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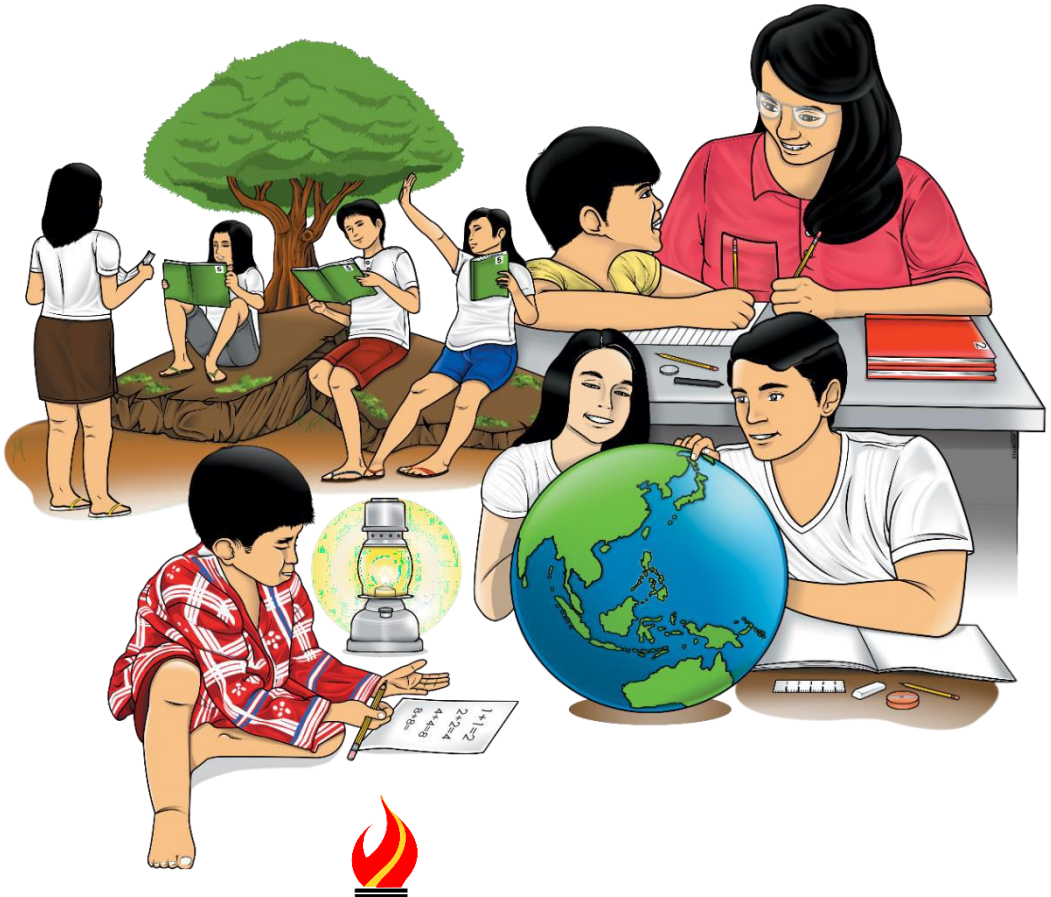
DEPARTMENT OF EDUCATION

Mathematics

Quarter 1 – Module 2
Solving Problems Involving Factors of Polynomials



ALTERNATIVE DELIVERY MODE
ADM

Mathematics – Grade 8
Alternative Delivery Mode
Quarter 1 – Module 2 Solving Problems Involving Factors of Polynomials
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Introductory Message

For the facilitator:

Welcome to the Mathematics 8 Alternative Delivery Mode (ADM) Module on Solving Problems Involving Factors of Polynomials!

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 Kto12 Curriculum while overcoming their personal, social, and economic constraints in schooling.

This learning resource hopes to engage the learners into 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:

Welcome to the Mathematics 8 Alternative Delivery Mode (ADM) Module on Solving Problems Involving Factors of Polynomials!

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 be enabled to process the contents of the learning resource while being an active learner.

This module has the following parts and corresponding icons:

 ***What I Need to Know***	This will give you an idea of the skills or competencies you are expected to learn in the module.
 ***What I Know***	This part includes an activity that aims to check what you already know about the lesson to take. If you get all the answers correct (100%), you may decide to skip this module.
 ***What's In***	This is a brief drill or review to help you link the current lesson with the previous one.
 ***What's New***	In this portion, the new lesson will be introduced to you in various ways; a story, a song, a poem, a problem opener, an activity or a situation.
 ***What is It***	This section provides a brief discussion of the lesson. This aims to help you discover and understand new concepts and skills.
 ***What's More***	This comprises activities for independent practice to solidify your understanding and skills of the topic. You may check the answers to the exercises using the Answer Key at the end of the module.
 ***What I Have Learned***	This includes questions or blank sentence/paragraph to be filled in to process what you learned from the lesson.
 ***What I Can Do***	This section provides an activity which will help you transfer your new knowledge or skill into real life situations or concerns.
 ***Assessment***	This is a task which aims to evaluate your level of mastery in achieving the learning competency.
 ***Additional Activities***	In this portion, another activity will be given to you to enrich your knowledge or skill of the lesson learned.
 ***Answer Key***	This contains answers to all activities in the module.

