = 2$

11. Which of the following ordered pairs satisfies the given system of linear equation $\begin{cases} x - 3y = 5 \\ 3x - 4y = -5 \end{cases}$?

A. (7,4)

B. $(-7,-4)$

C. $(7,-4)$

D. $(-7,4)$

12. All of the following ordered pairs satisfy the system of linear equation $\begin{cases} x + y = 6 \\ 2x + 2y = 12 \end{cases}$ EXCEPT:

A. (3, 3)

B. (4, 2)

C. (5,1)

D. (7, -2)

13. Mario invested a total of P 25,000 in his two funds paying 6 % and 8%, respectively in annual interest. The combined annual interest is P 1,800. What system of linear equations in two variables will best represent the situation?

A. $\begin{cases} x + y = 25{,}000 \\ 0.06x + 0.08y = 1{,}800 \end{cases}$

C. $\begin{cases} x - y = 25{,}000 \\ 0.08x + 0.06y = 1{,}800 \end{cases}$

B. $\begin{cases} x + y = 1{,}800 \\ 0.06x + 0.08y = 2{,}500 \end{cases}$

D. $\begin{cases} x + y = 1{,}800 \\ 0.06x - 0.08y = 25{,}000 \end{cases}$

14. Is $x + y^2 = 5$ and $x + 4y = 6$ a system of linear equation in two variables?

A. Yes, because it has two variables, x and y.

B. No, because the degree in one of the equations is not 1.

C. Yes, because it is written in standard form and in general form.

D. No, because the constants A, B, and C are all real numbers, but A and B are not both zero.

15. Jayda was tasked by her teacher to verify if the ordered pair $(-1, 2)$ will satisfy to the system $\begin{cases} 4x + 3y = 2 \\ 5x - y = -7 \end{cases}$. Her solution is shown below.

Equation1:
$$\begin{aligned} 4x + 3y &= 2 \\ 4(-1) + 3(2) &= 2 \\ -4 + 6 &= 2 \\ 2 &= 2 \end{aligned}$$

Equation2:
$$\begin{aligned} 5x - y &= -7 \\ 5(-1) - (2) &= -7 \\ -5 - 2 &= -7 \\ -7 &= -7 \end{aligned}$$

Was her solution correct?

A. Yes, because she substituted the values of the variable x = 1and y = -2.

B. Yes, because she followed the process of evaluating the system of linear equations.

C. No, because the point (-1, 2) is not a common point of the given system of linear equations in two variables.

D. No, because she is supposed to make two false statements that makes a solution of the system of linear equations.

Lesson 1 Illustrating Systems of Linear Equations in Two Variables

In today's "new normal" setting, almost everyone relies on digital communications to reach out their friends and family, deliver work/services from home, and even purchase basic necessities such as food, clothing, medicine, etc. Hence, there is an increasing number of subscribers in the mobile telecommunications industry.

In most cases, these telecommunication companies sold services on similar basis. For instance, these companies charge a fixed cost for a given number of gigabytes (GB) of mobile data subscription, unlimited calls to the same network, and a certain number of minutes of call and text messages sent to other networks plus an additional cost per kilobytes of mobile data used, number of minutes of call and text messages to other networks above that limit.

How would one know which plan is best to choose and which network services are good to avail? To answer these questions, we need to recognize that there is more than one variable involved and situation such as this can be modelled using linear equations in two variables.

Let us begin this module by reactivating your basic knowledge involving linear equations in two variables.

What's In

Transform Me!

Directions: Transform each pair of equations into the slope-intercept form ($y = mx + b$) and identify the slope (m) and y-intercept (b). Write your answers on a separate sheet of paper.

Given	Slope-intercept Form ($y = mx + b$)	Slope (m)	y-intercept (b)
1. $x + y = 5$ and $x - y = 1$			
2. $3x + 2y = 6$ and $6x + 4y = 12$			
3. $2x - y = 5$ and $2x - y = 3$			

Questions:

1. Were you able to transform each equation into its slope-intercept form correctly?
2. What have you observed with the slope(m) and y-intercept (b) of the pair of equations in item 1? item 2? item 3?
3. If you are to find ordered pairs that will satisfy both equations in each item, how would you do it?
4. What ordered pair/s, if there's any, that would satisfy both equations in item 1? item 2? item 3?

