

8

Lesson Exemplar for Mathematics

Quarter 1

Lesson

4

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Lesson Exemplar for Mathematics Grade 8

Quarter 1: Lesson 4 (Week 4)

SY 2025-2026

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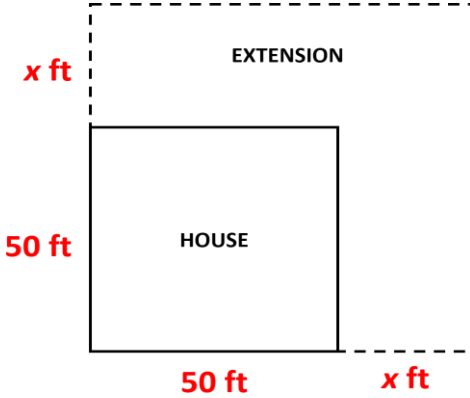
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MATHEMATICS / QUARTER 1 / GRADE 8

I. CURRICULUM CONTENT, STANDARDS, AND LESSON COMPETENCIES	
A. Content Standards	The learners should have knowledge and understanding of special products for binomials, and factorization of polynomials.
B. Performance Standards	By the end of the quarter, the learners are able to obtain special binomial products.
C. Learning Competencies and Objectives	Learning Competency 1. The learners are able to use special product patterns to multiply binomials. Learning Objectives By the end of the lesson, the learners are expected to: 1. solve for the square of binomial; 2. solve for the product of sum and difference of two terms; 3. solve for the cube of binomial; and 4. solve for the square of a trinomial.
D. Content	Special Products 1. Square of Binomial 2. Product of Sum and Difference of Two Terms 3. Cube of Binomial 4. Square of Trinomial
E. Integration	

II. LEARNING RESOURCES
Marecek, L., Anthony-Smith, M., Mathis, A. H., (2020, April 22). 6.4 Special Products - Elementary Algebra 2E OpenStax. https://openstax.org/books/elementary-algebra-2e/pages/6-4-special-products “Ex.1: Multiplying binomial to get difference of squares”. Khan Academy. https://www.khanacademy.org/math/algebra/x2f8bb11595b61c86:quadratics-multiplying-factoring/x2f8bb11595b61c86:special-product-binomials/v/special-polynomials-products-1 “Ex.2: Finding the square of binomial with one variable”. Khan Academy. https://www.khanacademy.org/math/algebra/x2f8bb11595b61c86:quadratics-multiplying-factoring/x2f8bb11595b61c86:special-product-binomials/v/square-a-binomial

III. TEACHING AND LEARNING PROCEDURE		NOTES TO TEACHERS
A. Activating Prior Knowledge	DAY 1 1. Short Review Activity 1: Do You Remember? Instruction: Let the learners multiply/divide the given polynomials. a. $(x + 3)(x - 4)$ b. $(x + 3)(x^2 - 2x + 3)$ c. $\frac{12x^4 - 16x^3 + 8x^2}{4x^2}$ 2. Feedback (Optional)	This activity is intended to recall the concept of multiplication and division of monomials and multinomials. Allot enough time for the learners to solve each problem on their own. After that, you may call learners to show and explain their work on the board.
B. Establishing Lesson Purpose	1. Lesson Purpose Activity 2: Find the Area! Instruction: Let the learners read and analyze the situation and answer the questions that follow. A contractor wants to extend a house on two sides. The figure below shows the layout of the plan. Guide Questions: 1. What is the original area of the house? 2. Represent the area of the house after it is extended and solve for the product. 3. If $x = 10$, what is the area of the extension of the house? 2. Unlocking Content Vocabulary Special Products is a Mathematical term in which factors are combined to form products. It is called "special" because they do not need long solutions. 	Activity 2 is intended to give the learner an idea regarding one of the special products which is the square of binomial. You may also add other questions if necessary. Answer Key: 1. 2500 sq. ft 2. $(x + 50)^2 = (x^2 + 100x + 2500)$ sq. ft 3. 3600 sq. ft
C. Developing and Deepening Understanding	SUB-TOPIC 1: Square of Binomial 1. Explication For the square of binomial, we have the following equation: $(a \pm b)^2 = a^2 \pm 2ab + b^2$ where a is the first term and b is the second term of the binomial. The result of squaring a binomial is called a perfect square trinomial.	You may allot 1 day for each subtopic of this lesson.