At the end of this module you will also find:

References	This is a list of all sources used in developing this module.

The following are some reminders in using this module:

1. Use the module with care. Do not put unnecessary mark/s on any part of the module. Use a separate sheet of paper in answering the exercises.
2. Don't forget to answer *What I Know* before moving on to the other activities included in the module.
3. Read the instruction carefully before doing each task.
4. Observe honesty and integrity in doing the tasks and checking your answers.
5. Finish the task at hand before proceeding to the next.
6. Return this module to your teacher/facilitator once you are through with it.

If you encounter any difficulty in answering the tasks in this module, do not hesitate to consult your teacher or facilitator. Always bear in mind that you are not alone.

We hope that through this material, you will experience meaningful learning and gain deep understanding of the relevant competencies. You can do it!

What I Need to Know

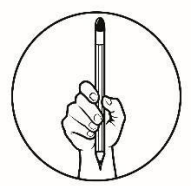
In this module, you will discover that the different methods of factoring can be used and applied in solving word problems. The scope of this material involves real-world encounters that can be defined mathematically using polynomial factoring. You are going to look at factoring at the real world and see how to solve word problems with reasonable solutions involving area, perimeter or finding two numbers that are consecutive values or create an equation that you are going to solve with accuracy and using variety of strategies.

This module contains:

Lesson 1- Solving Problems Involving Factors of Polynomials

After going through this module, you are expected to:

1. recall the different methods of factoring polynomials;
2. apply the concept of factoring in solving related problems; and
3. describe the importance of understanding factoring and its application to real-life;



What I Know

Read each item very carefully. Choose the letter of the correct answer. Write your answers on a separate sheet of paper.

1. The square of a number equals nine times that number. Find the number.
   A. 0 or 2
   B. 0 or 3
   C. 0 or 6
   D. 0 or 9

2. The area of a square is $4x^2 + 12x + 9$ square units. Which expression represents the length of the side?
   A. $(3x + 2)$ units
   B. $(2x + 3)$ units
   C. $(4x + 9)$ units
   D. $(4x + 3)$ units

3. Forty-nine less than the square of a number equals zero. Find the number.
   A. -3 or 3
   B. -7 or 7
   C. -13 or 13
   D. 0 or 9

4. The area of triangle is $80\ cm^2$. If the height of the triangle is $6\ cm$ less than its base, find the base and its height.
   A. $b = 20\ cm, h = 16\ cm$
   B. $b = 10\ cm, h = 6\ cm$
   C. $b = 35\ cm, h = 31\ cm$
   D. $b = 16\ cm, h = 10\ cm$

5. Suppose that four times the square of a number equals 20 times that number. What is the number?
   A. 0 or 1
   B. 0 or 5
   C. 0 or 10
   D. 0 or 20

6. If the area of the square is $4x^2 - 4x + 1$, what is the measure of its side?
   A. $-2x + 1$
   B. $-4x + 1$
   C. $4x - 2$
   D. $2x - 1$

7. The product of two consecutive integers is 90. Find the integers.
   A. -5 and -4 or 4 and 5
   B. -10 and -9 or 9 and 10
   C. -13 and -12 or 12 and 13
   D. -18 and -17 or 17 and 18

8. The area of a square is numerically equal to five times its perimeter. Find the length of a side of the square.

   A. 4 C. 10

   B. 5 D. 20

9. What is the measure of one side of the square if its area is $25x^2 - 70x + 49$?

   A. $5x + 7$ C. $7x + 5$

   B. $5x - 7$ D. $7x - 5$

10. A rectangular pond has a length of $4\ m$ more than twice its width. Solve for the length and the width if the area of the said pond is 96m^2?

    A. $l = 12\ m, w = 4\ m$ C. $l = 16\ m, w = 3m$

    B. $l = 24\ m, w = 2\ m$ D. $l = 16\ m, w = 6m$

11. The cube of a number equals nine times the number. Find the number.

    A. -1 or 0 or 1 C. -3 or 0 or 3

    B. -9 or 0 or 9 D. -27 or 0 or 27

12. The sum of a number and its square is 420. What are the numbers that satisfy this condition?

    A. 20 or 25 C. 12 or 13

    B. 10 or -11 D. 20 or -21

13. Suppose that five times the cube of a number equals 80 times the number. Find the number.

    A. -4 or 0 or 4 C. -10 or 0 or 10

    B. -5 or 0 or 5 D. -16 or 0 or 16

14. If a square pool is to be made a rectangle such that the length is increased by $6\ units$ and the width is decreased by $6\ units$, what will happen to its area?

