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DEPARTMENT OF EDUCATION

Mathematics

Quarter 1 - Module 2

Factoring Polynomials

ALTERNATIVE DELIVERY MODE
ADM

Mathematics – Grade 8
Alternative Delivery Mode
Quarter 1- Module 2: FACTORING
First Edition

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Mathematics

Quarter 1 - Module 2
Factoring

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What This Module is About

This module is the continuation of the factoring techniques you had learned from the previous module. In module 1, you encountered factoring by a common monomial factor, difference of two squares and sum or difference of two cubes.

In this module, you will learn how to factor perfect square trinomials and general trinomials and how factoring allows you to solve real-life problems.

What I Need to Know

At the end of this module, you should be able to:

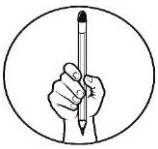
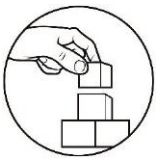
1. Factor completely different types of polynomials:
   (a.) perfect square trinomial;
   (b.) general trinomial; and
   (**M8AL- Ia-b-1);**
2. Solves problems involving factors of polynomials (**M8AL- Ia-b-2).**

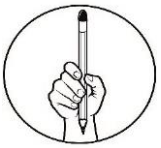
How to Learn from this Module

To achieve the objectives cited above, you are to do the following:

1. Carefully read all the lessons.
2. Take your time on going through each lesson.
3. Answer the pretest honestly; the purpose of the pretest is for you to determine your prior knowledge before going through the lessons and activities.
4. If you have a hard time understanding the lessons and activities, please do take a break. Having breaks between lessons and activities will give you some space where you can absorb the lesson well.
5. You can use the internet if you need more information about the lesson.

Icons of this Module

	What I Need to Know	This part contains learning objectives that are set for you to learn as you go along the module.
	What I know	This is an assessment as to your level of knowledge to the subject matter at hand, meant specifically to gauge prior related knowledge
	What's In	This part connects previous lesson with that of the current one.
	What's New	An introduction of the new lesson through various activities, before it will be presented to you
	What is It	These are discussions of the activities as a way to deepen your discovery and understanding of the concept.
	What's More	These are follow-up activities that are intended for you to practice further in order to master the competencies.
	What I Have Learned	Activities designed to process what you have learned from the lesson
	What I can do	These are tasks that are designed to showcase your skills and knowledge gained, and applied into real-life concerns and situations.



What I Know

Pre - Test

I. Multiple Choice:

Directions: Read and answer the questions below. Select the letter of the correct answer from the given choices. (2 points each)

1. Which of the following statement is correct?
   A. $6m^2 + 5mn + n^2 = (2m – n)(3m – n)$
   B. $16m^2 – 40m – 25 = (4m – 5)(4m – 5)$
   C. $6m^2 – 13m – 28 = (3m – 4)(2m + 7)$
   D. $4m^2 + 20m + 25 = (2m + 5)^2$

2. Which of the following are the factors of $p^2 + 5p + 4$?
   A. $(p + 1)(p + 4)$
   B. $(p + 2)(p + 2)$
   C. $(p + 5)(p – 1)$
   D. $(p + 2)^2$

3. One of the factors of $2d^2 + 5d – 12$ is $d + 4$. Which of the following is the other factor?
   A. $2d – 3$
   B. $2d + 3$
   C. $2d – 8$
   D. $2d + 8$

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

5. Your classmate Pedro asked to square $(4y – 6)$, he answered $16y^2 – 36$. Is his answer correct? Why?
   A. Yes, because squaring a binomial always produces a binomial product.
   B. Yes, because the product rule is correctly applied
   C. No, because squaring a binomial always produces a trinomial product.
   D. No, because the answer must be $16y^2 + 36$

II. Fill Me In.

Direction: Fill in the blanks the correct answer. (1 point each)

1. I am the square of (x + 1). _____
2. I am the root of $16y^2$. _____
3. I am the product of 7 and -3m. _____
4. I am the sum of (-15) and (-8). _____
5. I am the product of (r – 1) and (r + 2) _____

Lesson **1**

Factoring: Perfect Square Trinomials

What's In

You have learned in the previous lesson factoring sum or difference of two cubes. Note that learning the cube roots of the previous lesson played an important aspect of determining the factors of the expression. Likewise, in our new topic, you need again to master the roots of the expressions. Only that its square roots like the second topic of this module which was factoring difference of two squares. For this lesson, we will factor perfect square trinomials.