What's New

Connect Me

Directions: Match the linear equations on column A to its ordered pairs on column B. Choose the letter that corresponds to the correct answer.

Column A	Column B
1. $\begin{cases} x + y = 4 \\ x - y = 2 \end{cases}$	• $(1, 2)$
2. $\begin{cases} x + 2y = 5 \\ 4x - y = 2 \end{cases}$	• $(3, 1)$
3. $\begin{cases} x - y = 3 \\ 3x - 3y = 9 \end{cases}$	• $(6, -1)$
4. $\begin{cases} x + y = -4 \\ 2x - 3y = 7 \end{cases}$	• $(4, 1)$
5. $\begin{cases} x + 4y = 14 \\ 3x + 2y = 2 \end{cases}$	• $(-1, -3)$
	• $(-2, -4)$

Questions:

1. How did you determine the corresponding solution of each system of linear equation?
2. What difficulties did you encounter in finding the solution?
3. How will you address the difficulties experienced in finding the solution?

What is It

In order for you to investigate situations such as that of the best network services and plan to avail, you need to recognize that you are dealing with more than one variable and probably more than one equation.

A **system of linear equations** is a set of two or more equations of the same variables in each equation. It can have **no solution, one solution, or infinite solutions**. To solve the system of linear equations is to find the value of two variables that will satisfy the equations in the system.

Suppose you take the pair of equations $x + y = 5$ and $x - y = 1$. Note that there are infinitely many pair of numbers whose sum is 5, hence, you can say that there are infinitely many ordered pairs (x, y) that will satisfy the equation and some of these are shown in Table 1 below. Similarly, if you consider the equation $x - y = 1$, you can also say that there are infinitely many pair of numbers whose difference is 1, hence, you can also say that there are infinitely many ordered pair (x, y) that will satisfy $x - y = 1$ and some of these are shown in Table 2 below.

$x + y = 5$		
x	y	(x, y)
0	5	(0,5)
1	4	(1,4)
2	3	(2,3)
4	**1**	**(4, 1)**
5	0	(5,0)

Table 1

$x - y = 1$		
x	y	(x, y)
0	-1	$(0, -1)$
1	0	(1,0)
2	1	(2,1)
3	2	(3,2)
4	**1**	**(4, 1)**

Table 2

From tables 1 and 2, you see that the ordered pair (4,1) satisfies both $x + y = 5$ and $x - y = 1$. If you are to consider the equations simultaneously, then you can write this as:

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

This can be read as "the system of equations $x + y = 5$ and $x - y = 1$".

Since the ordered pair (4,1) satisfies both equations, then it is called a **solution** to the system of equations. A **solution** of a system of linear equations is an ordered pair (x, y) that satisfies both equations.

Generally, there are three types of systems of linear equations in two variables according to the number of solutions. Here are the three types of system of linear equations as shown in the table below.

System of Linear Equations	Slope-intercept Form	Slope	Y-intercept	Number of Solutions	Type of System of Linear Equations
1. $\begin{cases} x+y=5 \\ x-y=1 \end{cases}$	$\begin{cases} y=-x+5 \\ y=x-1 \end{cases}$	$m_1 \neq m_2$	$b_1 \neq b_2$	One solution	Consistent and Independent
2. $\begin{cases} 3x+2y=6 \\ 6x+4y=12 \end{cases}$	$\begin{cases} y=\frac{-3}{2}x+3 \\ y=\frac{-3}{2}x+3 \end{cases}$	$m_1 = m_2$	$b_1 = b_2$	Infinitely Many Solutions	Consistent and Dependent
3. $\begin{cases} 2x-y=5 \\ 2x-y=3 \end{cases}$	$\begin{cases} y=2x-5 \\ y=2x-3 \end{cases}$	$m_1 = m_2$	$b_1 \neq b_2$	No solution	Inconsistent

Example 1. $\begin{cases} x+y=5 \\ x-y=1 \end{cases}$

You already know from the discussion above that the ordered pair (4,1) is a solution to the given system of equations. Hence, you only need to check on the slopes and $y-intercepts$ of the given pair of equations. Transforming each equation into the slope-intercept form, you get:

Equation 1:

$$\begin{aligned} x+y &= 5 \\ x-x+y &= 5-x \\ y &= -x+5 \end{aligned}$$

$\boldsymbol{m = -1}$ **;** $\boldsymbol{b = 5}$

Equation 2:

$$\begin{aligned} x-y &= 1 \\ x-x-y &= 1-x \\ -y &= -x+1 \\ (-1)(-y) &= (-1)(-x+1) \\ y &= x-1 \end{aligned}$$

$\boldsymbol{m = 1}$ **;** $\boldsymbol{b = -1}$

Observe that the slope of equation 1 is not equal to the slope of equation 2. Hence, $m_1 \neq m_2$. This system of linear equations is **consistent and independent**. This system of linear equations has exactly **one solution**. The slopes of the lines defined by the equations are not equal, their y-intercepts could be equal or unequal.

In your next lesson, you can verify that by graphical method, the graphs of these equations intersect at exactly one point and that point of intersection is at (4,1).

Example 2. $\begin{cases} 3x+2y=6 \\ 6x+4y=12 \end{cases}$

Transforming each equation into the slope-intercept form, you get:

Equation 1:

$$3x+2y = 6$$

Equation 2:

$$6x+4y = 12$$

$3x - 3x + 2y$	$=$	$6 - 3x$	$6x - 6x + 4y$	$=$	$12 - 6x$
$2y$	$=$	$-3x + 6$	$4y$	$=$	$-6x + 12$
$\frac{1}{2}(2y)$	$=$	$\frac{1}{2}(-3x + 6)$	$\frac{1}{4}(4y)$	$=$	$\frac{1}{4}(-6x + 12)$
y	$=$	$\frac{-3}{2}x + 3$	y	$=$	$\frac{-3}{2}x + 3$
$\boldsymbol{m} = \frac{-3}{2}$	;	$\boldsymbol{b} = \mathbf{3}$	$\boldsymbol{m} = \frac{-3}{2}$	;	$\boldsymbol{b} = \mathbf{3}$

Observe that the slopes of both equations are equal, and the y-intercepts of both equations are also equal, hence, $m_1 = m_2$ and $b_1 = b_2$.

What are some of the ordered pairs that will satisfy both equations? You can test some ordered pairs as shown below and determine whether these set of points when substituted to both equations will yield a true statement.

a. the y-intercept: (0,3)

Equation 1: $x = 0;\ y = 3$			Equation 2: $x = 0;\ y = 3$		
$3x + 2y$	$=$	6	$6x + 4y$	$=$	12
$3(0) + 2(3)$	$=$	6	$6(0) + 4(3)$	$=$	12
6	$=$	6 ✓	12	$=$	12 ✓

b. the x-intercept: (2,0)

Equation 1: $x = 2;\ y = 0$			Equation 2: $x = 2;\ y = 0$		
$3x + 2y$	$=$	6	$6x + 4y$	$=$	12
$3(2) + 2(0)$	$=$	6	$6(2) + 4(0)$	$=$	12
6	$=$	6 ✓	12	$=$	12 ✓

c. Another point $(6, -6)$

Equation 1: $x = 6;\ y = -6$			Equation 2: $x = 6;\ y = -6$		
$3x + 2y$	$=$	6	$6x + 4y$	$=$	12
$3(6) + 2(-6)$	$=$	6	$6(6) + 4(-6)$	$=$	12
$18 - 12$	$=$	6	$36 - 24$	$=$	12
6	$=$	6 ✓	12	$=$	12 ✓

And you can go on testing infinitely many ordered pairs to show that indeed the system $\begin{cases} 3x + 2y = 6 \\ 6x + 4y = 12 \end{cases}$ has **infinitely many solutions**. Another thing that you can do to is to show that one equation is equivalent to the other. That is, in the example above, equation 2 can be obtained by multiplying each term of equation 1 by 2. Conversely, equation 1 can be obtained by dividing each term of equation 2 by

2. Hence, the two equations are equivalent. This system of linear equations is **consistent and dependent**.

In your next lesson, you can verify that by graphical method, the graphs of these two equations coincide. That is, the points in the graph of $3x + 2y = 6$ are exactly the same points in the graph of $6x + 4y = 12$.