    A. The area will increase by 12.
    B. The area will decrease by 12
    C. The area will increase by 36
    D. The area will decrease by 36

15. A rectangular garden has an area of $(12x^2 - 8x - 15)\ m^2$. Find its dimensions.

    A. $(3x - 5)m$ by $(4x + 3)m$
    B. $(6x + 5)m$ by $(2x - 3)m$
    C. $(6x - 3)m$ by $(2x - 5)m$
    D. $(12x - 15)m$ by $(x + 1)$

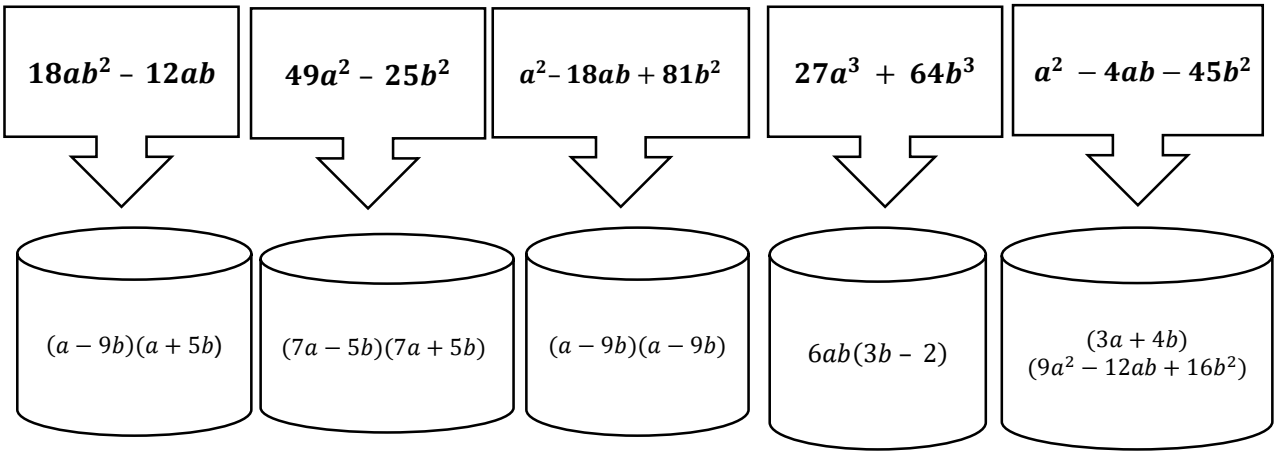
Lesson 1 Solving Problems Involving Factors of Polynomials

Previously, you studied about several ways of factoring polynomials. At this point, let us determine whether you captured the important points of that lesson. Consider the activity below:

What's In

Activity: ***Smart Connect!***

Written on the callouts with down arrows are polynomials. If you are to direct the arrows, to which cylinder should each be paired? Draw a line to connect the arrow to each cylinder which you think correctly represents the factors of the polynomials written on the callouts. Write your answers on a separate sheet of paper.



Now, consider these questions:

1. Were you able to connect the callouts to its right factors?
2. Was it easy for you to find the factors of the given polynomials?
   If *yes*, how did you do it? If *no*, what makes it difficult for you to factor?

If your answer to both questions above is YES, then you are ready to proceed to the next activity.

What's New

At this point, you are going to take everything you've learned about polynomials, factoring and polynomial equations and apply it to real-life situations.

Activity: ***Choose What You Sow!***

Directions: Read the given situation and solve. Below the answer box are the steps to be done to arrive at the correct answer. Arrange the steps in logical order by placing the letter of your choice on the shape provided in the Answer Box. The first step is done for you. Write your answers on a separate sheet of paper.

Suppose your mother asks you to make for her a rectangular-shaped garden. The total area of the garden is 84 square feet. She wants that the length of the garden is 8 feet longer than the width. Can you tell what is the length and the width of the garden?

Answer Box

A $84 = x^2 + 8x$

B $x + 14 = 0$ or $x - 6 = 0$

C $A = (length)(width)$
$84 = (x + 8)(x)$

D $0 = x^2 + 8x - 84$

E Let x be the $width$
$x + 8$ be the $length$

F $0 = (x + 14)(x - 6)$

Guide Questions:

1. How did you find the activity?
2. What do you think is the width of the garden? What is its length?
3. How many values of x can be found after solving the equation? Why did you not consider the other value?

What is It

The above activity illustrates how factoring can be used in solving real-life situations. In doing so, some helpful tips will guide you on how to successfully come up with the correct solution.

1. Write an equation that represents the given information. To help you figure it out, draw a picture or a diagram.

2. Follow the rules of polynomial equation by factoring. This means that you need to place all polynomials on one side of the equation and set it equal to zero, following the Zero Product Property.

   The Zero Product Property simply states that if ab = 0, then either a = 0 or b = 0 (or both).

3. Check the reasonableness of answers. This means that you have to discard solutions that do not make sense; say for example, time and distance cannot be negative.

4. Further, let us add up in our list of things to remember the following properties which will help you justify in the manipulation of your solutions.

Additive Inverse Property. The **additive inverse** (or the opposite sign or the negative) of a number $\boldsymbol{a}$ is the number that, when added to $\boldsymbol{a}$, yields zero. In symbol, $\boldsymbol{a + (-a) = 0}$.

