8 MATH

Quarter 1

PIVOT 4A LEARNER'S MATERIAL

This module was carefully examined and revised in accordance with the standards prescribed by DepEd Region 4A and Curriculum and Learning Management Division CALABARZON. All parts and sections of the module are assured not to have violated any rules stated in the IPR for learning standards.

The Editors

Mathematics

Grade 8

Regional Office Management and Development Team: Job S. Zape, Jr., Jisela N. Ulpina, Romyr L. Lazo, Fe M. Ong-ongowan, Lhovie A. Cauilan, Ephraim L. Gibas

Schools Division Office Development Team: Gemma C. Cortez, , Leylanie V. Adao, Rowena R. Cariaga, Cesar Chester O. Relleve, Abigail S. Laudato, Jocelyn G. Delgado, Karlo Jay L. Perez, Cristopher C. Midea, April Claire P. Manlangit

MATH Grade 8
PIVOT IV-A Learner's Material
Quarter 1
First Edition, 2020

Published by: Department of Education Region IV-A CALABARZON
Regional Director: Wilfredo E. Cabral
Assistant Regional Director: Ruth L. Fuentes

Guide in Using PIVOT Learner's Material

For the Parents/Guardian

This module was collaboratively designed, developed and reviewed by educators both from public and private institutions to assist you, the teacher or facilitator in helping the learners meet the standards set by the K to 12 Curriculum while overcoming their personal, social, and economic constraints in schooling.

This learning resource hopes to engage the learners in guided and independent learning activities at their own pace and time. Furthermore, this also aims to help learners acquire the needed 21st century skills while taking into consideration their needs and circumstances.

As a facilitator, you are expected to orient the learners on how to use this module. You also need to keep track of the learners' progress while allowing them to manage their own learning. Furthermore, you are expected to encourage and assist the learners as they do the tasks included in the module.

For the Learner

This module was designed to provide you with fun and meaningful opportunities for guided and independent learning at your own pace and time. You will have to process the contents of the learning resource while being an active learner.

PARTS OF PIVOT LEARNER'S MATERIAL

	Parts of the LM	Description
Introduction	What I need to know	The teacher utilizes appropriate strategies in presenting the MELC and desired learning outcomes for the day or week, purpose of the lesson, core content and relevant samples. This allows teachers to maximize learners awareness of their own knowledge as regards content and skills required for the lesson
	What is new	
Development	What I know	The teacher presents activities, tasks , contents of value and interest to the learners. This shall expose the learners on what he/she knew, what he /she does not know and what she/he wanted to know and learn. Most of the activities and tasks must simply and directly revolved around the concepts to develop and master the skills or the MELC.
	What is in	
	What is it	
Engagement	What is more	The teacher allows the learners to be engaged in various tasks and opportunities in building their KSA's to meaningfully connect their learnings after doing the tasks in the D. This part exposes the learner to real life situations /tasks that shall ignite his/ her interests to meet the expectation, make their performance satisfactory or produce a product or performance which lead him/ her to understand fully the skills and concepts .
	What I can do	
	What else I can do	
Assimilation	What I have learned	The teacher brings the learners to a process where they shall demonstrate ideas, interpretation, mindset or values and create pieces of information that will form part of their knowledge in reflecting, relating or using it effectively in any situation or context. This part encourages learners in creating conceptual structures giving them the avenue to integrate new and old learnings.
	What I can achieve	

Factoring Polynomials

I

Lesson

After going through this module, you are expected to factor completely the different polynomials with: **a**. common monomial factor; **b.** difference of two squares; **c**. sum and difference of two cubes; **d.** perfect square trinomials; and **e.** general trinomials and solve problem involving factors of polynomials

Learning Task 1. Recall your previous lesson about special products among polynomials, multiply the factors in Column A then match the product to Column B. Do it in your notebook.

Column A	**Column B**
1.$3x(2x - 5)$	A. $x^2 + 4xy + 4y^2$
2.$(x + 2y)^2$	B. $3x^2 + 11xy + 6y^2$
3. $(x - 3)(x + 2)$	C. $6x^2 - 15x$
4.$(3x + 2y)(x + 3y)$	D. $x^2 - x - 6$
5. $(x - 4)(x + 4)$	E. $x^2 - 16$

D

Factoring is an inverse process of multiplication. Through factoring, we write polynomials in simpler form and use it as a way of solving the roots of an equation.

There are different ways of factoring dependending on the type of polynomials being factored.

1. First determine if a **common monomial factor** (Greatest Common Factor) exists. Factor trees may be used to find the GCF of difficult numbers. Be aware of opposites: Ex. (a-b) and (b-a) , These two may be the same if we factor out –1 to any of the expressions.

$$3x - 12 = 3(x - 4)$$
$$x^2y^2 - 3xy^2 = xy^2(x - 3)$$
$$6(x - y) + a(x - y) = (x - y)(6 + a)$$

II. If the problem to be factored is a binomial, see if it fits one of the following situations.

A. **Difference of two squares:**

$$a^2 - b^2 = (a+b)(a-b)$$
$$9x^2 - 25y^2 = (3x+5y)(3x-5y)$$
$$(a+b)^2 - 25 = [(a+b)+5][(a+b)-5] = (a+b+5)(a+b-5)$$

B. **Sum of two squares**: $a^2 + b^2$ has no othe factor s except 1 and itself (it is prime).

C. **Sum of two cubes**:

$$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$$
$$8x^3 + 27y^3 = (2x+3y)(4x^2 - 6xy + 9y^2)$$

Note: Resulting trinomial is no longer factorable.

D. **Difference of two cubes**:

$$a^3 - b^3 = (a-b)(a^2 + ab + b^2)$$
$$x^3 - 64 = (x-4)(x^2 + 4x + 16)$$

Note: Resulting trinomial is no longer factorable.

E. If none of these occur, the binomial does not factor.

III. If the problem is a **trinomial**, check for one of the following possibilities.

A. **Square of a binomial**:

$$a^2 + 2ab + b^2 = (a+b)(a+b) = (a+b)^2$$
$$x^2 + 6x + 9 = (x+3)(x+3) = (x+3)^2$$
$$4x^2 - 20xy + 25y^2 = (2x-5y)^2$$

B. If a = 1, use reverse foil or trial and error method:

$$x^2 + 7x + 12 = (x+3)(x+4)$$
$$x^2 - 7x + 12 = (x-3)(x-4)$$
$$x^2 + 3x - 18 = (x+6)(x-3)$$
$$x^2 - 3x - 18 = (x-6)(x+3)$$

C. If $a \neq 1$, use trial and error method. (Grouping may also be used.)

Learning Task 2. Factor the following completely.

1. $x^2 + 3x - 18$
2. $3x^2 - 9x - 12$
3. $18x^2 + 3x - 15$
4. $5x^2 + 32x + 12$
5. $3x^3 + 24$

Solving word problem involving factoring polynomials.

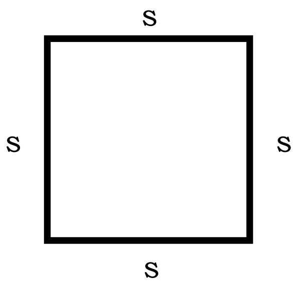
Example:

1. The area of a square is numerically equal to twice its perimeter. Find the length of a side of the square.

Solution.

Sketch a square and let s represent the length of each side. Then the area is represented by s^2 and the perimeter by 4s. Thus,

$$\begin{aligned} s^2 &= 2(4s) \\ s^2 &= 8s \\ s^2 - 8s &= 0 \\ s(s - 8) &= 0 \\ s = 0 \quad &\text{or} \quad s - 8 = 0 \\ s = 0 \quad &\text{or} \quad s = 8 \end{aligned}$$



Because 0 is not a reasonable answer to the problem, the solution is 8.

2. The sum of the ages of father and son is 39. if the father is 3 less than the square of the son's age, how old are they.

Solution. Let x—son's age and $x^2 - 3$ is the father's age

Equation: $x^2 - 3 + x = 39$

Solve : $x^2 + x - 42 = 0$

$(x + 7)(x - 6) = 0$

$x = -7$, and $x = 6$

The solution is 6 since there is no negative age, thus –7 cannot be considered

The age of the son is $x = 6$ and the father is $x^2 - 3 = 6^2 - 3 = 36 - 3 = 33$

Check : $33 + 6 = 39$.

Learning Task 3. Set up an equation and solve each problem.

1. The square of a number equals nine times that number. Find the number.
2. Suppose that four times the square of a number equals 20 times that number. What is the number?
3. Twice the square of the sum of a number and 3 is 98. Find the number.

E

Learning Task 4. Read carefully the

A. Factor the following completely.

1. $x^2 - 25$
2. $2x^2 -15x -8$
3. $3x^2 + 30x + 75$
4. $x^3 - 27$
5. $5x^3 - 5x^2 -10x$

B. Solve the following problems.

1. If the area of the rectangle is given by the polynomial $2x^2 - 7x - 15$, what is the dimension of the rectangle in terms of x?
2. The volume of the prism is $x^3 + 64$. If the height is the binomial factor of the volume and the trinomial factor is the product of length and width, find the height of the prism,
3. The length of a rectangular lot is 6 less than thrice its width, If the area is 45 square cm, What is the length and the width of the rectangle?

A

Learning Task 5: Solve this in your notebook.

