8

DepED
DEPARTMENT OF EDUCATION

Lesson Exemplar for Mathematics

Quarter 1
Lesson
6

Lesson Exemplar for Mathematics Grade 8
Quarter 1: Lesson 6 (Week 6)
SY 2025-2026

Development Team

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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 rational algebraic expressions and equations.
B. Performance Standards	By the end of the lesson, the learners are able to simplify, and operate with, rational algebraic expressions and solve simple rational algebraic equations. (NA)
C. Learning Competencies and Objectives	***Learning Competency*** By the end of the lesson, the learners are able to: *a. simplify rational algebraic expressions.* *b. perform operations on rational algebraic expressions.* ***Lesson Objectives*** *1. Accurate determine if a rational algebraic expression can be simplified.* *2. Correctly simplify a rational algebraic expression.* *3. Accurately add or subtract similar algebraic expressions.* *4. Accurately add or subtract dissimilar algebraic expressions.*
D. Content	• Simplifying Rational Algebraic Expression • Addition or Subtraction of Similar Rational Algebraic Expressions • Addition or Subtraction of Dissimilar Rational Algebraic Expressions
E. Integration	

II. LEARNING RESOURCES

Brainly. (2024, June 2). “What is the rational algebraic expressions and not rational algebraic expressions.” https://brainly.ph/question/8816229

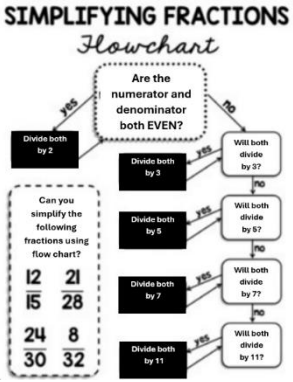
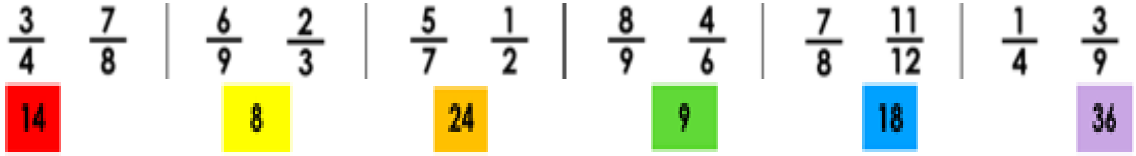
Freepik (2024, June 3). Math Graphic Images. https://www.freepik.com/free-photos-vectors/math-graphic

Helping with Math (2024, June 3). Addition of Rational Algebraic Expressions with Same Denominators. https://helpingwithmath.com/worksheet/addition-of-rational-algebraic-expressions-with-same-denominators-school-themed-worksheets/

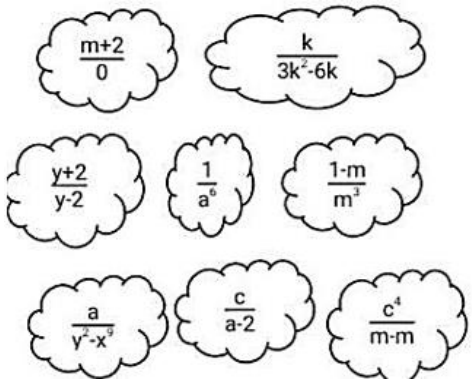
Houghton Mifflin Harcourt (2024, June 3). Guiding Student Research with a KWL Chart Template. https://www.hmhco.com/blog/free-kwl-chart-graphic-organizer-template

IXL Learning Inc (2024, June 1). Add and subtract rational expressions. https://www.ixl.com/math/algebra-2/add-and-subtract-rational-expressions

IXL Learning, Inc. (2024, June 1). Simplify rational expressions". https://www.ixl.com/math/algebra-1/simplify-rational-expressions
Pierce, R. (2024, June 2). Rational Expressions. *Math is Fun.* https://www.mathsisfun.com/algebra/rational-expression.html
Purple Math (2024, June 1). Adding and Subtracting Rational Expressions. https://www.purplemath.com/modules/rtnladd.htm
Scaffolded Math and Science (2024, June 3). Simplifying Fractions. https://www.scaffoldedmath.com/2021/10/how-to-simplify-fractions-video-with-models-and-primes.html
Scrib Slide Share (2024, June 2). Rational Algebraic Expressions. https://www.slideshare.net/slideshow/rational-expressions-module/236916426