2. Worked Example

Example 1: From Activity 2, after extending the house by x ft, the area is represented as the square of $(50 + x)$ or $(50 + x)^2$ and we can solve this by using the patter for the square of a binomial.

Solution: Since the first term is 50 and the second term is x .

Square the first term $(50)^2 = 2500$

Multiply the product of the first and second term by 2 $2(50)(x) = 100x$

Square the second term $(x)^2 = x^2$

Hence, the answer is $2500 + 100x + x^2$ or $x^2 + 100x + 2500$ sq. ft.

Example 2: $(x - 8)^2$

Solution: Since the first term is x and the second term is -8 .

Square the first term $(x)^2 = x^2$

Multiply the product of the first and second term by 2 $2(x)(-8) = -16x$

Square the second term $(-8)^2 = 64$

Hence, the answer is $x^2 - 16x + 64$.

Example 3: $(-3a + 7)^2$

Solution: Since the first term is $-3a$ and the second term is 7.

Square the first term $(-3a)^2 = 9a^2$

Multiply the product of the first and second term by 2 $2(-3a)(7) = -42a$

Square the second term $(7)^2 = 49$

Hence, the answer is $9a^2 - 42a + 49$.

Example 4: $(5xy - 3)^2$

Solution: Since the first term is $5xy$ and the second term is -3 .

Square the first term $(5xy)^2 = 25x^2y^2$

Multiply the product of the first and second term by 2 $2(5xy)(-3) = -30xy$

Square the second term $(-3)^2 = 9$

Hence, the answer is $25x^2y^2 - 30xy + 9$.

You may add more examples if needed.

3. Lesson Activity

Activity 3A: Square It to Solve It!

Instruction: Let the learners use the concept of square of binomial in solving the following.

- | | |
|------------------|-------------------|
| 1. $(x + 3)^2$ | 6. $(-2x - 7)^2$ |
| 2. $(y - 2)^2$ | 7. $(ab + 3)^2$ |
| 3. $(3u - 1)^2$ | 8. $(xy - 7)^2$ |
| 4. $(4k + 5)^2$ | 9. $(4x - 3y)^2$ |
| 5. $(-9n + 1)^2$ | 10. $(5a + 7b)^2$ |

DAY 2

SUB-TOPIC 2: Product of Sum and Difference of Two Terms

1. Explication

In finding the product of the sum and difference of two terms, we can use:

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

where a is the first term and b is the second term. The result of getting the product of the sum and difference of two terms is a difference of two squares.

2. Worked Example

Example 1: $(x + 3)(x - 3)$

Solution: Since the first term is x and the second term is 3

$$(x + 3)(x - 3) = (x)^2 - (3)^2$$

Hence the answer is $x^2 - 9$

Example 2: $(2y - 5)(2y + 5)$

Solution: Since the first term is $2y$ and the second term is 5

$$(2y + 5)(2y - 5) = (2y)^2 - (5)^2$$

Hence the answer is $4y^2 - 25$

Example 3: $\left(\frac{1}{3} + 4x\right)\left(\frac{1}{3} - 4x\right)$

Solution: Since the first term is $\frac{1}{3}$ and the second term is $4x$

$$\left(\frac{1}{3} + 4x\right)\left(\frac{1}{3} - 4x\right) = \left(\frac{1}{3}\right)^2 - (4x)^2$$

Hence the answer is $\frac{1}{9} - 16x^2$

Provide enough time for the learners to accomplish this activity.

You may adjust the indicated time in the worksheet for this activity if necessary.

Activity 3A Answer Key:

1. $x^2 + 6x + 9$
2. $y^2 - 4x + 4$
3. $9u^2 - 6u + 1$
4. $16k^2 + 40k + 25$
5. $81n^2 - 18n + 1$
6. $4x^2 + 28x + 49$
7. $a^2b^2 + 6ab + 9$
8. $x^2y^2 - 14xy + 49$
9. $16x^2 - 24xy + 9y^2$
10. $25a^2 + 70ab + 49b^2$

Example 4: $(-a^2 - xy)(-a^2 + xy)$

Solution: Since the first term is $-a^2$ and the second term is xy

$$(-a^2 - xy)(-a^2 + xy) = (-a^2)^2 - (xy)^2$$

Hence the answer is $a^4 - x^2y^2$

3. Lesson Activity

Activity 3B: Finding Errors!