1. Suppose that you friend factors $x^2y + 36xy$ like this:

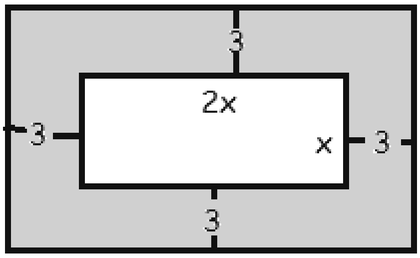
$$\begin{aligned} 24x^2y + 36xy &= 4xy(6x + 9) \\ &= (4xy)(3)(2x + 3) \\ &= 12xy(2x + 3) \end{aligned}$$

Is this correct? Would you suggest any changes?

2. If the sum of the square of the number and 4 time the number is 21, what is the number?

3. The length of the rectangle is 3 less than twice the width. If the area is 9 square ft, the length and width of the rectangle.

4. Given the figure below. Find the area of the shaded part of the rectangle if the area of the big rectangle is 6 times the area of the unshaded rectangle



Illustrating and Simplifying Rational Algebraic Expressions

WEEK

2

I

Lesson

After going through this module, you are expected to illustrate Rational Algebraic Expression and simplifies Rational Algebraic Expression

When you were in the intermediate you learned how to simplify rational numbers or fractions by canceling common factors.

Learning Task 1. Complete the table below. Do it in your notebook.

Rational Number	Factors of Numerator and denominator	Simplified Form
$\frac{21}{49}$	$\frac{3\cdot\cancel{7}}{\cancel{7}\cdot 7}$	$\frac{3}{7}$
$\frac{18}{36}$		
$\frac{81}{72}$		
$\frac{9m+9n}{9r-9s}$		
$\frac{m^2-9}{m+3}$		
$\frac{x^2+3x-4}{x^2+4x-5}$		

D

Recall that a **rational number** is a ratio of two real numbers. An **algebraic expression** is composed of a term or group of terms. A **term** is composed of coefficients and/or variables with multiplication/division as mathematical operations . Term are separated by plus or minus sign. Polynomials or algebraix expression may have one or more terms. 2x + 4 is an algebraic expression with 2 terms. These are 2x and 4.

Ratio means comparison of two or more quantities. Thus, a quotient of two algebraic expression is called **rational algebraic expression** where both the numerator and the denominator are polynomials. If P and Q are algebraic expressions and Q must not be equal to zero the expression $\frac{P}{Q}$ is called rational algebraic expression.

Illustrative example 1

Illustrate a rational expression whose numerator is m and the denominator is n.

Solution: $\frac{m \leftarrow \text{numerator}}{n \leftarrow \text{denominator}}$ where $n \neq 0$

Illustrative example 2

Given the expression x + 15 and 3x, illustrate two rational expressions whose value of x is not equal to zero.

Solution:

$\frac{x+15}{3x}$ where $x \neq 0$ because when x = 0 you will get 3(x)= 0

$\frac{3x}{x+15}$ where x = -15 because when x= -15 you will have (-15) + (15) = 0

Simplifying rational algebraic expression is the same as simplifying rational numbers. Both uses the concept of factoring. Factoring out and canceling the GCF among numbers is use in rational numbers while factoring out and canceling the common polynomial factors for rational algebraic expression.

Like the rational number $\frac{4}{8}$ it's simplest form is $\frac{1}{2}$ We have to look for the factors of 4 and 8, then cancel the common factors then write in simplest form.

Another example is $\frac{ac}{ae}$ it's simplest form is $\frac{c}{e}$ The common factor is **a**, so you can now cancel out **a** to get it's simplest form.

Aside from the knowledge of factoring, simplifying rational algebraic expression also applies the laws of exponent.

Law of Exponents For $a \neq 0, b \neq 0$	
Product	$a^x \times a^y = a^{x+y}$
Quotient	$a^x \div a^y = a^{x-y}$
Power	$(a^x)^y = a^{xy}$
Zero Exponent	$a^0 = 1$
Negative Exponent	$a^{-x} = \frac{1}{a^x}$

Examples:

1. Simplify $\frac{x^5}{x^3}$

   Solution $\frac{x^5}{x^3} = \frac{x \cdot x \cdot \cancel{x} \cdot \cancel{x} \cdot \cancel{x}}{\cancel{x} \cdot \cancel{x} \cdot \cancel{x}} = \frac{x \cdot x}{1} = x^2$

2. Simplify $\frac{(x+5)^2}{x^2+7x+10}$

   Solution $\frac{(x+5)^2}{x^2+7x+10} = \frac{\cancel{(x+5)}(x+5)}{\cancel{(x+5)}(x+2)} = \frac{x+5}{x=2}$

Learning Task 2. Simplify the following rational expressions. Do it in your notebook.

1. $\frac{ab^2}{ab}$ 2. $\frac{x^2-9}{x+3}$ 3. $\frac{4x^2-8x+12}{x-3}$ 4. $\frac{x^2+3x-4}{x^3-1}$

E

Learning Task 3. Encircle Rational Algebraic Expression. Do this in your notebook.

1. 6x—1   2, $x^2 + x - 3$ 3. $\frac{2}{3x}$ 4. $\frac{x^2-4}{x-2}$ 5. $\frac{1}{x^{-5}}$

B. Simplify the following rational algebraic expression.

1. $\frac{4m^2}{2m}$ 2. $\frac{abc}{bc}$ 3. $\frac{x+1}{x^2-4x-5}$

A

Learning Task 4: Do the following in your notebook.

1. Illustrate a rational expression whose numerator is **r** and the denominator is **s.**

2. Given the expressions **-1** and **b+1**. Illustrate a rational algebraic expression whose numerator is -1.

3. Illustrate a rational algebraic expression whose two polynomials are **m-9** and **m² - 81** respectively.

4. Dianne is asked to check if we can replace x by -3 or 6 in the rational algebraic expression $\frac{x+3}{x-6}$. How does Dianne should do it?

   A. Replace x by -3 in the numerator and 6 on the denominator.

   B. Replace x by -3 and 6 both the numerator and denominator to check.

   C. Number 6 should not be replaced because it will result to zero.

   D. -3 is the only allowed replacement for x.

WEEK 3

Operations on Rational Algebraic Expressions

I

Lesson

After going through this module, you are expected to perform Operation on Rational Algebraic Expression and solve Problems Involving Rational Algebraic Expression

Remember that adding or subtracting fractions can be done easily if the fractions are similar otherwise you have to make the fractions similar by finding its equivalent fractions. Rules apply also to rational algebraic expressions. However you have to recall also the rules in adding algebraic expressions in which only similar terms of algebraic expressions can be added or subtracted. Terms with the same literal coefficients are similar.

Learning Task 1. Add or subtract the following: Do it in your notebook.

1. $\frac{3}{8}+\frac{5}{8}$
2. $\frac{5}{8}-\frac{1}{6}$
3. 3x + 5x - x + 7
4. $5x^2$ - 6x + 2x –5

D

To **add** or **subtract** rational algebraic expression you must always check the denominator. In adding or subtracting rational algebraic with common denominator, simply add the numerators and copy the denominator. Always reduce your answer to its simplest form. Examine the following illustrative examples.

Illustrative example 1

Find the sum of $\frac{3}{6b}$ and $\frac{1}{6b}$ in lowest term

Solution

Check the denominator then perform the operation.

Since the denominators are the same , simply add the numerator then copy the denominator the simplify.

$$\frac{3}{6b}+\frac{1}{6b} = \frac{3+1}{6b} = \frac{4}{6b}$$

$$= \frac{\cancel{2}\cdot 2}{\cancel{2}\cdot 3b} = \frac{2}{3b}$$

Simplify the answer by finding the common factor of the numerator and denominator

Illustrative example 2

Add $\frac{x}{x^2-4}$ and $\frac{2}{x^2-4}$

Solution:

Check the denominator then perform the operation.

The denominators are the same, thus add the numerators and copy the denominator

$$\frac{x}{x^2-4} + \frac{2}{x^2-4} = \frac{x+2}{x^2-4}$$

Simplify the sum by finding the common factor if there is. $= \frac{\cancel{x+2}}{(\cancel{x+2})(x-2)} = \frac{1}{(x-2)}$

Since the denominator is the difference of two squares, then it is factorable

The sum in simplest form is $\frac{1}{x-2}$

$$\frac{x+2}{x^2-4}$$

Simplify, $\frac{-2x+1}{x^2-4} - \frac{-3x-1}{x^2-4}$. They have the same denominator thus you only need to copy its denominator. Now, we have

$$\frac{-2x+1}{x^2-4} - \frac{-3x-1}{x^2-4} = \frac{-2x+1+3x+1}{x^2-4} = \frac{x+2}{x^2-4}.$$

Observe that the denominator can still be factored, the given expression will become, $\frac{x+2}{x^2-4} = \frac{\cancel{x+2}}{(\cancel{x+2})(x-2)}$ we can see that we have a common term that can be cancelled

Hence the difference is $\frac{\mathbf{1}}{(\boldsymbol{x}-\mathbf{2})}$

Illustrative Example 4

Find the sum of $\frac{2m}{m-1}$ and $\frac{3}{m+4}$

Solution: $\frac{3}{m+4} + \frac{2m}{m-1}$ Since the denominators are not similar, you have to find the LCD which is (m + 4)(m—1)

$$\frac{3}{m+4} + \frac{2m}{m-1} = \frac{3(m-1) + 2m(m-1)}{(m+4)(m-1)} = \frac{3m-3+2m^2-2m}{(m+4)(m-1)}$$

$$= \frac{2m^2+m-3}{(m+4)(m-1)}$$

Simplify by factoring the numerator.

$$\frac{2m^2+m-3}{(m+4)(m-1)} = \frac{(2m+3)\cancel{(m-1)}}{(m+4)\cancel{(m-1)}} = \frac{(2m+3)}{(m+4)}$$

The sum is in lowest term is $\frac{(2m+3)}{(m+4)}$

When two fractions are **multiplied,** we multiply the numerators of the fractions to form the new numerator and we do the same for the denominators. This is the same with rational algebraic expressions.