Additive Identity Property states that the sum of any number and 0 is the given number. Zero, "0" is the **additive identity**. In symbol, $a + \mathbf{0} = \boldsymbol{a}$

Multiplicative Inverse Property The **multiplicative inverse** (or the reciprocal) of a number $\boldsymbol{a}$ is $\frac{\mathbf{1}}{\boldsymbol{a}}$ that, when multiplied to $\boldsymbol{a}$**,** the product is one. In symbol, $\mathbf{a \cdot \frac{1}{a} = 1}$.

Multiplicative Identity Property states that the product of any number and 1 is the given number, $a \bullet 1 = a$. One, "1" is the **multiplicative identity**.

Commutative Property of Addition. The order of the addends does not affect the sum. In symbol, $a + b = b + a$.

D**istributive Property of Multiplication** states that when a number is multiplied by the sum of two numbers, the first number can be distributed to both of those numbers and multiplied by each of them separately. In symbol, a(b + c) = ab + ac.

Consider the following examples:

Problem 1: The area of a square is numerically equal to fifty times its perimeter. Find the length of a side of the square.

Solution:

Step 1: Choose a variable to represent what is unknown.

Let $\boldsymbol{s}$ be the length of the side of a square

Step 2: Translate what you are seeing in words into Mathematical expressions. Meaning, write the equation based on the given information. Note that area of a square with side *s* is A = s^2 and its perimeter is $P = 4s$. Hence,

$$\boldsymbol{s^2 = 50(4s)}$$

Step 3: Simplify the expression and solve for the unknown.

s^2	$=$	$50(4s)$	Equation obtained in Step 2
s^2	$=$	$200s$	Simplify
$s^2 - 200s$	$=$	0	Place all polynomials on one side of the equation and set to 0
$s(s-200)$	$=$	0	Factor the polynomials
$s = 0$	or	$s - 200 = 0$	Zero Product Property
$s = 0$	or	$s - 200 + 200 = 0 + 200$	Additive Inverse Property
$s = 0$	or	$s = 200$	Resulting Equations

Since the length of a square could not be zero hence, the length of the side of the square is 200 units.

Problem 2: Suppose that six times the cube of a number equals 54 times the number. Find the number.

Solution:

Step 1: Choose a variable to represent what is unknown.

Let $\boldsymbol{x}$ be the number

Step 2: Translate what you are seeing in words into Mathematical expressions. Meaning, write the equation based on the given information.

$$\boldsymbol{6x^3 = 54x}$$

\

Step 3: Simplify the expression and solve for the unknown.

$6x^3$	$=$	$54x$	Equation obtained in Step 2
$6x^3 - 54x$	$=$	0	Place all polynomials on one side of the equation and set to 0
$6x(x^2 - 9)$	$=$	0	Factor the polynomials
$6x = 0$	or	$x^2 - 9 = 0$	Zero Product Property
$x = 0$			
	or	$x^2 - 9 = 0$	Factor the polynomial
		$(x - 3)(x + 3) = 0$	
$x - 3 = 0$		$x + 3 = 0$	Zero Product Property
$x - 3 + 3 = 0 + 3$	or	$x + 3 - 3 = 0 - 3$	Additive Inverse Property
$x = 3$	or	$x = -3$	Resulting Equations

Therefore, the numbers are -3 or 0 or 3.

Problem 3: The area of a square is $25y^2 - 100y + 100$ square units. What is the length of the side?

Solution:

Step 1: Choose a variable to represent what is unknown.

Let $\boldsymbol{y}$ be the length of side of the square.

Step 2: Translate what you are seeing in words into Mathematical expressions. Meaning, write the equation based on the given information.

$$25y^2 - 100y + 100 = 0$$

Step 3: Simplify the expression and solve for the unknown.

$25y^2 - 100y + 100 = 0$		Equation obtained in Step 2
$(5y - 10)(5y - 10) = 0$		Factor the polynomials
$5y - 10 = 0$ or $5y - 10 = 0$		Zero Product Property
$5y - 10 + 10 = 0 + 10$ or	$5y - 10 + 10 = 0 + 10$	Additive Inverse Property
$5y = 10$	$5y = 10$	Resulting Equations
$\frac{5y}{5} = \frac{10}{5}$	$\frac{5y}{5} = \frac{10}{5}$	Multiply both sides of the equation by $\frac{1}{5}$ (Multiplicative Inverse Property)
$y = 2$	$y = 2$	Resulting Equations

Observe that the value of the unknown is the same, y = 2. Therefore, the length of the side of the square is 2 units.

Problem 4: The square of a number is 20 more than 8 times the number. Find the number.

Solution:
Step 1: Choose a variable to represent what is unknown.

Let $\boldsymbol{z}$ be the number.

Step 2: Translate what you are seeing in words into Mathematical expressions. Meaning, write the equation based on the given information.

$$\boldsymbol{z^2 = 8z + 20}$$

Step 3: Simplify the expression and solve for the unknown.

z^2	$=$	$8z + 20$	Equation obtained in Step 2
$z^2 - 8z - 20$	$=$	0	Place all polynomials on one side of the equation and set to 0
$z^2 - 8z - 20$	$=$	$8z - 8z + 20 - 20$	Additive Inverse Property
$z^2 - 8z - 20$	$=$	0	Resulting Equation
$(z - 10)(z + 2)$	$=$	0	Factor the polynomials
$z - 10 = 0$	or	$z + 2 = 0$	Zero Product Property
$z - 10 + 10 = 0$	or	$z + 2 - 2 = 0 - 2$	Additive Inverse Property
$z = 10$	or	$z = -2$	Resulting Equations

Since there are two values of the unknown, then the numbers are $\boldsymbol{-2\ or\ 10}$.