What's New

Directions: Recall your table of squares and roots.

Square Roots	Squares		Square Roots	Squares		Square Roots	Squares		Square Roots	Squares
1	1		***6***	36		***11***	121		***16***	256
2	4		***7***	49		***12***	144		***17***	289
3	9		***8***	64		***13***	169		***18***	324
4	16		***9***	81		***14***	196		***19***	361
5	25		***10***	100		***15***	225		***20***	400

Square Roots	**Squares**		**Square Roots**	**Squares**
N	n^2		n^6	n^{12}
n^2	n^4		n^7	n^{14}
n^3	n^6		n^8	n^{16}
n^4	n^8		n^9	n^{18}
n^5	n^{10}		n^{10}	n^{20}

To square the exponent of the variable, just multiply the exponent by 2. On the other hand, to find the root of the exponent of the variable, just divide the exponent by 2.

What Is It

A **perfect square trinomial** is a polynomial with three terms that has squared first and last terms. Its middle term is twice the product of the square root of the first and last terms.

Formula:

$a^2 + 2ab + b^2 =$ $(a+b)(a+b)$ or $(a+b)^2$

$a^2 - 2ab + b^2 =$ $(a-b)(a-b)$ or $(a-b)^2$

Factor $16x^2 + 16x + 4$

Here are the steps in factoring perfect square trinomials.

Steps	Solution
a. Given Problem	• $16x^2 + 16x + 4$
b. First term Last term	• $16x^2$ • 4
c. Rewrite the 1st and last terms in squared form.	• $16x^2 = (4x)^2$; $4 = 2^2$
d. Get the square roots of the 1st and last terms	• The square root of $(4x)^2$ is 4x while $\sqrt{2^2}$ is 2 Note: $\sqrt{2^2}$ is read as the square root of 2^2
e. Solve the middle term by finding the product of twice the root of 1st term and the last term	• 2(4x)(2) = 16x (the same in the second term of the given trinomial)
f. List down the square roots - Copy the symbol of the 2nd term of the trinomial to separate the terms of your factors.	• (4x+2) (4x+2) factoring by quadratic trinomials • $(4x+2)^2$ factoring by perfect square trinomial

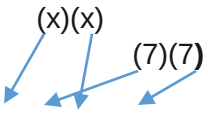
Let's Practice:

1. Factor $x^2+14x+49$

   Both of the 1st and last terms are perfect squares and 2(x)(7)=14x, then the given expression is a perfect square trinomial. Using the common monomial factor is not necessary.

	Squares	Roots
1st term	x^2=x^2	(x)(x)
3rd term	49= 7^2	(7)(7)

Middle term: 2(x)(7) = 14x



The polynomial is factored as ***(x+7)(x+7) or (x+7)²***

2. $16x^2-8xy+y^2$

	Squares	Roots
1st term	$16x^2$ = (4x)^2	(4x)(4x)
3rd term	y^2 = y^2	(y)(y)

Middle term: 2(4x)(y) = 8xy

The factored form of the expression is ***(4x-y)².***

3. $100a^2+40ab+4b^2$

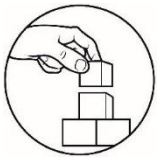
= $\sqrt{(10a)^2}$; $\sqrt{(2b)^2}$	Writing the $\sqrt{}$ of the 1st & last terms ($\sqrt{}$ square root symbol)
= $(10a+2b)(10a+2b)$	Factoring by quadratic trinomial
= $(10a+2b)^2$	Factoring by perfect square trinomial

Take note of the factors. Notice that twice of the product of the 1st & 3rd terms is equal to the 2nd term of the perfect square trinomial.