If there are common factors in both numerator and denominator of the two rational algebraic expressions then we may cancel them before we multiply.

Illustrative example 1

Find the product of $\frac{2s}{4k} \circ \frac{3}{2k^2}$

You can cancel the common term in the numerator and denominator . Cancel

the common factor 2 $\frac{\cancel{2}s}{4k} \cdot \frac{3}{\cancel{2}k^2} = \frac{3s}{4k^3}$

In **division** of Rational Algebraic Expression follow this rule: $\frac{P}{Q} \div \frac{R}{S} = \frac{P}{Q} \cdot \frac{S}{R}$

where P, Q, R, and S are polynomials in one variable and Q ≠ 0 , R ≠ 0 and S ≠ 0.

Illustrative example 2

Find the quotient: $\frac{m}{2} \div \frac{m-2}{m-1} =$

first: *get the reciprocal of* $\frac{m-2}{m-1}$. Which is $\frac{m-1}{m-2}$.

second: rewrite the equation and change the operation to multiplication, we have $\frac{m}{2} \circ \frac{m-1}{m-2}$

third: find the product of the given expression, then we have $\frac{m}{2} \circ \frac{m-1}{m-2} = \frac{(m)(m-1)}{2(m-2)}$

Since there is no common factors between the numerator and denominator, the product is already in its lowest term.

Illustrative example 3

Divide: $\frac{k^2-25}{k+5} \div \frac{k-5}{k^2+6k+5} = ?$

First, get the reciprocal of the divisor, $\frac{k-5}{k^2+6k+5}$, *which is* $\frac{k^2+6x+5}{k-5}$

Write as multiplication and factor expressions that are factorable.

$$\frac{(k-5)(k+5)}{k+5} \cdot \frac{(k+1)(k+5)}{k-5}$$

Cancel common factors between numerator and denominator before multiplying.

$$\frac{\cancel{(k-5)}\cancel{(k+5)}}{\cancel{k+5}} \cdot \frac{(k+1)(k+5)}{\cancel{k-5}} = (k+1)(k+5)$$

$$= k^2 + 6k + 5$$

Learning Task 2. Perform the indicated operation.

1. Find the sum of $\frac{2x}{x-1}$ *and* $\frac{x}{x-1}$

2. Find the difference when $\frac{2x-8}{x+6}$ *is subtracted from* $\frac{4x+1}{x+6}$

3. Multiply : $\frac{y^2-y-2}{5y}$ *and* $\frac{10y}{y+1}$

4. Divide: $\frac{6}{28x+4} \div \frac{6}{35x+5}$

To be able to solve a problem involving rational algebraic expressions you have to make a **Rational Equations**. To make rational equations, you must translate a word problem into a mathematical sentence.

Example: Seven divided by the sum of a number and two is equal to half the difference of the number and three. Find all such numbers.

A. Find what is asked? Find the numbers

B. Write all the given (Note: Use only one variable) $\frac{7}{x+2}$; $\frac{x-3}{2}$

C. Write the operation to be used and the equation to work on: $\frac{7}{x+2} = \frac{x-3}{2}$

D. Write the solution: Apply Cross Multiplication:

$(x + 2)(x-3) = 7(2) \longrightarrow (x^2 - x - 6) = 14 \rightarrow x^2 - x - 20 = 0$

$(x - 5)(x + 4) = 0$; $x = 5$ or $x = -4$

E. Write the final Answer:

If $x = 5$, the number is 1 and if $x = -4$, the number is $-\frac{7}{2}$

E

Learning Task 3. Perform the operation being asked in each item.

1. . Find the sum of $\frac{3}{2a}$ and $\frac{1}{6a}$ in simplest form.

2. Find the answer when $\frac{a}{a-b}$ is decreased by $\frac{b}{a-b}$

3. Simplify: $\frac{6}{x^2-4}+\frac{2}{x^2-5x+6}$

4. Subtract: $\frac{5}{2x^2+5x-3}-\frac{3}{2x^2-11x+5}$

5. Add: $\frac{3x}{x^2+5x+6}+\frac{x-2}{x^2+2x-3}$

Learning Task 4. Perform the operation being asked in each item. Simplify your final answer.

1. $\frac{3ab}{5} \circ \frac{4b}{a^2} =$

2. $\frac{3x^2}{2} \cdot \frac{2}{9x}$

3. $\frac{x^2-x-6}{5x+5} \cdot \frac{5}{x-3}$

4. $\frac{4}{n-6} \div \frac{4n}{8n-48}$

5. $\frac{a-4}{a^2-2a-8} \div \frac{1}{a-5}$

6. $\frac{6a+27}{18a^2+36a} \div \frac{16a+72}{2a+4}$

A

Learning Task 5. Solve the following problems

1. The width of a rectangle is 6x + 8, and the length of the rectangle is 12x + 16. Determine the ratio of the width to the perimeter.

   Supply the following:

   Perimeter = 2l + 2w = ____________________

   Ratio = $\frac{w}{P}$ ____________________

   Final answer in simplest form: ____________________

2. If 4 is divided by a number is equal to 3 divided by the number decreased by 2, find the number.

Rectangular Coordinate System

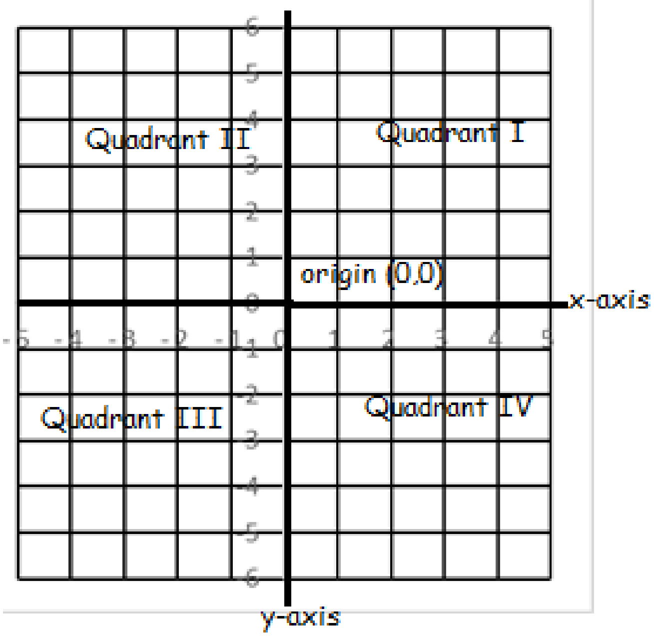
I

Lesson

After going through this module, you are expected to illustrate the rectangular coordinate system and its uses and illustrate linear equations in two variables.

CARTESIAN PLANE OR RECTANGULAR COORDINATE SYSTEM

Using point plotting, one associates an ordered pair of real numbers (x, y) with a point in the plane in a one-to-one manner. As a result, one obtains the 2 -dimensional Cartesian coordinate system. (x,y) is an ordered pair, whose first coordinate is x called abscissa and the second coordinate is y called the ordinate.

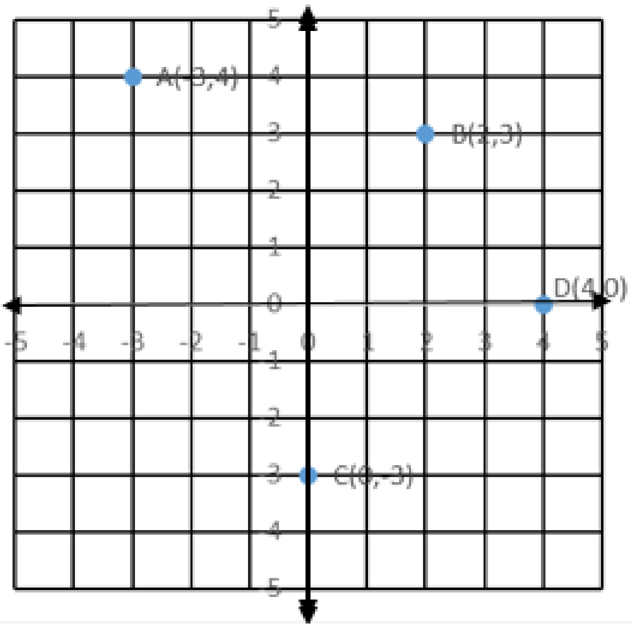


The origin is the intersection of the x and y axes whose coordinates are (0,0). The x and y axes divide the coordinate plane into 4 quadrants. The coordinates of points in quadrant I are both positive (x,y). In quadrant II the coordinates of points are (-x,y), x –coordinate is negative and the y -coordinate is positive. In quadrant III, the coordinates are both negative (-x,-y) and the coordinates point the points are positive x any negative y (x,-y).

Example: Plot the following points on the coordinate plane.

A (-3, 4)	B (2,-3)
C (0,2)	D (4,0)

In plotting the points always start from the origin and look for the first number in the x axis then move up or down depending on the y coordinates. When y coordinate is positive move upward otherwise move downward.