III. TEACHING AND LEARNING PROCEDURE		NOTES TO TEACHERS
A. Activating Prior Knowledge	**DAY 1** **1. Short Review** **A. Simplifying Fractions:** Give the learners a short recap about the basic concept of simplifying fractions by using the flow chart.  Image Source: Scaffolded Math and Science **B. Adding and Subtracting Fractions:** Use the prepared activity below to recall the addition and subtraction of fractions. 1. Draw lines to match the fraction pairs to their LCM.  	**DAY 1 Time Frame** 15 minutes - Review Activity 15 minutes - discussion 15 minutes – lesson activity 10 minutes – feedback and Q&A Note: Time frames are just suggestions it is up to the teacher if he/she will make it more flexible. (situation based) Introduce the lesson by giving the learners a short review on the first day by using the prepared activities Guide the learners in this activity by giving examples included in each activity. The activity B may also be used as a group task to promote a collaborative approach in the class for faster activation of the prior knowledge.

	2. Solve the following fractions. Write your answer in simplest form. a) $\frac{1}{4}+\frac{5}{8}=$ b) $\frac{2}{3}+\frac{1}{9}=$ c) $\frac{3}{8}+\frac{2}{16}=$ d) $\frac{1}{2}-\frac{3}{10}=$ e) $\frac{4}{5}-\frac{7}{15}=$ f) $\frac{13}{16}-\frac{5}{32}=$ 3. There is a sale on at Bitoy's Sleeves. The number on each long sleeve show what fraction of the original quantity of that color long sleeve is left in stock.  a. What fraction of the orange and blue long sleeves are left in stock? b. What fraction of the green and white long sleeves are left in stock? c. What fraction of the pink and black long sleeves have been sold? d. What fraction of the red and pink long sleeves have been sold? **2. Feedback (Optional)**	After the activity, give short feedback so that the learners will know why they are having those activities. Before proceeding to lesson proper, ask some questions that will link to the main lesson. Example: Based on the activity you had, what do you think our lesson for today? Note: If the learners have a good understanding about fractions, you may directly use the activity B.
B. Establishing Lesson Purpose	**1. Lesson Purpose** **Essential Questions:** 1. How do you know whether a rational algebraic expression can still be simplified? 2. How do you simplify a rational algebraic expression? 3. How will you add or subtract rational algebraic expressions with the same denominators? With no the same denominators? **2. Unlocking Content Vocabulary** A **rational algebraic** expression is an algebraic expression that can be written as a fraction, where both the numerator and the denominator are polynomials, and the denominator is not zero.	For the lesson purpose, you will introduce the lesson and discuss its importance using essential/guide question/s. Note: Essential questions are not necessary to be answered in this part. These questions will be answered in part of "learners' takeaways."
C. Developing and Deepening Understanding	**SUB-TOPIC 1: Simplifying Rational Algebraic Expression.** **1. Explicitation** **Classify Me!** Using the definition let the learners classify the expressions below to share their understanding of the content.	To introduce the lesson topic, use the "Classify Me" activity. Present it to the class then ask some learner to answer it. Have



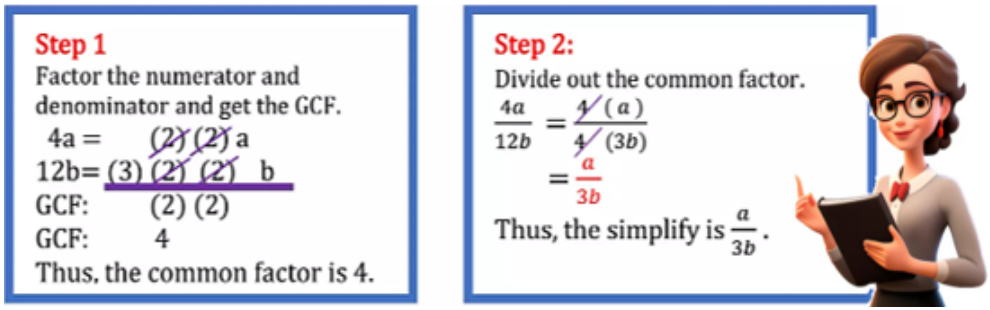
Rational Algebraic Expressions	Not Rational Algebraic Expressions