Factor:	*(10a + 2b) ,*
(10a) (2b)	*= 20ab*
20ab multiply by 2	*= 40ab*

4. $a^2-24ab+144b^2$

= $\sqrt{(a)^2}$; $\sqrt{(12b)^2}$	Writing the $\sqrt{}$ of the 1st & last terms respectively
2(a)(12b) = 24ab	middle term
= (a – 12b)	Combining the square roots with the middle term symbol.
= (a – 12b)(a – 12b)	Factoring by quadratic trinomial
= (a – 12b)^2	Factoring by perfect square trinomial



What's More

Activity 1: Perfect Hunt

Directions: Look for the different perfect square trinomials found in the box. Answers might be written diagonally, horizontally, or vertically. The highlighted one is done for you.

$25x^2$	$10x$	81	$18x$	x^2	4
$15x$	$16x^2$	$-24x$	9	$10x$	$28x$
$4x^2$	$-16x$	16	$15x$	25	$49x^2$
$16x^2$	49	$8x$	16	$24x^2$	9
25	$14x$	$8x$	$40x$	$30x$	$10x$
$7x$	x^2	$12x$	$25x^2$	40	$12x^2$

What I have Learned

Activity 2: Generalization

Directions: Answer the following questions.

1. Describe the steps in factoring a perfect square trinomial.
2. How will you know that the expression is a perfect square trinomial?
3. What will you do if the expression is not a perfect square trinomial?
4. State the relationships of the 2nd term of the expression to the 1st and last term
5. Define perfect square trinomial.

What I can Do

Activity 3:Fill Me With Faith

Directions: Supply the missing term to make the statement true.

1. $f^2 + 14f + 49$ = $(f + \_\_\_)^2$
2. $a^2 - 8a + 16$ = $(a - \_\_\_)^2$
3. $i^4 - 6i + 9$ = $(i^2 - \_\_\_)^2$
4. $t^2 + 10t + 25$ = $(t \_\_\_ 5)^2$
5. $h^2 - 12h + 36$ = $(h - \_\_)^2$

Lesson **2**

Factoring: General Trinomials

What's In

You have learned how to factor perfect square trinomials in the previous lesson. You have determined factors for perfect square trinomials and known that not all trinomials are perfect square. In this lesson, you will factor trinomials that are not perfect squares. These polynomials are called general trinomials.

What's New

A trinomial which is not a perfect square trinomial may be a quadratic trinomial in the form of ax^2+bx+c, where a, b, and c are constants and a≠0.

There are two types of quadratic trinomial in the form ax^2+bx+c.

1. ax^2+bx+c , a=1
2. ax^2+bx+c , a≠1

(Partible, et al., 2013)

Before we proceed to our examples let us first recall the rules of integers, for you to easily find the factors of our trinomials.

Rules for Integers	
ADDITION	***SUBTRACTION***
(+) and (+) = (+) **(-) and (-) = (-)** **(+) and (-)** *subtract, then copy the sign of the bigger number* **(-) and (+)**	**Change the sign of the subtrahend then proceed to addition rules.** **Ex: 5 - (-4)** **Subtrahend is -4 , change it to +4**
MULTIPLICATION and DIVISION	
(+) and (+) = (+) (-) and (-) = (+)	(+) and (-) = (-) (-) and (+) = (-)

What Is It

Factoring trinomials $ax^2 + bx + c$, where a= 1

We will study first how trinomials whose leading coefficient is 1 are being factored.

1. **Factor** $d^2 + 5d + 6$

Solution: **a.** List all the possible factors of 6

Factors of 6	
6	**1**
3	**2**
-6	**-1**
-3	**-2**

b. From your list of possible factors, find a pair whose sum is **5** *(which is the middle term).*

- 6 + 1 = 7
- **3 + 2 = 5**
- -6 + (-1) = -7
- -3 + (-2) = -5

3 and 2 *is the pair that we wanted to find whose sum is* ***5.*** *Therefore, the factors of* $d^2 + 5d + 6$ **=** $(d + 3)(d + 2)$