Learning Task 1. Read the instructions carefully.

A. In a separate graphing paper, plot the given points on one coordinate plane.

A (-4, 3) B (2, 7) C (5, -1) D (0, -8) E (-6, -2)

B. Identify the quadrant/axis of the following points:

1. (-4,-2) 2. (5.0) 3. (6,-8) 4. (-10, -35) 5. (0, - 12)

E

An equation in the form of ax + by = c is called a linear equation in two variables, where a, b, and c are constants, and at least one of a and b are not zero. This is also referred to as the standard form of linear equation. The symbols x and y are variables that represents any number that will satisfy the equation.

The equation 2x +3y = 32 is an example of a linear equation in two variables. This equation will only be true if we can find an ordered pair (x,y) that will satisfy the equation.

Example: Which of the following ordered pairs will make the equation $2x + 3y = 32$ true? 1, (4, 10) 2. (10, 4)

Solution: For the first ordered pair x = 4 and y = 10

Substitute: $2x + 3y = 32 \rightarrow 2(4) + 3(10) = 32 \rightarrow 8 + 30 = 32 \rightarrow 38 \neq 32$

Therefore the ordered pair (4,10) did not make the equation true.

Solution: For the second ordered pair x = 10 and y = 4

Substitute: $2x + 3x = 32 \rightarrow 2(10) + 3(4) = 32 \rightarrow 20 + 12 = 32 \rightarrow 32 = 32$

The ordered pair (10,4) satisfies the given equation. Hence (10,4) is called the solution of the equation

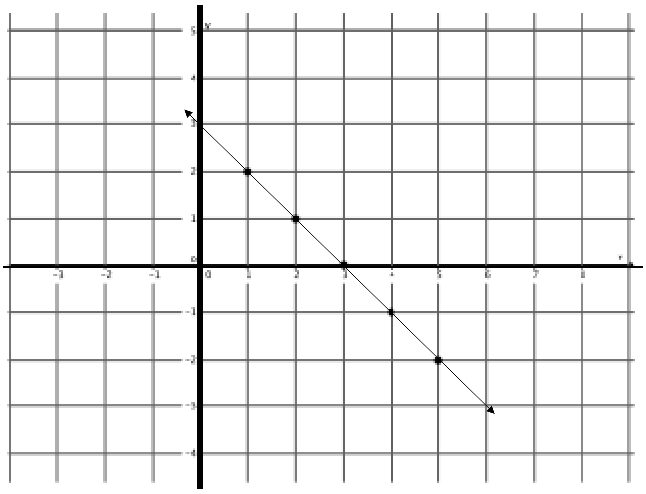
In a given equation there are several ordered pairs that will satisfy the equation and these ordered pairs will be contained in one line . Remember that two points determine a line. Hence, we can graph the equation of the line by having only two points, whose coordinates make the equation true.

Illustrative Example:

Find five solutions for the linear equation x + y = 3, and plot the solutions as points on a coordinate system. As you can see from the table at the right the following ordered pairs are solutions of the equation x + y = 3. (1, 2), (2, 1), (3.0), (4, -1) and (5, -2).

x	**Linear Equation:** **x+ y = 3**	**y**
1	1 + y = 3	2
2	2 + y = 3	1
3	3 + y = 3	0
4	4 + y = 3	-1
5	5 + y = 3	-2

Plot the points on one coordinate plane.



As you can see all the points form a straight line.

Using the graph , you can determine the slope of the line.

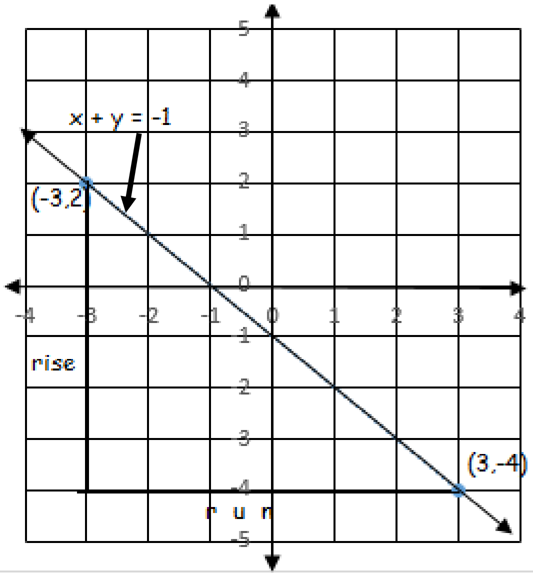
The *slope* of a *line* is a number that measures its "steepness". It also characterized the direction of the line. It is determine by the rise over the run between two points.

The graph at the right is the graph of the equation x + y = -1. The slope of the line can be determined by the rise over the run between the two points. m is use to represent the slope of the line.

$$m = \frac{rise}{run} = \frac{6}{-6} = -1$$

From point (3, 4), the run is 6, however since the direction is to the left, you use

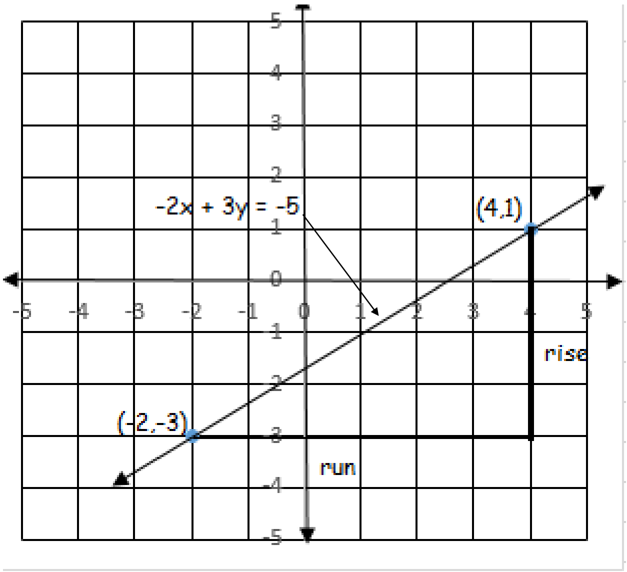
-6. Negative is use for direction. The rise is 6 units.



The slope is negative when the line falls to the right. When the line rises to the right the slope id positive.

The graph of equation –2x + 3y = -5 is a line tha rises to the right. The slope is

$$m = \frac{rise}{run} = \frac{4}{6} = \frac{2}{3}$$



Given only two points (x_1, y_1) and (x_2, y_2) without the graph, you can find the slope of the line using the formula m = $\frac{y_2 - y_1}{x_2 - x_1}$

Example. Find the slope of the line that passes through (-3, 2) and (3, -4)

Solution: $x_1 = -3$, $y_1 = 2$; $x_2 = 3$, $y_2 = -4$

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-4-2}{3-(-3)} = \frac{-6}{6} = -1$$

Learning Task 2: Read the instructions carefully. Do this in your notebook.

A. Complete the table

2x + y = 3		
x	y	(x,y)
-2	7	(-2,7)
0		
2		
5		
8		

B. Determine the slope of the line given two points.

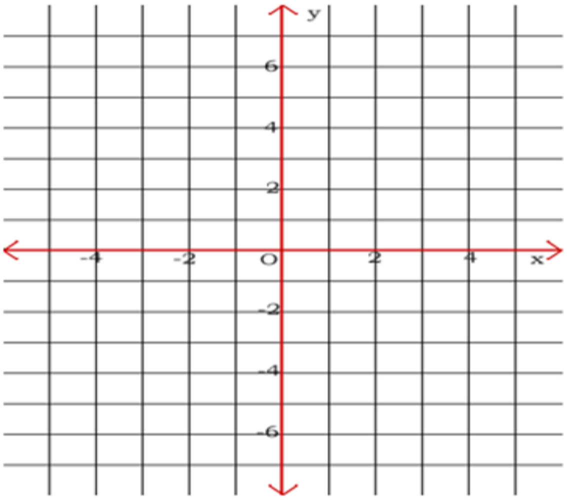
1. (-2, 4) and (1, 6)
2. (-3, -1) and (5, -5)
3. (3, -3) and (-4, 2)
4. (-3, 2) and (2,2)
5. (3, 4) and (3, -3)

E

Learning Task 3: Read the instructions carefully. Do this in your notebook.

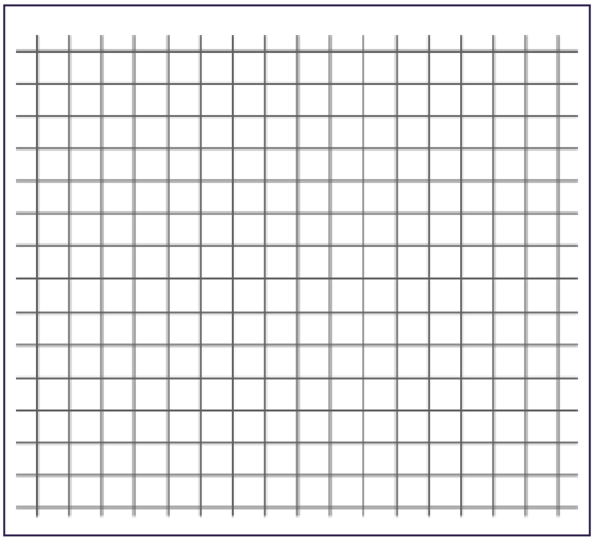
A. Plot and label the following points.