2. Worked Example

A. Simplify the following in its simplest form.

1) $\frac{4a}{102b}$

Solution:



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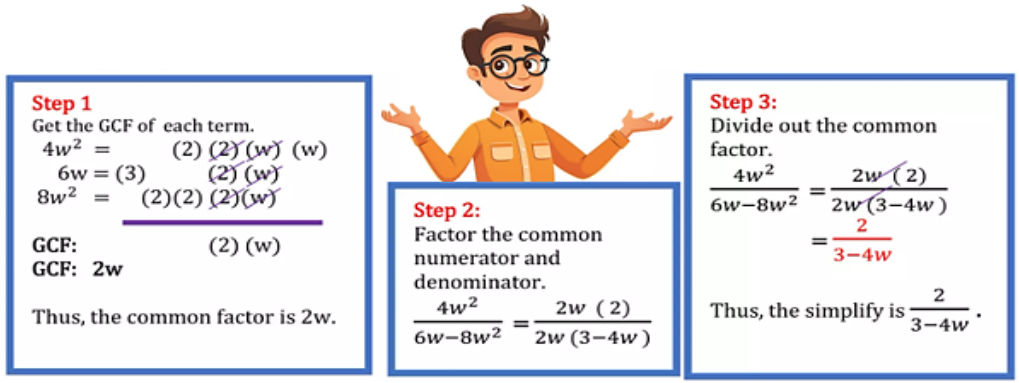
2) $\frac{4w^2}{6w-8w^2}$

Solution:



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their answers be written inside the box.

Process and validate the answer of learners then continue with the lesson proper.

Afterwards proceed to lesson proper and use the worked examples for elaboration of the lesson topic and for better understanding of the concept. The teacher may also add more activities for further elaboration of the lesson. (If necessary)

Teacher's Key Points:

Rational algebraic expression is a type of algebraic expression that can be written in the form of a fraction whose numerator and denominator are polynomials and the denominator is not equal to zero.

Restricted Values – are values of the variable that will make the denominator equal to zero.

Domain – is the set of allowable values of the variable.

Completely Factored – if all of its factors are prime. The factors can no longer be broken down into simpler factors.

3) $\frac{2x-2y}{y^2-x^2}$

Solution:

Step 1
Factor the common numerator and denominator.

$$\frac{2x-2y}{y^2-x^2} = \frac{2(y-x)}{(y-x)(y+x)}$$

Step 2:
Divide out the common factor.

$$\frac{2x-2y}{y^2-x^2} = \frac{2(y-x)}{(y-x)(y+x)} = \frac{2}{(x+y)}$$

You can only apply the difference of two squares if:
**The two terms are both perfect squares.*
**The operation is subtraction.*
Example:
$y^2 - x^2 = (y-x)(y+x)$

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3. Lesson Activity

A. Simplify the following in its simplest form.

1) $\frac{9m}{21n}$

Solution:

Step 1
Factor the numerator and denominator and get the GCF.
9m =
21n =
GCF:
GCF:
Thus, the common factor is __.

Step 2:
Divide out the common factor.

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2) $\frac{6p^2}{2p-4p^3}$

Solution:

Step 1
Get the GCF of each term.
$6p^2$ =
2p =
$4p^3$ =
GCF:
GCF:

Step 2:
Factor the common numerator and denominator.

$$\frac{6p^2}{2p-4p^3} =$$

Step 3:
Divide out the common factor.