Instruction: Let the learners analyze the given problem and its solution. If the solution and answer is correct, shade the smiley face emoji. Otherwise, shade the sad face emoji and write the correct solution and answer in the space provided.

1. $(t + 7)(t - 7)$	$= (t)^2 - (7)^2$ $= t^2 - 49$	😊	😞	
2. $(m + 6)(m - 6)$	$= (m)^2 - (6)^2$ $= m^2 - 12$	😊	😞	
3. $(4x - 1)(4x + 1)$	$= (4x)^2 - (1)^2$ $= 4x^2 - 1$	😊	😞	
4. $(4 - 2b)(4 + 2b)$	$= (4)^2 - (2b)^2$ $= 16 - 4b^2$	😊	😞	
5. $(3k + 5)(3k - 5)$	$= (3k)^2 - (5)^2$ $= 9k^2 - 25$	😊	😞	
6. $(p + 10q)(p - 10q)$	$= (p)^2 - (10q)^2$ $= p^2 - 100q^2$	😊	😞	
7. $(7m + 8n)(7m - 8n)$	$= (7m)^2 - (8n)^2$ $= 49m - 64n$	😊	😞	
8. $\left(c + \frac{1}{4}\right)\left(c - \frac{1}{4}\right)$	$= (c)^2 - \left(\frac{1}{4}\right)^2$ $= c^2 - \frac{2}{4}$	😊	😞	
9. $(-y + 4)(-y - 4)$	$= (-y)^2 - (4)^2$ $= y^2 - 16$	😊	😞	
10. $(3ab + xy)(3ab - xy)$	$= (3ab)^2 - (xy)^2$ $= 9ab^2 - xy^2$	😊	😞	

You may add more examples if needed.

Provide enough time for the learners to accomplish this activity.

You may adjust the indicated time in the worksheet for this activity if necessary.

Activity 3B Answer Key:

1.	😊	
2.	😞	$= (m)^2 - (6)^2$ $= m^2 - 36$
3.	😞	$= (4x)^2 - (1)^2$ $= 16x^2 - 1$
4.	😊	
5.	😊	
6.	😊	
7.	😞	$= (7m)^2 - (8n)^2$ $= 49m^2 - 64n^2$
8.	😞	$= (c)^2 - \left(\frac{1}{4}\right)^2$ $= c^2 - \frac{1}{16}$
9.	😊	
10.	😞	$= (3ab)^2 - (xy)^2$ $= 9a^2b^2 - x^2y^2$

DAY 3**SUB-TOPIC 3: Cube of Binomial****1. Explication**

For the cube of binomial, we have the following equation:

$$(a + b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$$

$$(a - b)^3 = a^3 - 3a^2b - 3ab^2 - b^3$$

where a is the first term and b is the second term.

2. Worked Example

Example 1: $(x + 2)^3$

Solution: Since the first term is x and the second term is 2

$$(x + 2)^3 = (x)^3 + 3(x)^2(2) + 3(x)(2)^2 + (2)^3$$

Hence the answer is $x^3 + 6x^2 + 12x + 8$

Example 2: $(2y - 1)^3$

Solution: Since the first term is $2y$ and the second term is 1

$$(2y - 1)^3 = (2y)^3 - 3(2y)^2(1) + 3(2y)(1)^2 - (1)^3$$

Hence the answer is $8y^3 - 12y^2 + 6y - 1$

Example 3: $(3x + 4y)^3$

Solution: Since the first term is $3x$ and the second term is $4y$

$$(3x + 4y)^3 = (3x)^3 + 3(3x)^2(4y) + 3(3x)(4y)^2 + (4y)^3$$

Hence the answer is $27x^3 + 108x^2y + 144xy^2 + 64y^3$

Example 4: $(b^2 - 3)^3$

Solution: Since the first term is b^2 and the second term is 3

$$(b^2 - 3)^3 = (b^2)^3 - 3(b^2)^2(3) + 3(b^2)(3)^2 - (3)^3$$

Hence the answer is $b^6 - 9b^4 + 27b^2 - 27$

3. Lesson Activity**Activity 3C: What's the Product?**

Instruction: Let the learners find the product of the following by using the concept of cube of binomial.