1. T (0, 9)
2. Y (2, -1)
3. L (1, 0)
4. E (-3, 5)
5. R (0, -7)
6. M (0, 0)
7. A (5, 2)
8. G (8, 8)
9. N (6, 6)
10. O (-5, 4)



B. Find three solutions for the linear equation 4x –3y = 1, and plot the solutions as points on a coordinate plane

4x –3y = 1		
x	y	(x,y)



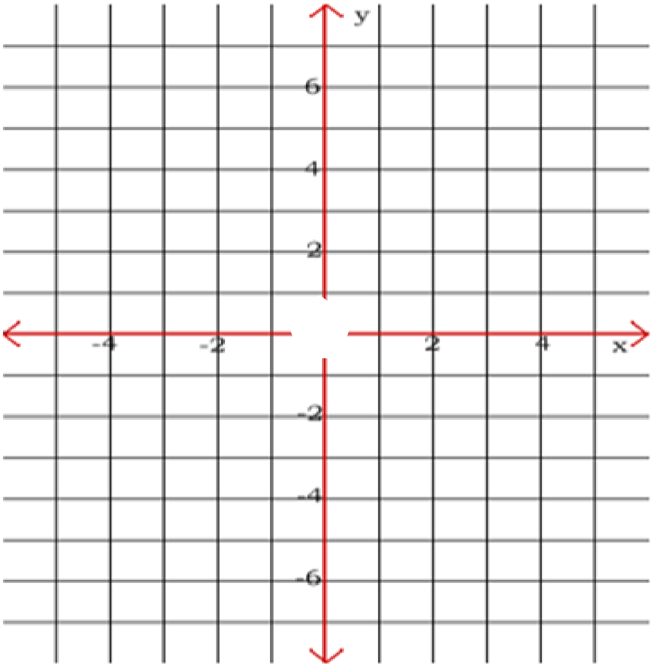
A

Learning Task 4. Read the instructions carefully. Answer it in your notebook.

A. Given x + 2y = 5

1. Find 2 solutions of the equation.
2. Graph the two points.
3. Find the slope.

B. Draw the map of your community where your house is at the origin then plot at least five (5) houses of your classmates. Write the coordinate of each classmate's house.



WEEK 5

Graphing Linear Equation In Two Variables

I

Lesson

After going through this lesson, you are expected to write the linear equation ax + by = c in the form y = mx + b and vice versa and graph a linear equation given:

a) Any two points;

b) The x – and y – intercepts; and

c) The slope and a point on the line.

Recall properties of equality that will help you solve linear equations in two variables. Among which are the Addition Property of Equality (APE) and Multiplication Property of Equality (MPE)

Addition Property of Equality states that that adding the same number to each side of an equation gives us an equivalent equation . If a, b and c are real numbers, and $a = b$, then $a + c = b + c$ or $a - c = b - c$.

Multiplication Property of Equality states that multiplying both sides of the equation with the same number gives us an equivalent equation. If a, b and c are real numbers and $a = b$, then $ac = bc$ or $\frac{a}{c} = \frac{b}{c}$

These properties of equality are used to change the standard form of linear equation in two variables ax + by = c into slope intercept form of the equation y = mx + b, where m is the slope and b is the y– intercept. The y intercept is the value of y where the graph crosses the y-axis.

Examples:

1. Change y - x = 4 to slope intercept form determine the slope and the y– intercept

   Solution: $y - x = 4$

   APE : $y - x + x = x + 4$

   $y = x + 4$,

The slope is the coefficient of variable x, therefore m = 1 and the y-intercept is the constant, b = 4.

2. Change 2x + 3y = 9 to slope intercept form. Find the slope and y-intercept

   Solution: 2x + 3y = 9. Apply APE by subtracting 2x to both sides of the equation : $2x - 2x + 3y = -2x + 9 \longrightarrow 3y = -2x + 9$

Apply MPE: 3y = -2x + 9 $\longrightarrow \frac{1}{3}(3y) = \frac{1}{3}(-2x+9) \longrightarrow y = \frac{-2}{3}x + 3$

The slope m = $-\frac{2}{3}$ and the y-intercept b = 3

To convert from ax + by + c = 0 to y = mx + b we need only to solve for y in terms of x.

Learning Task 1. Change the given Equation into slope intercept form y = mx + b. determine the slope and y– intercept.

1. y - 3x + 2
2. 2y + 4x + 10
3. 3x - y = 8
4. x + 2y = 6
5. 4x + 2y = - 6

D

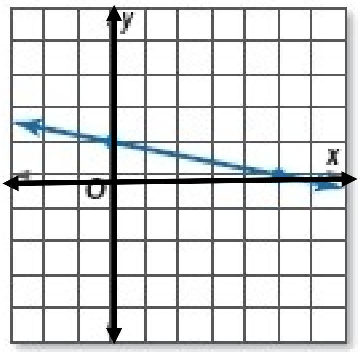
Graphing Linear Equations in Two Variables

A. Given any two points

Use the two points (5, 0) and (0, 1). Find the slope of the line containing the given points.

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{0-1}{5-0} = -\frac{1}{5}$$

The slope is which means that the line will fall to the right. $-\frac{1}{5}$ 1 is the rise and 5 is the run. Checking through the graphs by plotting he two given points, from (5,0) the run is 5 and the rise is 1.



The line crosses the y-axis at (0, 1), so the y intercept is 1. Write the equation in slope-intercept form y = mx + b $\longrightarrow y = -\frac{1}{5}x + 1$

B. Given the x– and y– intercepts

x-intercept – the point, **(x, 0)**, where the line crosses the x, axis

y-intercept – the point, **(0, y)**, where the line crosses the y-axis

To graph a line using this method…

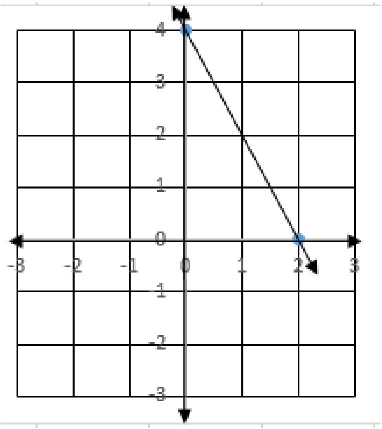
1. Find the x-intercept by letting y = 0 and solving for x
2. Find the y-intercept by letting x = 0 and solving for y
3. Plot both intercepts on the graph and connect with a straight line

Example: Find the x and y intercepts of 2x + y = 4.

If x = 0, then 2(0) + y = 4; y = 4. The y intercept is (0,4)

If y = 0, then 2x + 0 = 4; 2x = 4 and x = 2 . The x-intercept id (2,0)

Plot the x and y intercepts on the coordinate plane and connect to form the line.



C. The slope (m) and a point on the line

To graph…

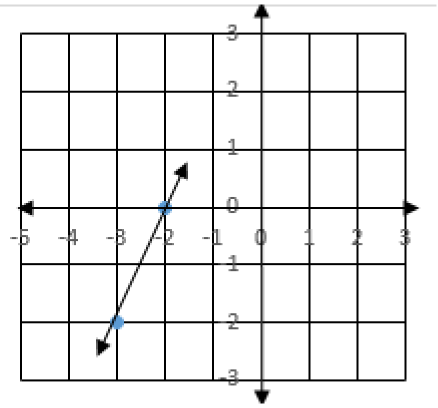
1. Plot the given point
2. Generate additional points on the line by starting at the given point (x, y) and moving the rise and run of the slope.

Example. m = 2 and pointn(-3, -2)

$$m = 2 = \frac{2}{1}$$

The rise is 2 and the run is 1.

From the given point (-3, -2) , move I 1 unit horizontally , 2 units upward. The point is (-2, 0). Connect the two points.



Learning Task 2.

A. Write the linear equation ax + by = c in the form y = mx + b

1. 3x + 4y = 8
2. 10x + 3y = 2
3. 16x + 9y = 40

B. Write the linear equation y = mx + b in the form ax + by = c

4. y = 3x - 3
5. y = - x + 7
6. y = $\frac{2}{3}x$ + 2

E

Graph the **linear equations given the following details:**

A. Using two points.

1. (2, -1) and (3, 2)
2. (4, -2) and (-5, 2)
3. (4, 3) and (0, 5)
4. (1, 6) and (-2, -5)

Find the slope of each line . Describe the graph.

B. Using intercepts

5. (0, -3) and (1, 0)
6. (-3, 0) and (0, -3)
7. (5, 0) and (0, -4)
8. (2. 0) and (0, 0, -4)

Find the slope of the line. Describe the graph.

C. Using slope and a point

9. m = 5 and (6, -1)
10. m = $\frac{3}{5}$ and (2, -4)
11. m = - 2 and (4, 1)
12. m = $-\frac{4}{3}$ and (-3, -3)

A

Learning Task 4: Read and analyze the problem carefully, then do what is asked below. Do it in your notebook.

1. Rowie is tracking the progress of her plant's growth. Today the plant is 5 cm high. The plant grows 2cm per day.

a. Write a linear model that represents the height of the plant after x days.

b. What will be the height of the plant be after 20 days?

c. C. Graph the number of days against the growth of the plants.

Equation of the Line

I

Lesson

After going through this lesson, you are expected to find the equation of a line given (a) two points, (b) the slope and a point and (c) the slope and its intercepts

From the given linear equation, we can determine 2 points that will satisfy the equation. Also we can determine the slope and the y– intercept so as the x and y intercepts.