2. Factor $k^2 + 3k - 28$

a. List all the possible factors of **-28** *(Note: the sign of the number is negative (-), then use a (+) and (-) pair of numbers.)*

Factors of -28	
7	**-4**
-7	**4**
14	**-2**
-14	**2**
28	**-1**
-28	**1**

b. Find a pair whose sum is **3***(the middle term of the trinomial). (check the rules of integers table)*

- ***7 + (-4)*** **= 3**
- *-7 + 4* *=(-3)*
- 14 + (-2) = 12
- -14 + 2 =-12
- *28 + (-1)* *= 27*
- *-28 + 1* *= -27*

7 and -4 *is the pair that we wanted to find whose sum is* ***3.*** *Thus, the factor of* $k^2 + 3k - 28$ **=** $(k + 7)(k - 4)$

Factoring trinomials $ax^2 + bx + c$**, where a≠ 1**

There are many ways of factoring these types of polynomials of this form, one of which is by inspection. Trial and error method is utilized in factoring this type of trinomials.

1. **Factor** $2q^3 - 6q^2 - 36q$

Noticeable that there is a common monomial factor. Begin by factoring out $2q$ first. Rewriting it, you have $2q(q^2 - 3q - 18)$.

Now we can follow the steps we did earlier, when a=1.

a. Listing all the factors of the 3rd term (-18) and finding a pair whose sum is equal to the 2nd term which is (-3).

Factors of -18	
18	**-1**
-18	**1**
9	**-2**
-9	**2**
6	**-3**
-6	**3**

b. Since -6 and 3 are the factors of -18 whose sum is -3, then the binomial factors of $(q^2 - 3q - 18)$ are $(q-6)(q+3)$.

c. Therefore, the factors of $2q^3 - 6q^2 - 36q$ are $2q(q-6)(q+3)$.

2. **Factor** $2x^2 + 3x - 5$

The factors of $2x^2$ are $2x$ and x; and of the third term -5 are $(5)and(-1)$, $(-5)and(1)$. Pair all possible binomial factors.

a. $(2x+5)(x-1)$
b $(2x-5)(x+1)$
c. $(2x+1)(x-5)$
d. $(2x-1)(x+5)$

To know which from the four pairs above are the factors of the given trinomial, we must get the product of the pair of binomials that is equal to the given expression.

Let's Check:

*Use the **FOIL Method** you had learned from your grade 7 Mathematics.*

FOIL (First, Outside, Inside, Last)

$(2x+5)(x-1)$

First Terms	$(2x)(x) =$	$2x^2$
Outside Terms	$(2x)(-1) =$	$-2x$
Inside Terms	$(5)(x) =$	$5x$
Last Terms	$(5)(-1) =$	-5

Arrange the products in the form of $ax^2 + bx + c$.

$2x^2 - 2x + 5x - 5$

(combine like terms, -2x + 5x)

Thus, the product of (2x + 5)(x – 1) is, $2x^2 + 3x - 5$, then such pair of binomials are the factors of the given expression.

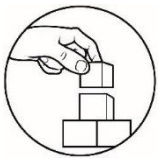
Remember:

To factor trinomials with 1 as the numerical coefficient of the leading term:

a. Factor the leading term of the trinomial and write these factors as the leading terms of the factors;
b. List down all the factors of the last term;
c. Identify which factor pair sums up to the middle term; then
d. Write each factor in the pairs as the last term of the binomial factors.

Note: always perform factoring using common monomial factor first before applying any type of factoring.

(Grade 8 Mathematics, Learner's Module)



What's More

Activity 1: Factor Bingo Game

Description:

Bingo game is an activity to practice your factoring skills with speed and accuracy.

Instruction:

On a clean sheet of paper, draw a 3 by 3 square grid and mark the center as **FACTOR,** as shown below**.** There will be mathematical expressions for you to find the factors. Chose the correct factors from the table below and write your answers on the grid under the expressions. Write BINGO to all sides of your 3x3 grid after you correctly answer all the given trinomials.