Example 3. $\begin{cases} 2x - y = 5 \\ 2x - y = 3 \end{cases}$

Transforming these equations into the slope-intercept form, we get:

Equation 1:

$$\begin{aligned} 2x - y &= 5 \\ 2x - 2x - y &= 5 - 2x \\ -y &= -2x + 5 \\ (-1)(-y) &= (-1)(-2x + 5) \\ y &= 2x - 5 \\ \boldsymbol{m = 2} \quad &; \quad \boldsymbol{b = -5} \end{aligned}$$

Equation 2:

$$\begin{aligned} 2x - y &= 3 \\ 2x - 2x - y &= 3 - 2x \\ -y &= -2x + 3 \\ (-1)(-y) &= (-1)(-2x + 3) \\ y &= 2x - 3 \\ \boldsymbol{m = 2} \quad &; \quad \boldsymbol{b = -3} \end{aligned}$$

Observe that the slope of equation 1 is equal to the slope of equation 2 but the y-intercept of equation 1 is not equal to the y-intercept of equation 2. Hence, $m_1 = m_2$ and $b_1 \neq b_2$. This system of linear equations is **inconsistent**. It has **no solution**.

Again, in your next lesson you can verify that by graphical method, the graphs of these two equations do not intersect at any point, hence, they are parallel.

Recall that at the beginning of this lesson, it has been mentioned that real-life situations can be modelled using system of linear equations in two variables. Now let us explore some of these using the examples below.

Example 4. A mobile network provider offers a postpaid sim-only plan that costs Php999 per month plus Php2.50 per text message sent to other networks. Another mobile network sim-only plan costs Php1299 per month but offers Php1 only for every text message sent to other networks. What are the two equations that can be used to represent the total monthly cost (y) of the number of text messages (x) sent to other networks?

Answer:

Let x be the total number of text messages sent to other networks
y be the total monthly cost of x text messages sent to other networks

Hence, we have the two equations:

$$y = 2.5x + 999 \text{ and } y = x + 1299$$

We can write these equations as a system: $\begin{cases} y = 2.5x + 999 \\ y = x + 1299 \end{cases}$.

> ***Note:*** *In your succeeding lesson, you will be able to know how to solve the system and determine which mobile network is best and wise to choose using the algebraic method.*

Example 5. Matthew and Minard are selling fruits for a school fundraising activity. Customers can buy small and large pieces of oranges. Matthew sells 3 small pieces and 14 large pieces of oranges for a total of Php203.00. Minard sells 11 small pieces of oranges and 11 large pieces of oranges for a total of Php 220.00. Write linear equations to represent the cost of a small and large pieces of oranges.

Answer:

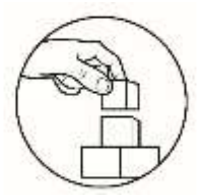
Let x be the number of small pieces of oranges
y be the number of large pieces of oranges

Hence, we have the two equations:

$3x + 14y = 203$ and $11x + 11y = 220$

We can write these equations as a system: $\begin{cases} 3x + 14y = 203 \\ 11x + 11y = 220 \end{cases}$.

> ***Note:*** *In your succeeding lesson, you will be able to know how to solve the system and determine the costs of each small and large oranges using the algebraic method.*



What's More

Activity 1. What am I?

Directions: Complete the table below and write your answer on a separate sheet of paper.

1. $\begin{cases} 2x - 3y = -7 \\ 2x - 3y = 8 \end{cases}$ 2. $\begin{cases} x - y = -5 \\ x + y = 1 \end{cases}$ 3. $\begin{cases} x + y = 1 \\ 3x + 3y = 3 \end{cases}$

Slope-intercept form	Slope	Y-intercept	Number of Solutions	Type of System of Linear Equation
1.				
2.				
3.				

Questions:

1. What helped you determine whether the system of linear equations is consistent and independent, consistent, and dependent, or inconsistent?
2. What does the slope and y-intercept of the system of linear equations tell you about its number of solution/s?

Activity 2: Let's Sell!