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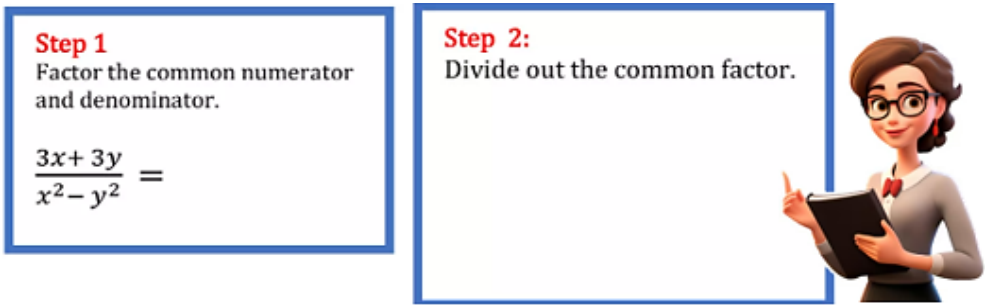
Simplest Form - if the numerator and denominator have no common factors other than 1.

Least Common Denominator (LCD) - is the least common multiple of the denominators of the rational algebraic expressions.

3) $\frac{3x+3y}{x^2-y^2}$

Solution:



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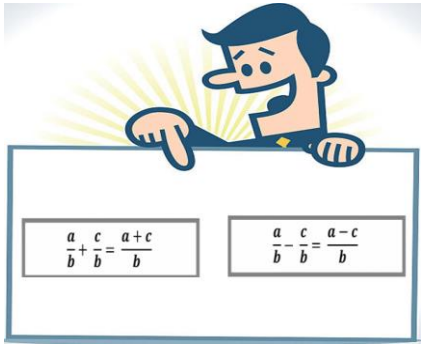
DAY 2

SUB-TOPIC 2: Addition or Subtraction Similar Denominator Rational Algebraic Expression.

1. Explicitation

To add or subtract rational expressions with similar denominators, add or subtract the numerators of the rational algebraic expressions and copy the denominator. Provided the denominator is not equal to zero, then…



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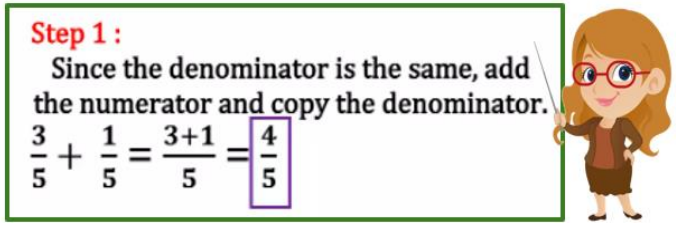
2. Worked Example

A. Perform the indicated operations.

1) $\frac{3}{5}+\frac{1}{5}$

Solution:



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DAY 2 Time Frame

5 – minutes review from day 1
25 – minutes discussion
20 – minutes lesson activity and giving feedback
5 – minutes wrap up

2) $\frac{3x+2}{x+5}+\frac{4x}{x+5}$

Solution:

Step 1 :
Since the denominator is the same, combine the numerator and keep the denominator.

$$\frac{3x+2}{x+5}+\frac{4x}{x+5}=\frac{3x+2+4x}{x+5}$$

Step 2 :
Combine like terms.

$$\frac{3x+2}{x+5}+\frac{4x}{x+5}=\frac{3x+4x+2}{x+5}$$

$$=\boxed{\frac{7x+2}{x+5}}$$

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3) $\frac{5r+2}{r+4}-\frac{10r}{r+4}$

Solution:

Step 1 :
Since the denominator is the same, combine the numerator and keep the denominator.

$$\frac{5r+2}{r+4}-\frac{10r}{r+4}=\frac{5r+2-10r}{r+4}$$

Step 2 :
Combine like terms.

$$\frac{5r+2}{r+4}-\frac{10r}{r+4}=\frac{5r-10r+2}{r+4}$$

$$=\boxed{\frac{-5r+2}{r+4}}$$

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3. Lesson Activity:

Perform the following operation and simplify if possible.

1. $\frac{3x}{x+1}+\frac{3}{x+1}$

Solution:

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

Solution:

Lesson Activity Answer Key:

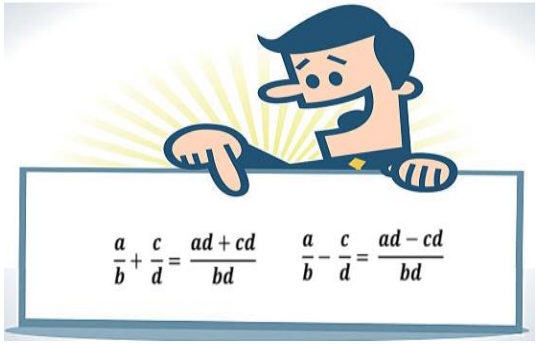
1. 3
2. $\frac{2x-7}{x+1}$

DAY 3

SUB-TOPIC 3: Addition or Subtraction Dissimilar Denominator of Rational Algebraic Expression.