$a^2 - a - 72$	$a^2 + 15a + 50$	$a^2 - a - 42$
$a^2 + 10a + 24$	**FACTOR**	$a^2 - a - 20$
$a^2 + 5a + 6$	$a^2 + 11a + 18$	$a^2 - 8a - 48$

Choose your factors from this table:

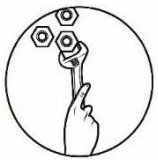
$(a+6)(a-8)$	$(a-7)(a+6)$	$(a+10)(a+5)$
$(a+4)(a-5)$	$(a+9)(a+2)$	$(a-8)(a+4)$
$(a+6)(a+4)$	$(a+3)(a+2)$	$(a+12)(a-4)$
$(a-9)(a+8)$	$(n-2)(n+16)$	$(a+3)(a+8)$

What I Have Learned

Activity 2: Generalization

Directions: Answer the following questions in your own words. Write your answer on the space provided.

1. How did you factor the trinomials?
2. Why is it important to identify the leading coefficient of the expressions?
3. Differentiate the steps in factoring $ax^2 + bx + c$, where a=0 and a≠0.
4. State the process in factoring general trinomials in your own words.
5. Did understanding the rules of integers help you? ___ How?



What I Can Do

Activity 3: I Can Factor Too!

Direction: Factor completely the following trinomials.

1. $x^2 - 5x - 24$
2. $x^2 + 8x - 65$
3. $x^2 + 9x + 20$

Lesson 3 Factoring: Problems Involving Factors of Polynomials

What's In

There were five factoring techniques you learned from the previous lessons. Namely, Common Monomial Factor, Difference of Two Squares, Sum or Difference of Cubes, Perfect Square Trinomials and lastly the General Trinomials. Learning these techniques of factoring will help us solve problems involving factors of polynomials.

What's New

Activity1: Review of Factoring Techniques

Description: In this part, you will be able to recall all the factoring techniques discussed for you to easily find the solution to the problems.

Direction: Identify which factoring technique is illustrated. Write your answer on the space provided.

1. $9x^2 - 1$ = (3x + 1)(3x – 1) _____
2. $6ab + 8bc$ = 2b(3a + 4c) _____
3. $25x^2 - 30x + 9$ = $(5x - 3)^2$ _____
4. $x^2 + 4x - 45$ = (x – 5)(x + 9) _____
5. $8b^3 + c^6$ = $(2b + c^2)(4b^2 - 2bc^2 + c^4)$ _____

What Is It

Description: This activity will enable you to apply factoring to find the number needed.
Direction: Solve for the number.

Problem: The product of one more than a number and 4 less than the number is 36. Find the number.

Hint: *In solving problems, you need to translate first the words used to their mathematical values.*

Solution:

➢ Product,	(_)	4	,	4
➢ One ,	1	less than	,	-
➢ More than,	+	number	,	x
➢ Number ,	x	is	,	=

a. To translate the problem:

The product of one more than a number and 4 less than the number is 36.

(x+1) (x-4) =36

$(x+1)(x-4)=36$

We need to change this form into the quadratic trinomial form we learned from the previous topic which is .

b. $(x+1)(x-4)=36$ Use the FOIL method to make this into a standard form.

$x^2-3x-4=36$ Eliminate 36 from the other side. Subtract 36 to both sides.

$$\begin{array}{rcr} x^2-3x-4 & = & 36 \\ \underline{-36} & = & \underline{-36} \\ x^2-3x-40 & & 0 \end{array}$$

$x^2 - 3x - 40 = 0$

c. Factor $x^2 - 3x - 40$

What Factoring Technique can we use here?
Is it factoring general trinomials? Then you are right!