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

Situation: *A store will sell 3 large and 4 small flowerpots for Php205. They will also sell 2 large and 3 small flowerpots for Php145. Let x represents large pot, and y represents small pot.*

Questions:

1. What equations can be used to model the situation?
2. Do the equations form a system of linear equations in two variables? Explain your answer.

What I Have Learned

Complete Me!

Directions: Supply the correct term to complete the statement. Write your answer on a separate sheet of paper.

1. The solution to a system of linear equations in two variables is an ordered pair that satisfies the given _______________.
2. A system of linear equations is a set of ___________ of the same variables in each equation.
3. In the given system $x - y = -1$ and $2x + y = 4$, the solution is _______________ because the values satisfy the given equations.
4. The system of linear equation is consistent and independent when it has only _________.
5. The system of linear equation is consistent and dependent when the slopes of the lines and the y-intercepts are _______.
6. The system of linear equation is inconsistent when the slopes of the lines defined by the equations are equal, but their y-intercepts are ________.

What I Can Do

It's your turn!

Directions: Read the situation below and answer the questions that follow. Write your answers on a separate sheet of paper.

Mr. Castillo makes small and large gift boxes to be sold during the Christmas season. The materials for a small gift box costs P15 while the materials for a large gift box costs P20. In a day, he has to finish making 6 boxes and spend only P110 for the materials.

Questions:

1. What equations can be used to model the situation?
2. How many small gift boxes and large gift boxes will he be able to finish in one day?

Your output will be rated using the following rubrics:

Criteria	Outstanding 4	Satisfactory 3	Developing 2	Beginning 1
Accuracy of Computations	The computations done are accurate and show deep understanding of the concepts of system of linear equations in two variables. An explanation is provided in each step of the computation.	The computations done are accurate and show understanding of the concepts of system of linear equations in two variables.	The computations done are with 1 or 2 errors and show little understanding of the concepts of system of linear equations in two variables.	The computations done are erroneous and show no understanding of the concepts of system of linear equations in two variables.

Assessment

Directions: Choose the letter of the correct answer. Write the chosen letter on a separate sheet of paper.

1. Which of the following is NOT a system of linear equations in two variables?

A. $\begin{cases} x - y + 5 \\ -3x^2 = 0 \end{cases}$

C. $\begin{cases} 4x - 8y = 12 \\ 2x - \frac{1}{3}y = -12 \end{cases}$

B. $\begin{cases} 3x - y = 5 \\ x - 11y = -1 \end{cases}$

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

2. What system of linear equations in two variables is equivalent to $\begin{cases} y = \frac{1}{2}x - 4 \\ y = 4x - 5 \end{cases}$?

A. $\begin{cases} x - 2y = 8 \\ 4x - y = 5 \end{cases}$

C. $\begin{cases} x - y = 8 \\ 4x - 2y = 5 \end{cases}$

B. $\begin{cases} 4x - y = -2 \\ x + 2y = -5 \end{cases}$

D. $\begin{cases} x + 2y = -8 \\ x - 4y = -5 \end{cases}$

3. What system of linear equations in two variables is the same as $\begin{cases} \frac{4}{5}x - y = -3 \\ y = \frac{2}{3}x - 5 \end{cases}$?

A. $\begin{cases} 4x + 10y = 5 \\ 2x - 3y = 15 \end{cases}$

B. $\begin{cases} 4x - 10y = 15 \\ 2x - 3y = 15 \end{cases}$

C. $\begin{cases} 4x - 5y = -15 \\ 2x - 3y = 15 \end{cases}$

D. $\begin{cases} 4x + 10y = -5 \\ 3x - 2y = -15 \end{cases}$

4. Which of the following ordered pairs satisfies the system $\begin{cases} x + 4y = -1 \\ x + 2y = 1 \end{cases}$?

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

5. Which of the following equations can be paired with $x - y = 4$ to make a consistent and independent system?

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

6. What equation is best paired to $2x + y = 3$ to make an inconsistent system of linear equations in two variables?

A. $x - y = 4$
B. $x + 2 = y$
C. $y = -2x + 1$
D. $y = -2x + 3$

7. Which of the following equations can be paired with $6x - 3y = 24$ to make a consistent and dependent system?

A. $y = 2x - 8$
B. $y = 2x + 8$
C. $y = 6x + 24$
D. $y = 6x - 24$

8. What system of linear equations in two variables is the same as $\begin{cases} \frac{1}{2}x - 4y = 4 \\ x - \frac{1}{3}y = 6 \end{cases}$?