Example: Given $-2x + y = 6$

Find: a. two points that will satisfy the equation
(b) slope and y– intercept
(c) x and y intercept

Solution:

(a) $-2x + y = 6$

If $x = -1$	If $y = 2$
$-2(-1) + y = 6$	$-2x + 2 = 6$
$2 + y = 6 \rightarrow y = 4$	$-2x = 4 \rightarrow x = -2$
The point is (-1, 4)	The point is (-2, 2)

(b) Change the equation to slope intercept form : $y = 2x + 6$

Therefore the slope $m = 2$ and the y– intercept $b = 6$

(c) Find the and y intercept of $-2x + y = 6$

Let $x = 0$, $-2(0) + y = 6$; $y = 6$. the intercept is (0,6)

Let $y = 0$, $-2x + 0 = 6$; $-2x = 6$, $x = -3$, the y intercept is (-3,0)

Learning Task 1 : From the given equation of the line a) find two points that will satisfy the equation, b) the slope and the y intercepts and c) the x and y – intercepts.

1. $3x + 2y = 5$
2. $3y - x = 9$

D

You can find the equation of the line given the graph, 2 points, slope and a point , slope and intercept or the x and y intercepts.

A. **Given the slope and the y– intercept**.

Remember that equation of the line can be written in the form of slope intercept form, y = mx + b

Example: If m = 2 and the y-intercept b = -3, the the equation is y = 2x - 3.

This can be changed to standard for of equation: -2x + y = -3.

B. Given 2 points.

The formula in finding the equation of the line given two points is:

$$y - y_1 = \frac{y_2 - y_1}{x_2 - x_2}(x - x_1)$$

Example. Find the equation of the line that passes through points (2, 5) and (-2, -3)

Solution: Let $x_1 = 2$, $y_1 = 5$, $x_2 = -2$ and $y_2 = -3$

$$y - y_1 = \frac{y_2 - y_1}{x_2 - x_2}(x - x_1) \longrightarrow y - 5 = \frac{-3-5}{-2-2}(x - 2) \longrightarrow y - 5 = 2(x - 2)$$

The equation in slope intercept form is y = 2x + 1

The standard equation is -2x + y = 1

C. Given the slope and a point

The formula in finding the equation of the line given the slope and appoint

Is $y - y_1 = m(x - x_1)$

Example. Find the equation of the line whose slope is –1 and passes through the point (5, -3)

Solution: y - (-3) = -1(x - 5) → y + 3 = -x + 5 → y = -x - 2 or x + y = -2

D.* Given the x intercepts (*a, 0*) and the y-intercept *(0, b)

The formula in finding the equation of the line given the intercepts

is: $y = -\frac{b}{a}x + b$

Example . The x and y intercepts of the line are –3 and 4 respectively. Find the equation of the line.

$$y = -\frac{b}{a}x + b \longrightarrow y = -\frac{4}{(-3)}x + 4 \longrightarrow y = \frac{4}{3}x + 4 \ \ or \ \ 3y - 4x = 12$$

Learning Task 2. Find the equation of the line . Write in slope intercept form and in standard form

1. m = -5, b = 1
2. (1, -2) , (3, 3)
3. (-2, 0) and (0, 5)
4. *a* = 2, b = -7
5. m = 2 , (3, -1)

E

Learning Task 3 . Find the equation of the line. Do it in your notebook.

(a) In slope intercept form y = mx + b

(b) in standard form *a*x + by = c

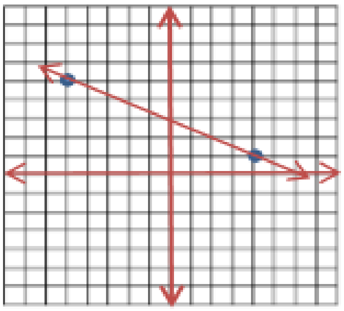
1. The slope is 5 passing through (-1, 4).
2. The line passes through point (3, -4) and (-2, 2)
3. The slope is $\frac{3}{4}$ and the y-intercept is (0,4)
4. The x intercept -3 and the y-intercept is 6
5. Passing through the points (-1, -2) and (5, 3)

A

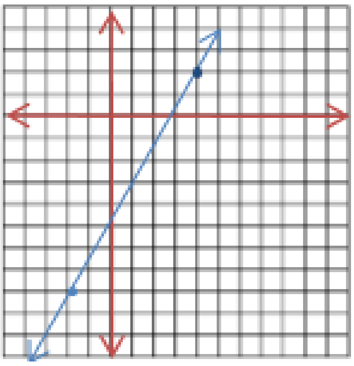
Learning Task 4 : Do the following in your notebook.

A. Find the equation of the line given the graph.

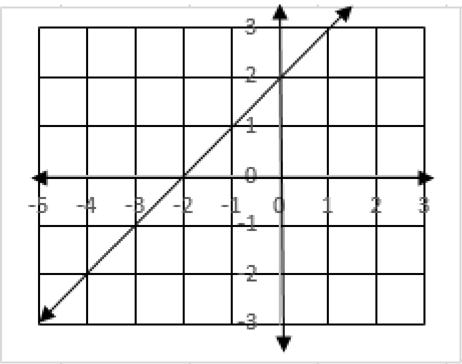
1.



2.



3.



Systems of Linear Equation in Two Variables

Lesson

I

After going through this lesson, you are expected to illustrate system of linear equation in two variables and determine if the graph of the systems of equation are parallel, perpendicular , intersecting or coinciding lines

In the previous lesson you were able to graph the linear equation in two variables . The graph is a line that either rises to the right or falls to the right.

The graph rises to the right if the slope is positive and if it falls to the right if the slope is negative. When the graph is a horizontal line, the slope is zero. When the graph is vertical, the slope is undefined.

A pair of linear equations in two variables form a system of linear equations. The graph of a system of two equations is a pair of lines in the plane.

Learning Task 1: Graph each pair of linear equations in one coordinate plane.

Do this in your notebook.

1. $y = 2x + 2$ and $2y = 4x + 4$
2. $Y= x—5$ and $y = -x + 3$
3. $Y = 2x—3$ and $y = 2x + 4$

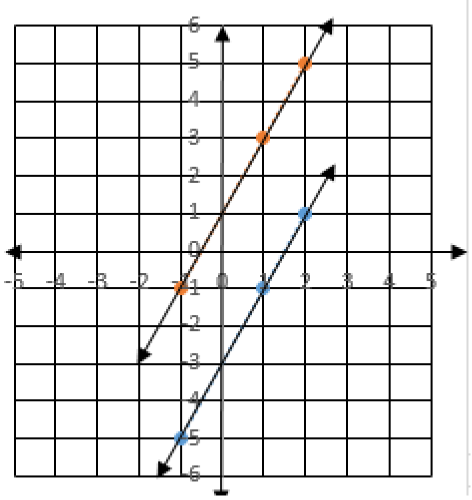
D

The graph of systems of linear equation may coincide, may be parallel, perpendicular or intersecting.

Example: Graph the System of equations

(a) $y = 2x - 3$ and $y = 2x + 1$

Using the slope and intercept in graphing.



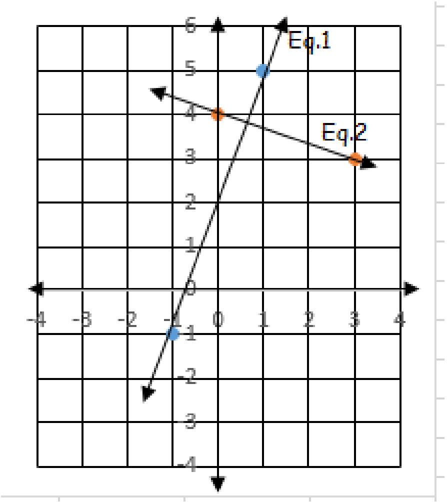
The lines are parallel . Looking back to the two equations, their slopes are equal and the y intercepts are different ; $m_1 = m_2$, $b_1 \neq b_2$

(b) Eq. 1: y = 3x + 2 and Eq. 2: $y = -\frac{1}{3}x + 4$

m = 3, b = 2 $m = -\frac{1}{3}$ b = 4

The lines are perpendicular meaning they intersect and form a right angle. The lines have different y intercepts. Their slopes are negative reciprocals of each other. The product of the slopes is –1.

$$m_1 \cdot m_2 = -1 \quad and \quad b_1 \neq b_2$$

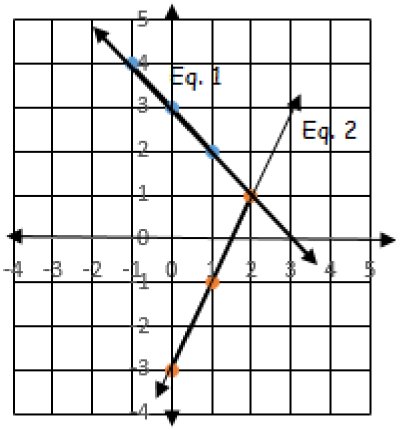


(c) Eq. 1: y = -x + 3 and Eq. 2: y = 2x - 3

m = -1, b = 3 m = 2 , b = -3

The graph are intersecting lines but not perpendicular. The slope of the lines are not equal and the y–intercepts are not also equal .

$$m_1 \neq m_2 \quad and \quad b_1 \neq b_2$$



(d) If each line in the system has the same slope and the same y-intercept, the lines are coincident. The lines are on top of each other.

Learning Task 2. Without graphing, tell whether the graphs of the system of equations are parallel, perpendicular, intersecting or coinciding. Do it in your notebook.