Problem 5: The length of a rectangular table is 8 more than the width. If the area is $180\ m^2$, find the length and the width.

Solution:
Step 1: Recall that the area of a rectangle can be found by multiplying the length ($\boldsymbol{l}$) and the width ($\boldsymbol{w}$). In symbols,

$$Area = (length)(width)\ or\ Area = l\ x\ w$$

Step 2: Substitute the values given in the problem to the formula in finding the area of the rectangle where

Area = $180\ m^2$

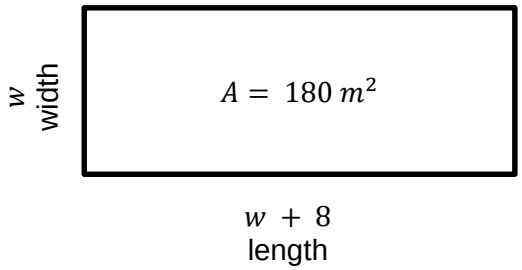
length ($\boldsymbol{l}$) = $w + 8$ (8 more than the width)

width (**w**) = w

Since $Area = l\ x\ w$, to substitute

$$180 = (w + 8)(w)$$

Consider the illustration:



Step 3: Simplify the expression and solve for what is asked.

$180 = (w + 8)(w)$	$Area = l\, x\, w$
$180 = w^2 + 8w$	Distributive Property of Multiplication
$180 - 180 = w^2 + 8w - 180$	Place all polynomials on one side of the equation and set to O by Additive Inverse Property
$0 = w^2 + 8w - 180$	Resulting Equation
$0 = (w + 18)(w - 10)$	Factor the Polynomials
$w + 18 = 0\ or\ w - 10 = 0$	Zero Product Property
$w + 18 - 18 = 0 - 18 \quad or$ $w - 10 + 10 = 0 + 10$	Additive Inverse Property
$w = -18 \quad or \quad w = 10$	Resulting Equations

Now, there are two values of the unknown $-\mathbf{18}\ \boldsymbol{or}\ \mathbf{10}$. Since you are looking for the values of the dimensions: length and width, you have to consider the positive value which is 10 and discard -18 since there is no negative dimension. Therefore, the dimensions are:

$$\boldsymbol{Width}\ (\boldsymbol{w}) = \mathbf{10}$$
$$\boldsymbol{Length}\ (\boldsymbol{w} + \mathbf{8}) = \mathbf{10} + \mathbf{8} = \mathbf{18}$$

In conclusion, the width of the table is $\mathbf{8}\ \boldsymbol{meters}$ while its length is $\mathbf{18}\ \boldsymbol{meters}$.

Problem 6: The product of two consecutive integers is 110. Find the value of the integers.

Solution:

Step 1: Define the integers based on the given problem.

Let $\boldsymbol{x}$ be the first integer

$\boldsymbol{x + 1}$ be the second integer since the two numbers are consecutive

Step 2: Analyze what operation to be used. Product means to multiply.

$(First\ integer)\ times\ (Second\ Integer)\ =\ 110$, or

$$(\ x\ )\quad (\ x+1\ )\ =\ 110$$

Step 3: Simplify the expression and equate it to zero.

$x^2\ +\ x\ -\ 110\ =\ 110\ -\ 110$	Additive Inverse Property
$x^2\ +\ x\ -\ 110\ =\ 0$	Resulting Equation
$(x+11)(x-10)\ =\ 0$	Factoring
$(x\ +\ 11)=0\quad or\quad (x\ -\ 10)\ =\ 0$	Zero Product Property
$x\ +\ 11\ -\ 11\ =\ 0\ -\ 11\ or$ $x\ -\ 10\ +\ 10\ =\ 0\ +10$	Additive Inverse Property
$x\ =\ -11\quad or\quad x\ =\ 10$	Additive Identity Property

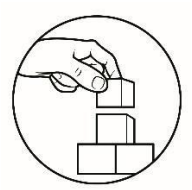
Since there are two values of x, then there could be two pairs of consecutive integers. That is:

If the first integer is $x=-11$, then the second integer $x\ +\ 1=\ -11\ +\ 1\ =\ -10$. The first pair of consecutive integers are $-\mathbf{11}$ and $-\mathbf{10}$.

If the first integer is $x=10$, then the second integer $x\ +\ 1\ =\ 10\ +\ 1\ =\ 11$. The second pair of consecutive integers are **10** and **11**.

Going Back

Now, if you are going back to answer the problem regarding the rectangular-shaped garden, can you now surely cite the dimensions of the garden? Well, if your answers are **6 feet** and **14 feet**, respectively, for the width and the length, then you got it correct!



What's More

Activity 1: I Can Fill It!