A. $\begin{cases} x - 8y = 8 \\ 3x - y = 18 \end{cases}$

B. $\begin{cases} x + 8y = 8 \\ 3x + y = 18 \end{cases}$

C. $\begin{cases} 8x - y = 8 \\ x - 3y = 18 \end{cases}$

D. $\begin{cases} 8x + y = -8 \\ x + 3y = -18 \end{cases}$

9. Which of the following is a system of linear equations in two variables?

A. $\begin{cases} -x = 5 \\ y - 4y = 4 \end{cases}$

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

C. $\begin{cases} 3 - y = 8 \\ -6x + y = 6 \end{cases}$

D. $\begin{cases} x + 4 = y \\ 2x - 2y = -8 \end{cases}$

10. All of the following ordered pairs satisfy the system $\begin{cases} 2x - y = 4 \\ 4x - 2y = 8 \end{cases}$, EXCEPT:

A. $(0, -4)$
B. $(2, 0)$
C. $(4, 4)$
D. $(0, 2)$

11. Which of the following statements is true about the system $\begin{cases} 2x + y = 4 \\ x - y = 2 \end{cases}$?

A. There is an ordered pair (2,0) that satisfies both equations.
B. There are infinitely many ordered pair that satisfy both equations.
C. The slope of the first equation is equal to the slope of the second equation.
D. The slope and the y-intercept of the first equation and second equation are equal.

12. Which statement is true about the system $\begin{cases} x + y = 15 \\ 3x + 3y = -10 \end{cases}$?

A. There is one ordered pair that will both equations.
B. There is no ordered pair that will satisfy both equations.
C. Equation 2 is obtained by multiplying each term in equation 1 by 3.
D. There are infinitely many ordered pairs that will satisfy both equations.

13. Which of the following system of linear equations can best represent the problem: "The sum of two numbers is 3, thrice the first number plus twice the second number is 7."?

A. $\begin{cases} x + y = 3 \\ 3x + 2y = 7 \end{cases}$
B. $\begin{cases} x + y = 3 \\ 2x + 3y = 7 \end{cases}$
C. $\begin{cases} x - y = 3 \\ 3x + 2y = 7 \end{cases}$
D. $\begin{cases} x + y = 3 \\ 3x - 2y = 7 \end{cases}$

14. Neria is buying $Php1500$ worth of flowering plants. A pot of rose costs $Php150$ and a pot of gumamela costs $Php75$. While Zasha is buying $Php1400$ worth of flowering plants. A pot of bromeliad costs $Php200$ and a pot of santan costs $Php50$. Which of the following system of equations best represent the situation?

A. $\begin{cases} 150x + 75y = 1500 \\ 200x + 50y = 1400 \end{cases}$
B. $\begin{cases} 150x - 75y = 1500 \\ 200x - 50y = 1400 \end{cases}$
C. $\begin{cases} 75x + 150y = 1500 \\ 50x - 200y = 1400 \end{cases}$
D. $\begin{cases} 150x - 75y = 1500 \\ 200x - 50y = 1400 \end{cases}$

15. Dustin Zayd was tasked by his teacher to find an ordered pair that satisfies the given system $\begin{cases} 6x - 5y = -2 \\ x + 2y = -11 \end{cases}$. He answered (3, 4). Was Dustin Zayd correct?

A. No, because he did not follow the steps in evaluating system of linear equations in two variables.
B. No, because the point (3, 4) does not satisfy the given system of linear equations in two variables.
C. Yes, because he substituted the variable of $x = 3$ and $y = 4$ to the system of linear equations.
D. Yes, because he yielded two true statements that makes a solution of the system of linear equations.

Additional Activities

Mathematics and art are related in a variety of ways. Mathematics can be discerned in arts such as music, dance, and in many forms of visual arts. Hence, your task is to compose a jingle, dance video, painting or collage, or any other art forms to share your learning in illustrating a system of linear equations in two variables, particularly its relevance to your life.