1. $(x - 5)^3$

2. $(y + 3)^3$

3. $(m + 1)^3$

4. $(3x + 7)^3$

5. $(2a - 2)^3$

6. $(5x - 6)^3$

7. $(x + y)^3$

8. $(3p - 4q)^3$

9. $(5x + 3y)^3$

10. $(3c^2 - \frac{1}{3})^3$

You may add more examples if needed.

Provide enough time for the learners to accomplish this activity.

You may adjust the indicated time in the worksheet for this activity if necessary.

Activity 3C Answer Key:

1. $x^3 - 15x^2 + 75x - 125$

2. $y^3 + 9y^2 + 27y + 27$

3. $m^3 + 3m^2 + 3m + 1$

4. $27x^3 + 189x^2 + 441x + 343$

5. $8a^3 - 24a^2 + 24a - 8$

6. $125x^3 - 450x^2 + 540x - 216$

7. $x^3 + 3x^2y + 3xy^2 + y^3$

8. $27p^3 - 108p^2q + 144pq^2 - 64q^3$

9. $125x^3 + 225x^2y + 135xy^2 + 27y^3$

10. $27c^6 - 9c^4 + c^2 - \frac{1}{27}$

DAY 4**SUB-TOPIC 4: Square of Trinomial****1. Explicitation**

In finding the square of a trinomial, we can use:

$$(a + b + c)^2 = a^2 + b^2 + c^2 + 2ab + 2ac + 2bc$$

where a is the first term, b is the second term and c is the third term.

2. Worked Example

Example 1: $(x + y + z)^2$

Solution: Since the first term is x , the second term is y and the third term is z

Square the first term

$$(x)^2 = x^2$$

Square of the second term

$$(y)^2 = y^2$$

Square the third term

$$(z)^2 = z^2$$

Multiply the product of the first and second term by 2

$$2(x)(y) = 2xy$$

Multiply the product of the first and third term by 2

$$2(x)(z) = 2xz$$

Multiply the product of the second and third term by 2

$$2(y)(z) = 2yz$$

Hence, the answer is $x^2 + y^2 + z^2 + 2xy + 2xz + 2yz$.

Example 2: $(a + 2b + 3c)^2$

Solution: Since the first term is a , the second term is $2b$, the third term is $3c$

Square the first term

$$(a)^2 = a^2$$

Square of the second term

$$(2b)^2 = 4b^2$$

Square the third term

$$(3c)^2 = 9c^2$$

Multiply the product of the first and second term by 2

$$2(a)(2b) = 4ab$$

Multiply the product of the first and third term by 2

$$2(a)(3c) = 6ac$$

Multiply the product of the second and third term by 2

$$2(2b)(3c) = 12bc$$

Hence, the answer is $a^2 + 4b^2 + 9c^2 + 4ab + 6ac + 12bc$.

Example 3: $(2x - 3y - 4z)^2$

Solution: Since the first term is $2x$, the second term is $-3y$, the third term is $-4z$

Square the first term

$$(2x)^2 = 4x^2$$

Square of the second term	$(-3y)^2 = 9y^2$
Square the third term	$(-4z)^2 = 16z^2$
Multiply the product of the first and second term by 2	$2(2x)(-3y) = -12xy$
Multiply the product of the first and third term by 2	$2(2x)(-4z) = -16xz$
Multiply the product of the second and third term by 2	$2(-3y)(-4z) = 24yz$

Hence, the answer is $4x^2 + 9y^2 + 16z^2 - 12xy - 16xz + 24yz$.

3. Lesson Activity

Activity 3D: Complete It!

Instruction: Let the learners complete the solution for each square of trinomial.

1. $(x + 3y + 5z)^2$

Square the first term	_____
Square of the second term	_____
Square the third term	_____
Multiply the product of the first and second term by 2	_____
Multiply the product of the first and third term by 2	_____
Multiply the product of the second and third term by 2	_____
Answer: _____	

2. $(4a - 7b - 2c)^2$

Square the first term	_____
Square of the second term	_____
Square the third term	_____
Multiply the product of the first and second term by 2	_____
Multiply the product of the first and third term by 2	_____
Multiply the product of the second and third term by 2	_____
Answer: _____	

You may add more examples if needed.