Factors of -40	
-40	1
40	-1
-20	2
20	-2
-10	4
10	-4
-8	5
8	-5

Thus, the factor of $x^2 - 3x - 40$ is *(x-8)(x+5).* So (x – 8)(x + 5) = 0

But do not stop here because we still need to find the number. To do that, we are going to get the value of x.

x – 8 = 0 to get the value of x ;
x – 8 + 8 = 0 + 8
x = 8

x+5 = 0 to get the value of x
x+5 – 5 = 0 – 5
x = -5

Therefore, the numbers that we found is x= 8 or -5.
Checking:

x = -5

$x^2 - 3x - 4 = 36$
$(-5)^2 - 3(-5) - 4 = 36$
$25 + 15 - 4 = 36$

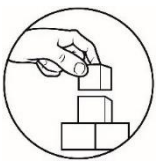
✓ $36 = 36$

x = 8

$x^2 - 3x - 4 = 36$
$(8)^2 - 3(8) - 4 = 36$
$64 - 24 - 4 = 36$

✓ $36 = 36$

x = - 5 or 8 are both correct numbers.



What's More

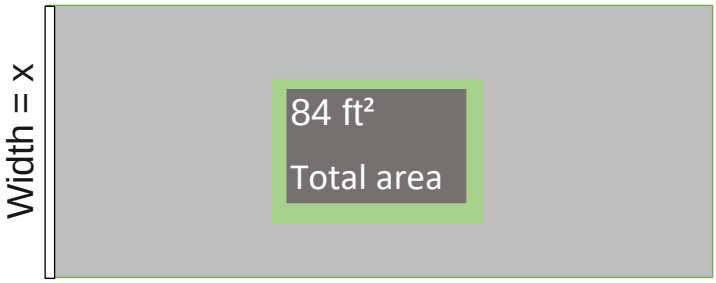
Activity1 :Let's Do Gardening!

Description: In this part, you will learn how to find the dimensions of your vegetable garden. Find out if your backyard has enough space to put this garden.

Directions: Find the dimensions of your garden.

Problem: *A vegetable garden in rectangular shape has a total area of 84 square feet. The gardener wants to make the length 8 feet longer than the width. Find the dimensions of this garden, its width and its length.*

Let's make an illustration of your garden.



Length = x + 8

Remember that		Area= (Length)(Width)	
		84 = (x+8) (x)	Multiply x to (x+8)
		84 = x^2+8x	Set the equation equal to 0
	-84 + 84	= $x^2+8x-84$	Subtract 84 to both sides
		0 = $x^2+8x-84$	equation 1

Now we can do our factoring:

$x^2+8x-84$

Factors of -84	
-84	1
84	-1
-42	2
42	-2
-21	4
21	-4
-14	6
14	-6
-7	12
7	-12

Is the pair whose sum is equal to the middle term which is 8.

Thus, the factor of ***$x^2+8x-84$*** is ***(x+14)(x-6)***. From equation 1,
(x + 14)(x – 6) = 0

x+14=0	***x-6=0***
x= -14	***x=6***

However, we are dealing with distance which is the length and width of the vegetable garden, the negative solution -14 is not valid. So the value of our x=6.

width = x	***length= x+8***	***Area = (length)(width)***
x=6,	***6+8***	***= (14) (6)***
Width=6	***length = 14***	***Area = 84 ft²***

Therefore, the dimensions are 6 ft. for the width and 14 ft. for the length.

What I Have Learned

Activity 2: Generalization

Direction: Answer the following question and write your answer on the space provided.

1. Which factoring technique mostly utilized in solving problems involving factors of polynomials?

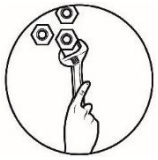
   _____
   _____
   _____

2. Why is it important to learn factoring techniques in solving those problems?

   _____
   _____
   _____

3. Express your idea in this lesson.

   _____
   _____
   _____



What I Can Do

Activity 3. Word Problem is not a Problem!

Direction: Solve for the value of x and y.

Problem:

1. The product of the two consecutive positive integers is 132. Find the two integers.
2. The width of the rectangle is 1 less than the length. Its area is 72 square inches. Find length and width of the rectangle

Summary

You have completed this module; let's summarize what you had just learned. This module taught you to factor different products through the use of different patterns and rules. Factoring techniques that you had learned are:

1. Factoring Perfect Square Trinomials; and
2. Factoring General Trinomials.

You have also learned that real-life problems can be solved using factors of polynomials.