Your output will be rated using the following rubric.

Criteria	**Performance Level**				
	Beginning (6 points)	**Developing (7 points)**	**Approaching Proficiency (8 points)**	**Proficient (9 points)**	**Advanced (10 points)**
Output Requirements	Limited evidence of output requirements	Output meets some requirements, guidelines, and objectives	Output meets most requirements, guidelines, and objectives	Output meets all requirements, guidelines, and objectives with the capacity to advance	Output exceeds requirements, guidelines, and objectives at an advanced level
Craftsmanship/ Technique	Limited developing knowledge of tools, and media techniques	Some developing knowledge of understanding the tools and media. Techniques were not used	Output is needing better attention to the use of tools and media. Recognizes necessary techniques	Proficient use of tools, media, and techniques. Most elements are skillful and complete with capacity to advance	Advanced use of tools, media, and techniques. All elements are skillful and complete
Productivity	Limited effort to develop ideas, produce work or use time well. Almost never accessed resources	Minimal effort to develop ideas, produce work or use time well. Rarely accessed resources	Adequate effort to develop ideas, produce work or use time well. Sometimes accessed resources	Proficient effort to develop ideas, produce work or use time well. Often accessed resources	Advanced effort to develop ideas, produce work or use time well. Accessed available resources when needed

Criteria	Performance Level				
	Beginning (6 points)	**Developing (7 points)**	**Approaching Proficiency (8 points)**	**Proficient (9 points)**	**Advanced (10 points)**
Critical Thinking	Limited attempt to accurately interpret process and content	Minimal attempt to accurately interpret process and content	Adequate attempt to accurately interpret process and content	Proficient attempt to accurately interpret process and content	Advanced attempt to accurately interpret process and content
Critical Response	Limited attempt to make connection s to the artistic process	Recognizes some artistic vocabulary although unclear. Does not create comparisons to global issues or cultural context	Some use of artistic vocabulary. Does not create comparisons to global issues or cultural context	Proficient use of artistic vocabulary. Creates some comparisons to global issues or cultural context with the capacity to advance	Advanced use of artistic vocabulary. Creates relevant comparisons to global issues or cultural contexts

Answer Key

What I Know

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

What's In

1. $y = -x + 5; m = -1; b = 5$
   $y = x - 1; m = 1; b = -1$
2. $y = -\frac{3}{2}x + 3; m = -\frac{3}{2}; b = 3$
   $y = -\frac{3}{2}x + 3; m = -\frac{3}{2}; b = 3$
3. $y = 2x - 5; m = 2; b = -5$
   $y = 2x - 3; m = 2; b = -3$

What's New

Connect me

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

What's More

Activity 2 "Let's Sell"

1. $\begin{cases} 3x + 4y = 205 \\ 2x + 3y = 145 \end{cases}$

2. Yes. (Explanation may vary.)

What I Have Learned

1. equation
2. two or more
3. (1,2)
4. one solution
5. equal
6. not equal

What I can Do

1. $\mathbf{x + y = 6 \ (eq.1)}$

   $15x + 20y = 110 \ (eq.2)$

2. Mr. Castillo will be able to finish 2 small boxes and 4 large boxes in one day.

(Note: Answer in item 2 must be accompanied with computations)

Assessment

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

Additional Activities

Answers may vary.

What's More

Activity 1. What Am I?

Slope-intercept Form	Slope	Y-intercept	Number of Solutions	Type of System of Linear Equation
1. $\begin{cases} y = \frac{2}{3}x + \frac{7}{3} \\ y = \frac{2}{3}x + \frac{-8}{3} \end{cases}$	$m_1 = m_2$	$b_1 \neq b_2$	No solution	Inconsistent
2. $\begin{cases} y = x + 5 \\ y = -x + 1 \end{cases}$	$m_1 \neq m_2$	$b_1 \neq b_2$	One solution	Consistent and Independent
3. $\begin{cases} y = -x + 1 \\ y = -x + 1 \end{cases}$	$m_1 = m_2$	$b_1 = b_2$	Infinitely many solutions	Consistent and dependent

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