1.y = x + 7 and y = - x + 2

2.Y = 5x and y = 5x - 1

3. 2x + y = 1 and 2y + 4x = 2

4. Y = 2x + 3 and y = -x - 4

E

Learning Task 3. Graph the system of equations

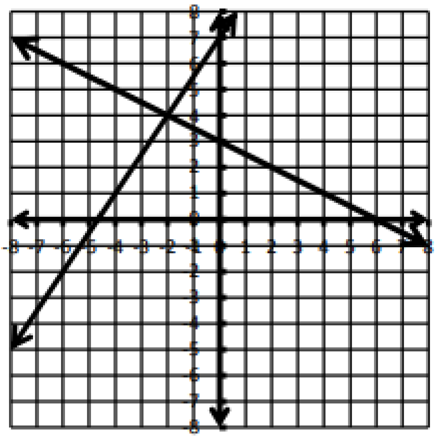
1. y = x + 5 and y = 5x + 5
2. x – 3y = –12 and 4x + 6y = –12
3. x + 2y = -5 and -2x + y = 3
4. y = 3x – 2 and y = –x – 6
5. 2x – 3y = –2 and 4x + y = 24

E

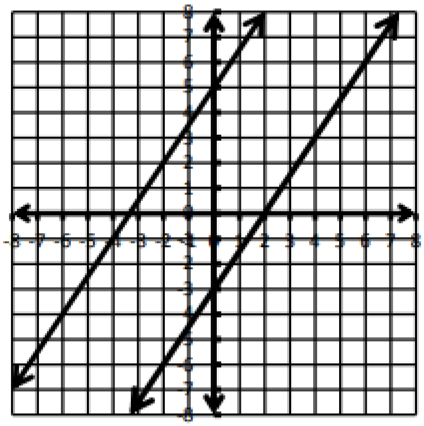
Learning Task 4: Do it in your notebook**.**

A. Describe the slope and y– intercepts of the graphs of the system of equations.

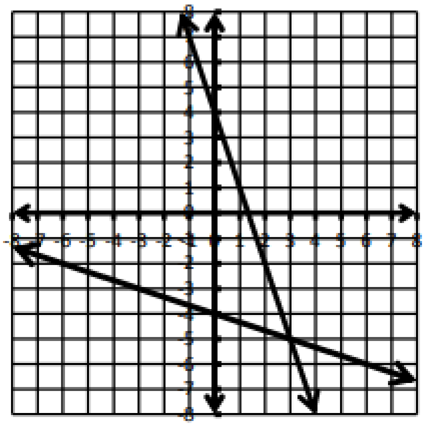
1.



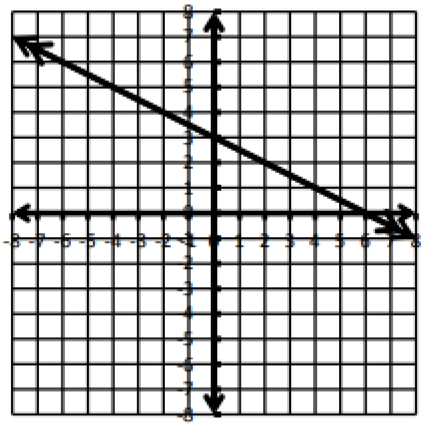
2.



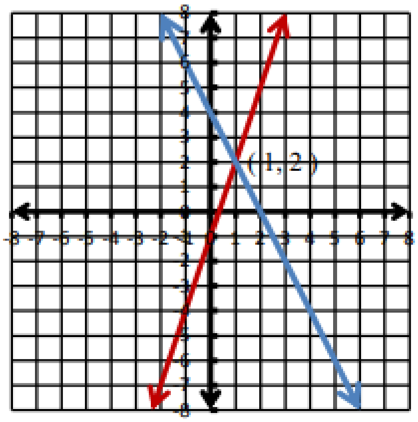
3.



4.



5.



Solutions of Systems of Linear Equation in Two Variables In Two Variables

I

Lesson

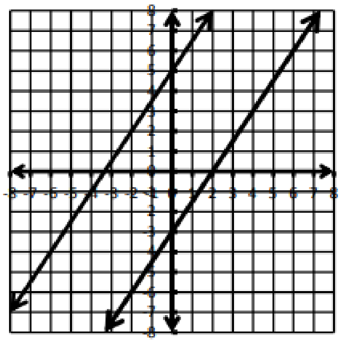
After going through this lesson, you are expected to solve a system of linear equations in two variables by **a**. Graphing; **b**. Substitution; **c.** Elimination, and solve problems involving systems of linear equations in two variables.

In your previous lesson you find an ordered pair that satisfy the given equation in two variables and this ordered pair is called the solution of the equation. Since it is a line , all the points within the line are said to be the solution of the equation.

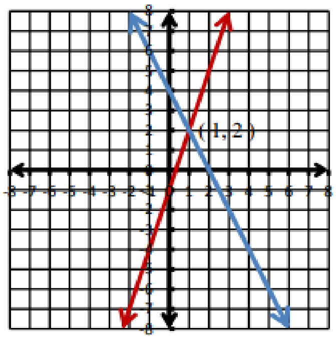
However in a system of equations, you are looking for a unique ordered pair that will satisfy both equations. Through graphs, that ordered pair is the coordinate of the point of intersection of the two lines. The point is the solution of the system of equations. System of equation may 1 solution, no solution or infinite solution.

Learning Task 1: Which of the following graphs has one, non or infinite solutions. Write you answer in your notebook.

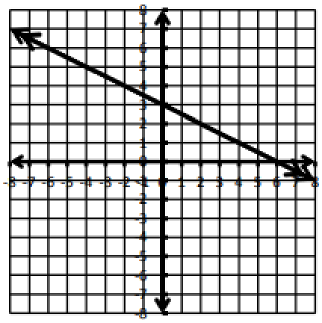
1.



2.



3.



A **system of linear equations** contains two or more equations e.g.

D

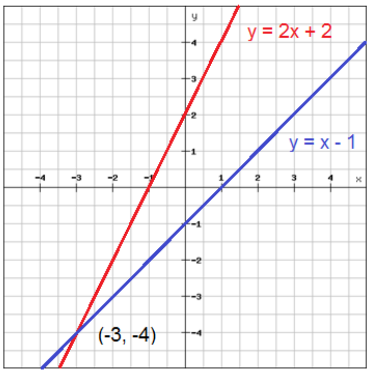
Finding the solution of system of equation can be done different ways.

A. By Graphing

Illustrative Example:

Graph the equations in coordinate plane:

$$\left.\begin{array}{r} \mathbf{-2x + y = \ 2} \\ \mathbf{-x + y = -\ 1} \end{array}\right\}$$



The two lines intersect in **(-3, -4)** which is the solution to this system of equations.

B. By Substitution

Solving Systems of Linear Equations by Substitution	
Step 1	Solve for one variable in one of the equation
Step2	Substitute the resulting expression into the other equation
Step 3	Solve the equation to get the value of the variable
Step 4	Substitute the value to any of the original equation to solve
Step 5	Write the values from Steps 3 and 4 as an ordered pair (x,y). and check

Illustrative Example

Eq. 1: $\mathbf{-2x + y = \ 2}$

Eq. 2: $\mathbf{-x + y = -1}$

Step 1. Use equation 2: $y = x - 1$ (eq. 3)

Step 2. Substitute to eq. 1 : $-2x + (x - 1) = 2$

Step 3: Solve for x: $(-2x + x) = 2 + 1 \rightarrow -x = 3 \rightarrow x = -3$

Step 4: Substitute the value of x to Eq. 1. $-2(-3) + y = 2$

$6 + y = 2 \rightarrow y = 2 - 6 \rightarrow y = -4$

Step 5: The solution is (-3, -4)

C. By Elimination

Solving Systems Equations by Elimination	
Step 1	Write the systems so that the like terms are aligned. See to it that the variable to be eliminated have the same numerical coefficients otherwise multiply both
Step 2	Eliminate one of the variables and solve for the other variable by Addition or Subtraction
Step 3	Substitute the value solved to any of the original
Step 4	Write the results in Steps 2 and 3 as an ordered pair, (x,y), and check

Illustrative Example

Solve the system:

Step 1

Eq. 1: $\mathbf{-2x + y = 2}$

Eq. 2: $\mathbf{-x + y = -1}$

Step 2:

$$\begin{array}{r} -2x + y = 2 \\ -x + y = -1 \\ \hline -x \quad = 3 \\ X = -3 \end{array}$$

Subtract the equations to eliminate y since they have the same numerical coefficient.

Step 3: Substitute the vale of x to any of original equation.

Eq. 1: $-2x + y = 2$

$-2(-3) + y = 2$

$6 + y = 2$

$Y = 2 - 6$

$Y = -4$

Eq. 2 $-x + y = - 1$

$-(-3) + y = -1$

$3 + y = -1$

$y = -1 - 3$

$y = -4$

As you can see the value of y is the same using the two equations

The ordered pair is (-3, -4).

In solving systems of equation you may use any method, graphing, substitution or elimination.

There are problems real life situations that can be solved using systems of equations.

Example: The admission fee at a small fair is P 15.00 for children and P 40.00 for adults. On a certain day, 2200 people enter the fair and P 50,500.00 is collected. How many children and how many adults attended?

Solution: Let x be number of adults and y the number of children.

40x amount generated from adults and 15y amount generated from children.