Below is a problem where you can solve by simply following the steps that can be found at the right side. Fill in the blank spaces with the needed solution. In each activity, write your answers on a separate sheet of paper.

Problem: The sum of the square of a number and 15 is the same as eight times the number. What are the numbers?

Solution	What To Do
Let $\boldsymbol{x}$ be the number	Use a variable to represent the unknown
$\_\_\_ + \mathbf{15} \quad = \_\_\_$	Translate into mathematical expression
$\boldsymbol{x^2} + \mathbf{15} - \_\_\_\_ = \mathbf{8}\boldsymbol{x} - \_\_\_$	Place polynomial on one side and set equation to zero by Additive Inverse Property
$\boldsymbol{x^2} + \mathbf{15} - \mathbf{8}\boldsymbol{x} \quad = \_\_\_$	Write the resulting equation
$\mathbf{x^2} - \mathbf{8}\boldsymbol{x} + \_\_\_ = \_\_\_$	Arrange the terms in descending order of its exponents
$(\_\_\_)(\_\_\_) \quad = \mathbf{0}$	Factor the polynomial
$(\boldsymbol{x} - \_\_\_) = \mathbf{0} \quad \boldsymbol{or} \quad (\boldsymbol{x} - \_\_\_) = \mathbf{0}$	Apply the Zero Property
$\boldsymbol{x} - \mathbf{5} + \_\_ = \mathbf{0} + \_\_ \quad \boldsymbol{or}$ $\boldsymbol{x} \_\_ + \mathbf{3} = \mathbf{0} + \_\_$	Solve for the unknown by using Additive Inverse Property
$\boldsymbol{x} = \_\_\_\_ \quad \boldsymbol{or} \quad \boldsymbol{x} = \_\_\_\_$	Write the resulting equation.

Final Statement: The numbers are _____.

Activity 2: Get the Order!

To solve the next problem, solutions are already presented but they are in disarray. So, what you are going to do now is to re-arrange the solution by placing each beside the appropriate hints/guides cited in the box below. Write your answers on a separate sheet of paper.

Problem: A rectangle has a base that is ten meters longer than its height. The area of the rectangle is 24 square meters. What are the dimensions of the rectangle?

To represent the unknown, you use the variable $\boldsymbol{h}$.

Hints / Guides	Place Your Order Here
Choose a variable to represent the unknown.	
Translate into mathematical expressions using the formula $\boldsymbol{A = bh}$	
Apply the Distributive Property of Multiplication.	
Place polynomials in one side and set the equation to zero by using Additive Inverse property.	
Factor the polynomial.	
Set to zero each of the factor by Zero Product Property.	
Simplify equations by using Additive Inverse Property.	

$A = base\ times\ height\ or$
$24 = (h + 10)\,(h)$

Let h be the height
$h + 10$ be the base

$24 - 24 = h^2 + 10h - 24$
$0 = h^2 + 10h - 24$

$24 = h^2 + 10h$

$0 = (h + 12)(h - 2)$

$h + 12 = 0\ or\ h - 2 = 0$

$h + 12 - 12 = 0 - 12$ $\quad or \quad$ $h - 2 + 2 = 0 + 2$
$h = -12$ $\quad or \quad$ $h = 2$

Questions:

1. What value of $\boldsymbol{h}$ will you take as the height of the rectangle?
2. Why do you say so?
3. What is the base of the rectangle?
4. How did you get the measurement of the base?

Activity 3: Give it to Me!

For sure by now, you are already familiar of how real-life applications on factoring can be solved. You can take the challenge of finding the right answers to the problems found below. Be reminded to write your answers on a separate sheet of paper.

You can do it!

Problem: Originally a rectangle was twice as long as its width. When 5 meters was subtracted from its length and 3 meters was subtracted from its width, the new rectangle had an area of 55 meters. Find the dimensions of the original rectangle.

To start, assign a variable for the unknown. Say,

Let $\boldsymbol{w}$ be the width of the original rectangle
$\boldsymbol{2w}$ be the length of the original rectangle

Consider the questions that follow. You are given two choices to each of the question. Place a Check mark (√) on the empty box of your choice. Then, you have to support your answer why you have chosen such. Are you ready? Begin!

Questions:

1. What will be the mathematical equation that you will obtain based on the information given?

	$\boldsymbol{(2w - 5)(w - 3) = 55}$
	$\boldsymbol{(2w - 3)(w - 5) = 55}$

Support your choice:

_____

2. What is the resulting equation when the polynomials are multiplied?

	$\boldsymbol{2w^2 - 11w + 15 = 55}$
	$\boldsymbol{2w^2 - 11w - 15 = 55}$

You can show your solution to show your Answer:

3. When the polynomials are placed on one side and the equation is set to zero, what will be the resulting equation?

	$\boldsymbol{2w^2 - 11w + 40 = 0}$
	$\boldsymbol{2w^2 - 11w - 40 = 0}$

Support your choice:

_____

4. What are the factors of the polynomials based on the equation you have in item #3?

	$\boldsymbol{(2w + 5)(w - 8) = 0}$
	$\boldsymbol{(2w - 5)(w + 8) = 0}$

Support your choice:

_____

5. What are the possible values of the unknown?

	$w = 8 \; or \; w = \frac{-5}{2}$
	$w = -8 \; or \; w = \frac{5}{2}$

Support your choice:

_____

6. What are the measures of the length and the width of the original rectangle?

	$\boldsymbol{Width = 8\,meters}$ $\boldsymbol{Length = 16\,meters}$
	$\boldsymbol{Width = 2.5\,meters}$ $\boldsymbol{Length = 5\,meters}$

Support your choice:

_____

That was easy wasn't it? You'll just have to remember that when it comes to solving word problems using factoring, there are a couple things to remember before you begin.

