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DEPARTMENT OF EDUCATION

Mathematics

Quarter 1 – Module 4
Simplifying Rational Algebraic Expressions

ALTERNATIVE DELIVERY MODE
ADM

Mathematics – Grade 8
Alternative Delivery Mode
Quarter 1 – Module 4 Simplifying Rational Algebraic Expressions
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Mathematics

Quarter 1 – Module 4
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Introductory Message

For the facilitator:

Welcome to the Mathematics 8 Alternative Delivery Mode (ADM) Module on Simplifying Rational Algebraic Expressions!

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

This learning resource hopes to engage the learners 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 Simplifying Rational Algebraic Expressions!

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

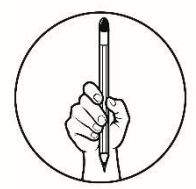
This module was designed and written for you to answer the activity you've missed while you are away from school. It is here to help you simplify rational algebraic expressions. The scope of this module permits it to be used in many different learning situations. The language used recognizes your diversity and diverse vocabulary level. The lessons are arranged to follow the standard sequence of the course. But the order in which you read them can be changed to correspond with the textbook you are now using.

This module contains:

Lesson 1: Simplifying Rational Algebraic Expressions

After going through this module, you are expected to:

1. identify if the given algebraic expression is in simplest form;
2. express rational algebraic expressions in simplest form; and
3. appreciate the application of rational algebraic expression in real-life situations



What I Know

PRE-ASSESSMENT

Choose the letter of the correct answer and write it on your answer sheet.

1. When is a rational algebraic expression in lowest term?

A. If the numerator and denominator are both of degree one.
B. If either the numerator or the denominator is factored completely.
C. If the numerator and denominator have no common factor other than 1.
D. If the numerator and denominator have no common factor other than -1.

2. Which of the following is one of the steps in simplifying rational expressions?

A. Add the common factors.
B. Subtract out the common factors.
C. Multiply the common factors.
D. Divide out the common factors.

3. Which of the following is the simplified form of the rational expression $\frac{x+5}{5+x}$?

A. -1
B. 1
C. 2
D. $\frac{x+5}{5+x}$

4. In the rational algebraic expression $\frac{x^2-1}{1-2x+x^2}$, what factor is common to both numerator and denominator?

A. $x + 1$
B. $x - 1$
C. $x^2 - 1$
D. $x^2 + 1$

5. Which of the following is the simplest form of $\frac{x^2+2x+1}{x^2-1}$?

A. $\frac{x+1}{x-1}$
B. $\frac{x+1}{1-x}$
C. $\frac{1-x}{x+1}$
D. $\frac{x-1}{x+1}$

6. Which of the following rational expression has $\frac{x+1}{2}$ as simplest form?

A. $\frac{2x+1}{4}$
B. $\frac{x^2-1}{2x+2}$
C. $\frac{x^2+2x+1}{2x+2}$
D. $\frac{(x+1)(x+2)}{2x+2}$

7. Which of the following is the simplest form of $\frac{2a^2b^3c^4}{4a^4bc^4}$?

A. $\frac{a^2}{2b^2}$
B. $\frac{b^2}{2a^2}$
C. $\frac{a^2}{2b^2c^4}$
D. $\frac{b^2}{2a^2c^4}$

8. Which of the following is the simplest form of $\frac{y^2-1}{y^3-1}$?

A. $\frac{1}{y}$
C. $\frac{y+1}{y^2+y+1}$
B. $\frac{1}{y-1}$
D. $\frac{y+1}{y^2-y+1}$

9. Which of the following is the simplest form of $\frac{a^2-1}{1-a^2}$?

A. 0
C. -1
B. 1
D. 2

10. Which of the following is the simplest form of $\frac{2x^2+7x+3}{2x^2-5x-3}$?

A. $\frac{7x}{-5x}$
C. $\frac{x+7}{x-5}$
B. $\frac{2x+3}{2x-3}$
D. $\frac{x+3}{x-3}$

11. Given $\frac{x^2-1}{x^2-x} = \frac{(x+1)(x-1)}{x(x-1)} = \frac{(x+1)(x-1)}{x(x-1)} = \frac{1}{1} = 1$. Is the process of simplifying the rational expression correct?

A. Yes, because $\frac{x^2-1}{x^2-x}$ is equivalent to $\frac{1}{1}$ which is equal to1.
B. Yes, because the process followed the steps in simplifying rational expression.
C. No, because dividing out of the common factors were done incorrectly.
D. No, because the factors of the numerator and denominator are incorrect.

12. Suppose you are painting a square whose side measures s long. What is the ratio of the perimeter to the area of the wall in simplest form?