Equations : Eq. 1 $x + y = 2200$ Number of adults and children

Eq. 2. $40x + 15y = 50{,}500$ amount collected

Use Substitution. From Eq. 1 $x + y = 2200$ $y = -x + 2200$

Substitute to Eq.2 : $40 x + 15y = 50{,}500$

$$40x + 15 (-x + 2200) = 50{,}500$$

$$40x -15x + 33{,}000 = 50{,}500$$

$$25x = 50{,}500 - 33{,}000$$

$$25x = 17{,}500$$

$$X = 700$$

Substitute the value of x to any of the equation. Suppose we use

Eq. 1 $x + y = 2200 \longrightarrow 700 + y = 2200 \longrightarrow y = 2200 - 700 \rightarrow y = 1, 500$

Therefore , there are 700 adults and 1,500 children

Check: $x + y = 2200$ $40x + 15y = 50500$

$700 + 1500 = 2200$ $40(700) + 15(1500) = 50500$

$2200 = 2200$ $28000 + 22500 = 50500$

$50500 = 50500$

Learning Task 2.

A. Solve the systems of equations by a) graphing b) elimination c) substitution

Eq. 1: $2x - 3y = -1$; Eq. 2: $y = x - 1$

B. Solve the problem using any method.

The sum of two numbers is 32 and the difference is 2. Find the numbers

E

Solves a systems of linear equations in two variables.

Solve the following systems by graphing.

1) $2x + y = 5$ and $x - 3y = - 8$

2) $6x - 3y = - 9$ and $2x + 2y = - 6$

Solve the following systems by substitution

3) $y = 5x - 3$ and $-x - 5y = - 11$

4) $2x - 6y = - 24$ and $x = 5y - 22$

Solve the following systems by elimination

5) $- 4x - 2y = -2$ and $4x + 8y = - 24$

6) $x - y = 11$ and $2x + y = 19$

A

Learning Task 4. Solve the problem involving systems of linear equations in two variables.

1. Your mother bought 20 kilos of mangoes and atis combined. Mango is P 60.00 per kilo and atis is P 40.00 per kilo. If she paid P 1000.00 for 20 kilos, how many kilos of each kind mother bought?

   (a) If x is number of kilos of mango and number of kilos of atis, then the equation is: ___________________________

   (b) Equation for the Cost of fruits ________________________

   (c) The system of equations are __________________ and ___________

   (d) Solve by any method.

   (e) Check if your result will satisfy the problem.

Answer Key

WEEK 1				
Learning Task 1	Learning Task 2	Learning Task 3	Learning Task 4	Learning Task 5
1. C	1. (x + 6)(x – 3)	1. 0 or 9	1. (x + 5)(x – 5)	1. Yes: Suggestion: 24x²y + 36xy = 12xy(2x+3)
2. A	2. 3(x-4)(x+1)	2. 0 or 5	2. (2x + 1)(x – 8)	
3. D	3. 3(6x-5)(x + 1)	3. 4 or -10	3. 3(x + 5)(x+ 5)	2. – 7 or 3
4. B	4. (5x + 2)(x + 6)		4. (x – 3)(x² = 3x + 9)	3. l = 3, w = 3
5. E	3. 3((x + 2)(x²-2x+4)		5. 5x(x-2)(x+1)	4. 90 sq. units

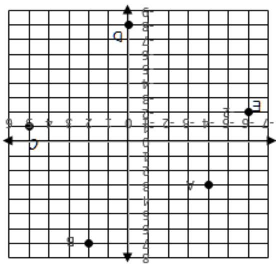
WEEK 2					
Learning Task 1			Learning Task 2	Learning Task 3	Learning Task 4
$\frac{18}{36}$	$\frac{2\cdot 9}{2\cdot 2\cdot 9}$	$\frac{1}{9}$	1. b	A. All are rational	1. $\frac{r}{s}$
$\frac{81}{72}$	$\frac{9\cdot 9}{9\cdot 8}$	$\frac{9}{8}$	2. x – 3	B	2. $\frac{-1}{b=1}$
$\frac{9m+9n}{9r-9s}$	$\frac{9(m+n)}{9(r-s)}$	$\frac{m+n}{r-s}$	3. 4(x + 1)	1. 2m	3. $\frac{m-9}{m^2-81}$
$\frac{m^2-9}{m+3}$	$\frac{(m+3)(m-3)}{m+3}$	m-1	4. $\frac{x+4}{x^2+x+1}$	2. a	4. B
$\frac{x^2+3x-4}{x^2+4x-5}$	$\frac{(x+4)(x-1)}{(x+5)(x-1)}$	$\frac{x+4}{x+5}$		3. $\frac{1}{x-5}$	

WEEK 3				
Learning Task 1	Learning Task 2	Learning Task 3	Learning Task 4	Learning Task 5
1. 1	1. $\frac{3x}{x-1}$	1. $\frac{5}{3a}$	1. $\frac{12b^2}{5a}$	1. P = 12(3x + 4)
2. $\frac{11}{24}$	2. $\frac{2x+9}{x+6}$	2. 1	2. $\frac{x}{3}$	$\frac{2(3x+4)}{12(3x+4)}$
3. 7x + 7	3. 2(y – 2)	3. $\frac{4(2x+1)}{(x^2-1)(x-2)}$	3. $\frac{x-2}{x+5}$	$\frac{1}{6}$
4. $5x^{-2}$ – 4x -5	4. $\frac{5}{4}$	4. $\frac{2(x-17)}{(2x-1)(x+3)(x-5)}$	4. $\frac{8}{n}$	2. 8
		5. $\frac{4x^2-3x-4}{(x+2)(x+3)(x-1)}$	5. $\frac{a-5}{a+2}$	
			6. $\frac{1}{24a}$	

WEEK 4

Learning Task 1

B. 1. Q III 2. x –axis
3. Q IV 4. Q III 5. y-axis



Learning Task 2

A.

x	y	(x,y)
0	3	(0,3)
2	-1	(2.-1)
5	-7	(5,-7)
8	-13	(8,-13)

B. 1 m = $\frac{2}{3}$

2 m = - $\frac{1}{2}$

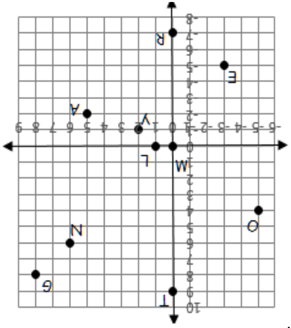
3 m = $\frac{-5}{7}$

4 m = 0

4 m = undefined

Learning Task 3

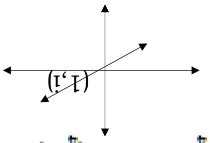
A.



B. 1 1 (1,1)

0 $\frac{-1}{3}$ $(0,\frac{-1}{3})$

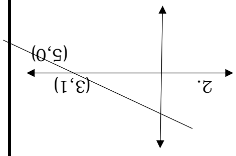
$\frac{1}{4}$ 0 $(\frac{1}{4},0)$



Learning Task 4

A. 1. Possible answer
(5, 0) and (3,1)

2.

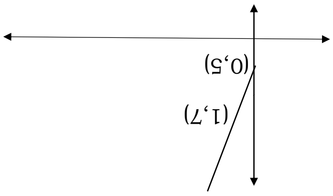


3 m = $\frac{1}{8}$

B. Answer may vary

WEEK 5

Learning Task 1	Learning Task 2	Learning Task 4.
1. y = 3x – 2	A. 1 y = $-\frac{3x}{4}+2$	1. a y = 2x + 5
2. y = -2x – 5	2. y = $-\frac{10x}{3}+\frac{2}{3}$	b 45 cm
3. y = x – 8	3. y = $-\frac{16x}{9}+\frac{40}{9}$	
4. y = $\frac{x}{2}+3$	B. 4. -3x + y = -3	
5 y = -2x - 3	5. x + y = 7	
	6. -2x + 3y = 6	



References

Rico Ruallo, Louie M. Lozada, Christine anne M. Prepuse, Andrea E. Lopez, Sharp Math 8, K to 12 edition. Published by The Bookmark, Inc. Makati City, Philippines, 2016 pp. 38-47

Orlando A. Oronce, Marilyn O. Mendoza, E-Math 8, Revised edition. Published by Rex Book store Inc. Sampaloc, Manila, Philippines,2019 pp. 77-86

URL sources:

https://www.youtube.com/watch?v=mEs3VUqmPGc
https://www.ipracticemath.com/learn/integer/subtracting-integers
https://www.onlinemathlearning.com/subtracting-rational-expressions-help.html
https://www.onlinemathlearning.com/multiplying-rational-expressions-help.html
https://sites.google.com/site/algebra2polynomialfunctions/home/9-solving-equations-using-factoring
https://cpb-us-e1.wpmucdn.com/cobblearning.net/dist/5/1342/files/2016/08/factoring-and-distributive-hard-1jfr3rz.pdf
https://www.onlinemathlearning.com/polynomial-equation-word-problem.html

Internet Websites For Information
https://themathlab.com
https:// chilimath.com
https:// dummies.com
oxford dictionary (www.google.com)
https://www.merriam-webster.com/dictionary/reciprocal
https://www.onlinemathlearning.com/dividing-rational-expressions-help.html

8 Mathematics Learner's Module
@Mathgiraffe.com

For inquiries or feedback, please write or call:

Department of Education Region 4A CALABARZON

Office Address: Gate 2 Karangalan Village, Cainta Rizal

Landline: 02-8682-5773 local 420/421

Email Address: lrmd.calabarzon@deped.gov.ph