1. Explicitation

To add or subtract rational algebraic expressions with dissimilar denominators, first find their LCD, then rewrite them as expressions with similar denominators using their LCD, and then add or subtract them. Provided that the denominators are not equal to zero, then…



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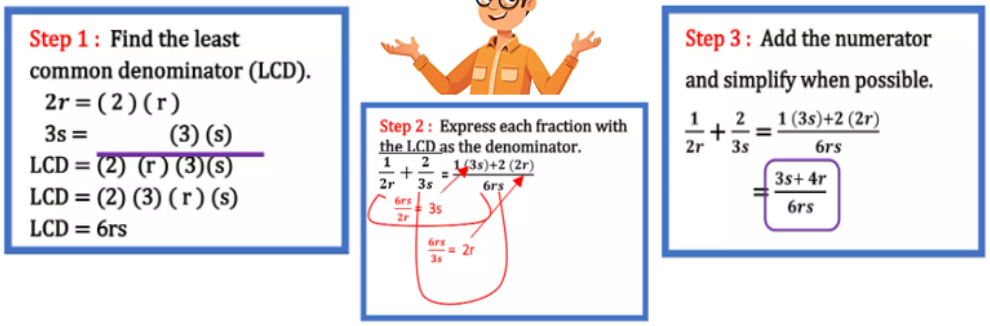
2. Worked Example

Perform the following operation and simplify if possible.

1) $\frac{1}{2r}+\frac{2}{3s}$

Solution:



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DAY 3 Time Frame

5 – minutes short review from day 2
20 – minutes lesson discussion with worked examples.
25 – minutes lesson activity and giving feedback
5 – minutes wrap up.

For sub-topic 3, use the of lesson activities from sub-topic 1 that will serve as short review for this lesson.

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2) $\frac{2}{r+1}+\frac{x}{r-1}$

Solution:

Step 1 .
Combine the denominator.

$$\frac{2}{r+1}+\frac{x}{r-1}=\frac{\quad}{(r+1)(r-1)}$$

Step 2 .
Cross Multiply.

$$\frac{2}{r+1}+\frac{x}{r-1}=\frac{2(r-1)+x(r+1)}{(r+1)(r-1)}$$

Step 3 .
Multiply the numerator.

$$\frac{2}{r+1}+\frac{x}{r-1}=\frac{2(r-1)+x(r+1)}{(r+1)(r-1)}$$

$$=\frac{2r-1+xr+x}{(r+1)(r-1)}$$

$$=\frac{2r+x+xr-1}{(r+1)(r-1)}$$

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Note: You can only add or subtract if they have the same variables and exponents regardless of their numerical coefficients.

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

Solution:

Step 1.

Find the LCD.

Thus the **LCD** is

$$(x+1)(x-1).$$

Step 2.

Rewrite each rational algebraic expression with LCD.

There is no need to rewrite $\frac{2x-4}{x^2-1}$ since its denominator can be factored as $(x+1)(x-1)$, which is LCD.

Step 3.

Rewrite each rational algebraic expression with LCD.

In the expression $\frac{3}{x+1}$, multiply the numerator and denominator by (x -1). This is done so that its denominator will become $(x+1)(x-1)$, which is LCD.