Assessment:

Post-Test

I. Multiple Choice:

Directions: Read and answer the questions below. Select the letter of the correct answer from the given choices. (2 points each)

1. Which of the following values of *k* will make $y^2 - 5y + k$ factorable?
   A. -14 C. 5
   B. -10 D. 12

2. Which of the following statement is correct?
   A. $6w^2 - 13w - 28 = (3w - 4)(2w + 7)$
   B. $4w^2 + 20w + 25 = (2w + 5)^2$
   C. $6w^2 + 5wx + x^2 = (2w - x)(3w - n)$
   D. $16w^2 - 40w + 25 = (4w - 5)(4w - 5)$

3. One of the factors of $2c^2 + 5c - 12$ is $2c - 3$. Which of the following is the other factor?
   A. c – 4 C. c – 8
   B. c + 4 D. c + 8

4. The area of a rectangular vegetable garden is $(12u^2 - 8u - 15)m^2$. Which of the following are the expressions to determine the dimensions?
   A. L = (3u – 5)m ; W = (4u + 3)m
   B. L = (6u + 5)m ; W = (2u – 3)m
   C. L = (6u – 3)m ; W = (2u – 5)m
   D. L = (12u – 15)m ; W = (u + 1)m

5. If the area of a square flower garden is $(4x^2 - 12x + 9)$ square units, is it possible to solve its sides? Why?
   A. Yes, using factoring difference of two squares.
   B. No, one of the sides must be given.
   C. Yes, the area is a perfect square trinomial.
   D. No, the area is not factorable

II. Fill Me In.

Direction: Fill in the blanks the correct answer. (1 point each)

1. I am the square of (y – 1) _____
2. I am the factors of $x^2 – 6x + 9$ _____
3. I am the factors of $2p^2 + 11p + 14$ _____
4. I am the sum of (-4abc) and 10abc _____
5. I am the product of (a – 4) and (2a + 3) _____

Key to Answers

Pre-Test

I. Multiple Choices

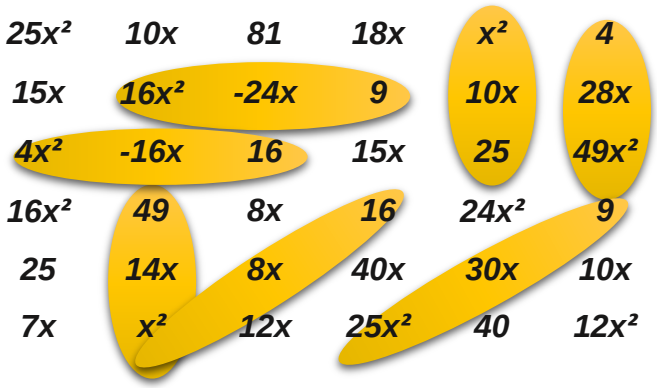
1. D
2. A
3. A
4. B
5. C

II. Fill – in

1. $x^2 + 2x + 1$
2. 4y
3. -21m
4. -23
5. $r^2 + r - 12$

Lesson 1. Factoring Perfect Square Trinomial

Activity **1:**



Activity 2: Generalization

- Answers may vary

Activity 3: Fill Me With Faith

1. 7
2. 4
3. 3
4. +
5. 6

.

Lesson2: Factoring General Trinomial

Activity 1: Factor Bingo Game

$a^2 - a - 72$ $(a-9)(a+8)$	$a^2 + 15a + 50$ $(a+10)(a+5)$	$a^2 - a - 42$ $(a-7)(a+6)$
$a^2 + 10a + 24$ $(a+6)(a+4)$	**FACTOR**	$a^2 - a - 20$ $(a+4)(a-5)$
$a^2 + 5a + 6$ $(a+3)(a+2)$	$a^2 + 11a + 18$ $(a+9)(a+2)$	$a^2 - 8a - 48$ $(a+6)(a-8)$

References

Mathematics Learner’s Module, Grade 8

Fe G. Partible , Beda H. Esller , Milna K. Cabrera, Roland S. Zorilla, Violeta C. Mendoza, 2013 Edition , College Algebra

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