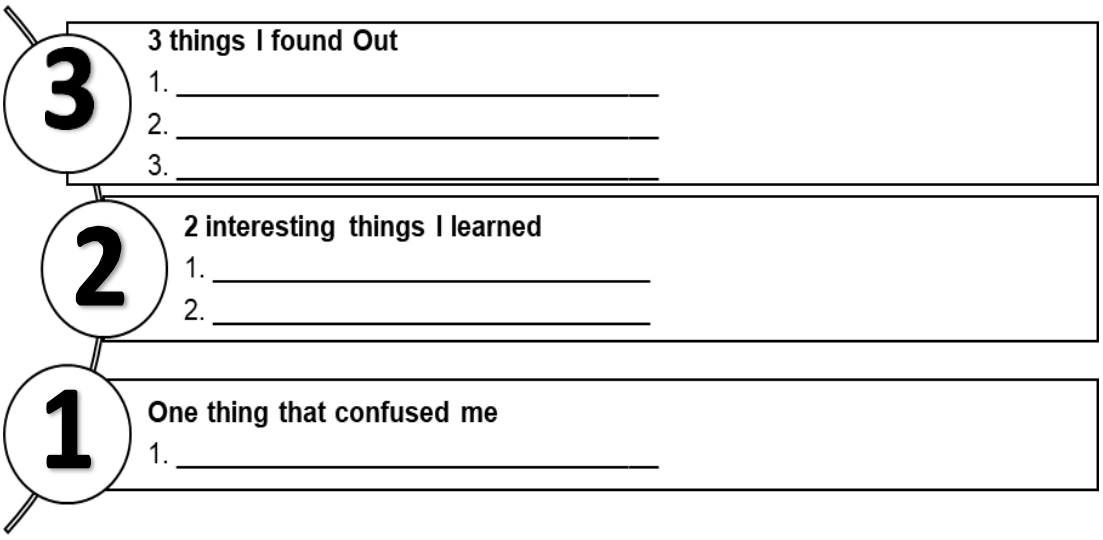
In many cases, word problems are based on "real life" situations so you need to make sure that your answers make sense in the context of the problem. You need to make sure that the answers make sense.

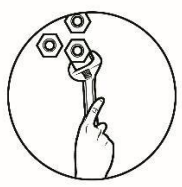
Congratulations for having reached this far!

What I Have Learned

Activity: ***My Learning in 3… 2…1!***

Complete the 3-2-1 Chart about your discoveries in solving word problems involving factoring of polynomials. Write your answers on a separate sheet of paper.





What I Can Do

With the many examples you've encountered in this module that depict real-life applications of factoring, let's turn the table around this time.

Activity: *Let's Get Real!*

Do the following. Use a separate sheet of paper for your output.

1. Formulate two real-life problems involving factors of polynomials. Choose two (2) of the following situations:

   - ✓ Area Problem
   - ✓ Perimeter Problem
   - ✓ Consecutive Integers Problem
   - ✓ Number Problem

2. Solve the problems you formulated accurately using a variety of strategies. Show complete solution.

Be guided with the following rubric:

Points	Indicators
5	The problem is clear, detailed & organized; No grammatical issues; Choose an efficient strategy that made sense; All of the steps in the solution are correct.
4	The problem is clear and detailed; A few grammatical issues; Choose a strategy that made sense; A few of the steps in the solution are correct.
3	The problem is not clear, not detailed and not organized; Lots of grammatical issues; The strategy doesn't make sense; All of the solutions are incorrect.

My Design Box

Assessment

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

1. The square of a number equals five times that number. Find the number.
   A. 0 or 1
   B. 0 or 3
   C. 0 or 5
   D. 0 or 7
2. Find the number if one hundred less than the square of a number equals zero.
   A. -10 or 10
   B. -20 or 20
   C. -30 or 30
   D. -40 or 40
3. Which expression represents the length of the side of the square with an area of $4b^2 + 16b + 16$ square units?
   A. $(2b + 4)$ units
   B. $(4b + 2)$ units
   C. $(8b + 4)$ units
   D. $(4b + 8)$ units
4. The difference of the square of a number and 36 is the same as -5 times the number. Find the numbers that satisfy the given condition.
   A. $4\ and\ -9$
   B. $6\ and\ -3$
   C. $8\ and\ 7$
   D. $12\ and\ -3$
5. Six times the square of a number equals eighteen times that number. What is the number?
   A. 0 or -3
   B. 0 0r -6
   C. 0 or 3
   D. 0 or 6
6. The square of a number decreased by 625 is zero. What is the number?
   A. 15
   B. 35
   C.45
   D.25
7. If the area of the square is $4x^2 - 8x + 4$, what is the length of the side?
   A. $-2x + 2$
   B. $-x + 2$
   C. $2x - 2$
   D. $x + 2$
8. The product of two consecutive integers is 306. Find the integers.
   A. -4 and –5 or 4 and 5
   B. -9 and -10 or 9 and 10
   C. -12 and -13 or 12 and 13
   D. -17 and -18 or 17 and 18