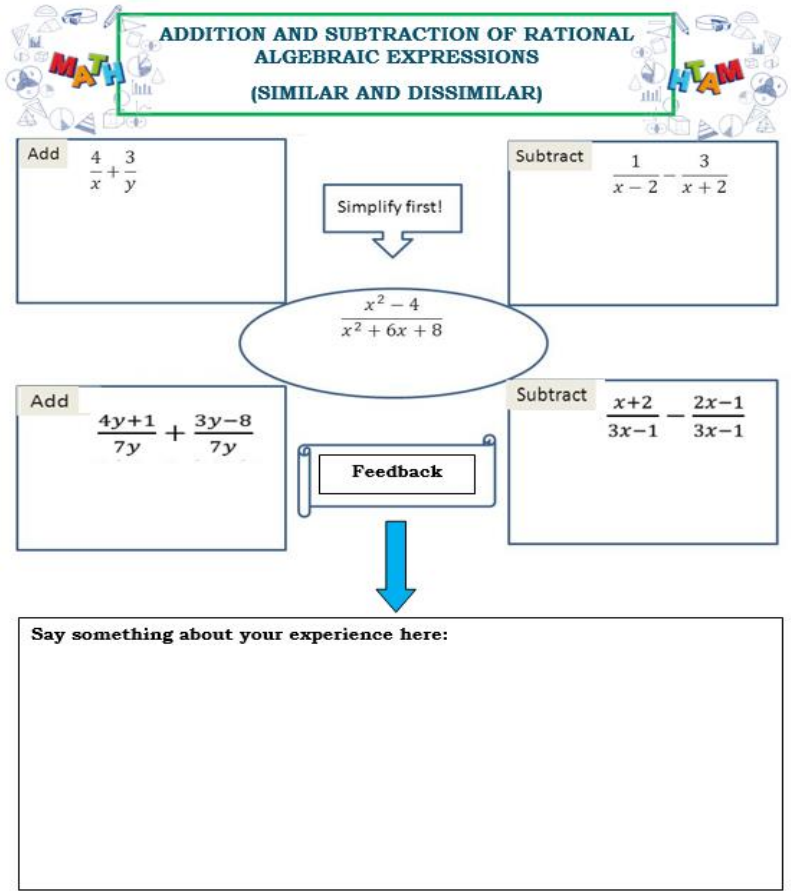
Step 4.

Rewrite each rational algebraic expression with LCD

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

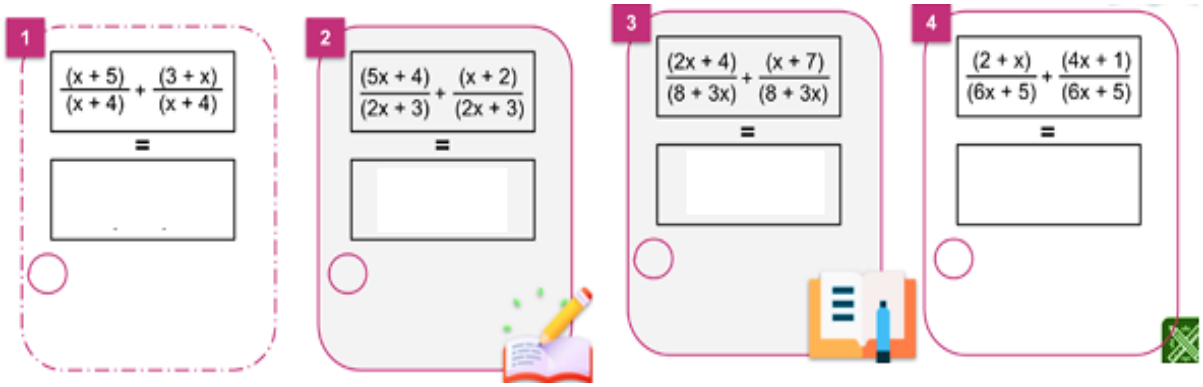
	3. Lesson Activity A. Perform the following operation and simplify if possible. 1) $\frac{3x-1}{x}+\frac{2x+2}{x+1}$ Solution: 2) $\frac{2x-4}{x^2-4}-\frac{3x}{x+2}$ Solution:  Step 5. Proceed to the operation as indicated with the same denominator. $\frac{2x-4}{x^2-1}-\frac{3}{x+1}=\frac{2x-4}{(x+1)(x-1)}-\frac{3(x-1)}{(x+1)(x-1)}$ $=\frac{(2x-4)-3(x-1)}{(x+1)(x-1)}$ $=\frac{2x-4-3x+3}{(x+1)(x-1)}$ $=\frac{-x-1}{(x+1)(x-1)}$ $=\frac{-1(x+1)}{(x+1)(x-1)}$ $=\frac{-1}{x-1}$ Therefore, $\frac{2x-4}{x^2-1}-\frac{3}{x+1}=\frac{-1}{x-1}$.	
D. Making Generalizations	**1. Learners' Takeaways** 1. How do you know whether a rational algebraic expression can still be simplified? 2. How do you simplify a rational algebraic expression? 3. How will you add or subtract rational algebraic expressions with the same denominators? With no the same denominators?	To identify the learners' takeaways, let them answer essential questions and make them provide real-life examples. It could be a group task or an individual task. Use the picture for the learners' takeaways.