Provide enough time for the learners to accomplish this activity.

You may adjust the indicated time in the worksheet for this activity if necessary.

Activity 3D Answer Key:

1. $(x)^2 = x^2$
 $(3y)^2 = 9y^2$
 $(5z)^2 = 25z^2$
 $2(x)(3y) = 6xy$
 $2(x)(5z) = 10xz$
 $2(3y)(5z) = 30yz$
 $x^2 + 9y^2 + 25z^2 + 6xy + 10xz + 30yz$

2. $(4a)^2 = 16a^2$
 $(-7b)^2 = 49b^2$
 $(-2c)^2 = 4c^2$
 $2(4a)(-7b) = -56ab$
 $2(4a)(-2c) = -16ac$
 $2(-7b)(-2c) = 28bc$
 $16a^2 + 49b^2 + 4c^2 - 56ab - 16ac + 28bc$

	3. $(-2p + 4q + 5)^2$ Square the first term _____ Square of the second term _____ Square the third term _____ Multiply the product of the first and second term by 2 _____ Multiply the product of the first and third term by 2 _____ Multiply the product of the second and third term by 2 _____ Answer: _____	3. $(-2p)^2 = 4p^2$ $(4q)^2 = 16q^2$ $(5)^2 = 25$ $2(-2p)(4q) = -16pq$ $2(-2p)(5) = -20p$ $2(4q)(5) = 40q$ $4p^2 + 16q^2 - 16pq - 20p + 40q + 25$ <i>Note: For no.3 the square of the third term should be the last term since it is a constant.</i>
D. Making Generalizations	DAY 4 Learners' Takeaways and Reflection on Learning Activity 4: Closing the Loop! Instruction: Let the learners answer the following questions. 1. What are the key concepts of our lesson? 2. Which part of the lesson is the easiest for you? Why? 3. Which part of the lesson is the hardest for you? Why? 4. How are we as a class today?	The activity is intended to determine what the learners have learned as well as to give feedback to their experiences during the lesson. Allot enough time to listen and process the responses of your learners. You may do this activity at the end of each subtopic. You may also add questions if needed.

IV. EVALUATING LEARNING: FORMATIVE ASSESSMENT AND TEACHER'S REFLECTION		NOTES TO TEACHERS
A. Evaluating Learning	1. Formative Assessment Activity 5: Let's Solve It! Instruction: Let the learners use special products in solving the following. 1. $(3x + 5)^2$ 2. $(5m^2 + 1)(5m^2 - 1)$ 3. $(2p - 3)^3$ 4. $(x^2 + y^2)^3$ 5. $(a + 2b - 3c)^2$ 2. Homework (Optional)	Answer Key: 1. $9x^2 + 30x + 25$ 2. $25m^2 - 1$ 3. $8p^3 - 36p^2 + 54p - 27$ 4. $x^6 + 3x^4x^2 + 3x^2y^4 + y^6$ 5. $a^2 + 4b^2 + 9c^2 + 4ab - 12bc - 6ac$

B. Teacher's Remarks	<i>Note observations on any of the following areas:</i>	Effective Practices	Problems Encountered	The teacher may take note of some observations related to the effective practices and problems encountered after utilizing the different strategies, materials used, learner engagement, and other related stuff. Teachers may also suggest ways to improve the different activities explored/lesson exemplar.
	strategies explored			
	materials used			
	learner engagement/interaction			
	others			
C. Teacher's Reflection	<i>Reflection guide or prompt can be on:</i> <u>principles behind the teaching</u> <i>What principles and beliefs informed my lesson?</i> <i>Why did I teach the lesson the way I did?</i> <u>students</u> <i>What roles did my students play in my lesson?</i> <i>What did my students learn? How did they learn?</i> <u>ways forward</u> <i>What could I have done differently?</i> <i>What can I explore in the next lesson?</i>			Teacher's reflection in every lesson conducted/facilitated is essential and necessary to improve practice. You may also consider this as an input for the LAC/Collab sessions.