9. The area of a square is numerically equal to five times its perimeter. Find the length of a side of the square.
   A. 4
   B. 10
   C. 20
   D. 40

10. The area of a square lot is 256 square meters, find the length of one side.
   A. 14 meters
   B. 16 meters
   C. 24 meters
   D. 26 meters

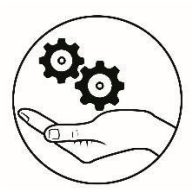
11. What is the measure of one side of the square if its area is $x^2 - 22x + 121$?
   A. $11\ units$
   B. $22\ units$
   C. $30\ units$
   D. $50\ units$

12. The area of a rug is 108 square centimeters. The length of the rug is 6 cm less than twice its width. What is the width of the rug?
   A. 6 cm
   B. 9 cm
   C. 12 cm
   D. 15 cm

13. Suppose that two times the cube of a number equals 8 times the number. Find the number.
   A. -1 or 0 or 1
   B. -2 or 0 or 2
   C. -3 or 0 or 3
   D. -4 or 0 or 4

14. A rectangular pond has a length of 4 m more than twice its width. Solve for the length and the width if the area of the said pond is $96m^2$?
   A. $l = 2\,m, w = 4m$
   B. $l = 24\,m, 2 = 2\,m$
   C. $l = 16\,m, w = 3\,m$
   D. $l = 16\,m, w = 6\,m$

15. The area of the floor of a rectangular room is 84 square feet. The length of the room is 5 feet more than its width. Find the width and length of the room.
   A. 7 feet and 11 feet
   B. 7 feet and 12 feet
   C. 8 feet and 11 feet
   D. 8 feet and 12 feet



Additional Activities

If you want to practice more with the real-life applications of Factoring, here's some situations for you to work on.

Real Quick!

1. Four times the square of a number is 45 more than eight times the number. What is the number?

2. The base of a triangle is 4 meters longer than the height. Find the height if the area of the triangle is 16 square meters.?

Finally, you've answered all of the problems. Congratulations for doing so!

Hope you enjoy spending the time answering the problems in this module. Remember, "*A problem is a chance for you to do your best*. – Duke Ellington"

There's more fun in Math! Until next time…

Answer Key

What I Know 1. D 9. B 2. B 10. D 3. B 11. C 4. D 12. D 5. B 13. A 6. D 14. D 7. B 15. B 8. D	***What's In*** ***Smart Connect*** 1.$18ab^2$-12ab= 6ab(3b – 2) 2.$49a^2$ -$25b^2$ = (7a – 5b)(7a + 5b) 3.a^2 – 18ab+$81b^2$ =(a-9b)(a-9b) 4.$27a^3$+$64b^3$ = (3a+4b) ($9a^2$-12ab+$16b^2$) 5. a^2 – 4ab – $45b^2$ = (a-9b)(a+5b)	***What's New*** ***Choose What You Sow!*** E, C, A, D, F, B
What's More ***Activity 1: I Can Fill It!*** Let x be the number X^2 + 15 =8x X^2 + 15- 8x = 8x – 8x X^2 + 15-8x = 0 X^2 – 8x + 15 = 0 (x-3)(x-5)=0 X – 5 = 0 or x – 3 = 0 x-5+5 = 0+5 or x-3+3 = 0+3 x = 5 or x = 3	***What's More*** ***Activity 2: Get the Order*** 1. Let h be the height h + 10 be the base 2. A = base times height or 24 = (h + 10) (h) 3. 24 = h^2 + 10h 4. 24-24 = h^2 + 10h – 24 0 = h^2 + 10h – 24 5. 0 = (h+12)(h-2) 6. h + 12 = 0 or h – 2 = 0 7. h + 12 – 12 = 0 -12 or h – 2 + 2 = 0 + 2 h = -12 or h=2 Height = 2 meters Base = h + 10 = 12 meters	***What's More*** ***Activity 3: Give It to Me*** 1.(2w-5)(w-3) 2.$2w^2$ – 11w+15=55 3.$2w^2$ – 11w-40=0 4.(2w+5)(w-8)=0 5.w=8 or w=5/2 6.width is 8 meters Length is 16 meters
What I Have Learned Answers may Vary	**What I Can Do** Answers may Vary	
Post Assessment 1. C 2. A 3. A 4. A 5. C 6. D 7. C 8. D 9. C 10. B 11. A 12. B 13. B 14. D 15. B	**Additional Activities** ***Real Quick*** 1.The number is either -5/2 or 9/2 2. The height of the triangle is 4 meters.	

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