2. Reflection on Learning
Let's Hear From You!



The "Let's Hear From You" activity will help learners to write or share their reflection/s. This activity can be done by pair.

If the time is not enough for this activity, teacher can adjust or let the learners write a short essay instead. Another option is make this activity as their homework.

IV. EVALUATING LEARNING: FORMATIVE ASSESSMENT AND TEACHER'S REFLECTION		NOTES TO TEACHERS
A. Evaluating Learning	**DAY 4** **1. Formative Assessment** A. On the space before each number, write TRUE if the statement is correct; otherwise, write FALSE. _____ 1. The expression $\frac{8x^2y^2}{9z^5}$ is simplest form. _____ 2. The expression $\frac{x^2-9}{x-3}$ is in simplest form. _____ 3. The complete factorization of $\frac{x^2-16}{x-4}$ *is* $\frac{(x-4)(x+4)}{x-4}$. _____ 4. The complete factorization of $\frac{x+3}{x^3+27}$ *is* $\frac{(x+3)}{(x+3)(x^2+3x+9)}$. _____ 5. The expression $\frac{x^3-8}{x+2}$ is in simplest form. _____ 6. The expression $\frac{6x+18}{9x-3}$ is in simplest form. _____ 7. The complete factorization of $\frac{x^2-8x+15}{x-3}$ is $\frac{(x-3)(x-5)}{x-3}$ _____ 8. The complete factorization of $\frac{x^2+x-6}{x+3}$ is $\frac{(x+3)(x-2)}{x+3}$ _____ 9. The expression $\frac{m^3-16}{m^2-4}$ is in simplest form. _____ 10. The expression $\frac{x^2-5x+6}{x^2-3x-10}$ is in simplest form. A. Add the following and simplify if possible.  Photo from Helping with Math	**DAY 4 Time Frame** 30 – minutes formative assessment. 25 – minutes checking of answers and giving feedback. **Formative Assessment A. Answer Key:** 1. TRUE 2. FALSE 3. TRUE 4. FALSE 5. TRUE 6. FALSE 7. TRUE 8. TRUE 9. FALSE 10.TRUE **Formative Assessment B. Answer Key:** 1. $\frac{(4x+8)}{(x+4)}$ 2. $\frac{(6x+6)}{(2x+3)}$ 3. $\frac{(3x+11)}{(8+3x)}$ 4. $\frac{(5x+1)}{(6x+5)}$

C. Perform the following operation as indicated.

1. $\frac{7x}{x-6} + \frac{42}{6-x}$

Solution:

2. $\frac{14}{15-5x} - \frac{8}{2x-6}$

Solution:

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

Solution:

4. $\frac{4z}{z^2+z-20} + \frac{z}{z^2-8z+16}$

Solution:

2. Homework (Optional)

Formative Assessment C. Answer Key:

1. 7
2. $\frac{34}{5(3-x)}$
3. $\frac{x(x-7)}{(x+2)(4x-1)}$
4. $\frac{z(5z-11)}{(z-4)^2(z+5)}$

B. Teacher's Remarks

Note observations on any of the following areas:	**Effective Practices**	**Problems Encountered**
strategies explored		
materials used		
learner engagement/ interaction		
others		

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.

C. Teacher's Reflection	*Reflection guide or prompt can be on:* • *principles behind the teaching* *What principles and beliefs informed my lesson?* *Why did I teach the lesson the way I did?* • *students* *What roles did my students play in my lesson?* *What did my students learn? How did they learn?* • *ways forward* *What could I have done differently?* *What can I explore in the next lesson?*	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.