A. 2
C. $\frac{4}{s}$
B. $2s$
D. $\frac{4}{s^2}$

13. Suppose the city circle has a radius r. What is the ratio of the circumference to the area of the city circle in simplest form?

A. 1
C. $\frac{r}{2}$
B. $\frac{2}{r}$
D. $\frac{2r}{r^2}$

14. Is the rational expression $\frac{x+2}{x^2-4x+4}$ in simplest form?

A. Yes, because the numerator and the denominator have no common factor other than 1.
B. Yes, because the numerator and the denominator are in simplest form of a polynomial expression.
C. No, because the numerator and the denominator have different degrees.
D. No, because the numerator and the denominator were not factored completely.

15. Is the rational expression $\frac{x-9}{9-x}$ in simplest form?

A. Yes, because the numerator and the denominator are in simplest form of a polynomial expression.
B. Yes, because the numerator and the denominator are both polynomial expression.
C. No, because negative one can still be factored from either the numerator or the denominator.
D. No, because negative one can still be factored from both the numerator and the denominator.

Lesson 1 Simplifying Rational Algebraic Expressions

Recall that a rational number is a number that can be written as one integer divided by another integer, such as $1 \div 2$ or $\frac{1}{2}$. We usually use the word fraction to mean $\frac{1}{2}$. This idea can be extended to algebraic expression. A *rational expression* is a polynomial divided by another polynomial, such as $(x+1) \div (2x+3)$ or $\frac{x+1}{2x+3}$.

In your previous grade level, you learned the concept of similar fractions, equivalent fractions, and simplifying fractions.

For example, you know that a fraction $\frac{15}{20}$ is equivalent to $\frac{3}{4}$ and can be simplified in the following manner:

$$\frac{15}{20} = \frac{3 \cdot \cancel{5}}{4 \cdot \cancel{5}} = \frac{3}{4} \cdot 1 = \frac{3}{4}$$

Let us review your knowledge in reducing fractions to its simplest form by performing the activity below.

What's In

Activity 1: Plain and Simplest

Match the given fractions in column A to its simplest form in column B. Write your answer on a separate sheet of paper.

A	B
1. $\frac{7}{28}$	A. $\frac{1}{2}$
2. $\frac{2}{4}$	B. $\frac{4}{5}$
3. $\frac{10}{25}$	C. $\frac{7}{9}$
4. $\frac{14}{18}$	D. $\frac{7}{3}$
5. $\frac{28}{12}$	E. $\frac{1}{4}$
	F. $\frac{2}{5}$

Questions**:**

1. What did you do to reduce each fraction to its simplest form?
2. When can you say that a fraction is already in its simplest form?

Just like rational numbers, rational algebraic expressions can also be expressed in its simplest form. The next activity will utilize your knowledge in factoring polynomials.

What's New

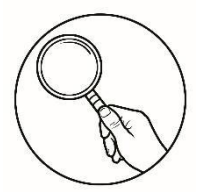
Let Go and Be Unique!

Complete the table below. In each item, a pair of polynomial is given. The *third column* is the factored form of each polynomial, the *fourth column or the Let Go column* is the factor/s common to each pair of polynomials, and the *last column or the Be Unique column* is the factor/s not common to each pair of polynomials. Write your answer on a separate sheet of paper. The first item is done to serve as an example, you may start in the second item.

Item No.	**Given**	**Factored Form**	**Let Go**	**Be Unique**
1.	$x^2 + x - 6$	$(x-2)(x+3)$	$x+3$	$x-2$
	$x^2 - 9$	$(x-3)(x+3)$		$x-3$
2.	$15a$			
	$12a^2b$			
3.	$3x^2 - 12x$			
	$6x^2 + 3x$			
4.	$x^2 + 4x + 3$			
	$x^2 - 3x - 4$			
5.	$2x^2 + 11x + 5$			
	$x^2 + 6x + 5$			

Guide Questions:

1. What techniques did you use to identify the factors of the given polynomials?
2. If you are going to write the remaining factors in the Be Unique column as rational expressions, are these rational expressions in simplest form? Why or why not?



What is It

A fraction is said to be in simplified form when all pair of factors common to the numerator and denominator have been removed.

To simplify a fraction, we remove a factor equal to 1. This can be done in two ways. For example, to simplify $\frac{9}{15}$, we proceed as follows:

Method 1			Method 2		
$\frac{9}{15}$	$= \frac{3 \cdot 3}{5 \cdot 3}$	Factor the numerator and the denominator	$\frac{9}{15}$	$= \frac{3 \cdot 3}{5 \cdot 3}$	Factor the numerator and the denominator
	$= \frac{3}{5} \cdot \frac{3}{3}$	$\frac{a \cdot c}{b \cdot c} = \frac{a}{b} \cdot \frac{c}{c}$; Separate and divide out common factors		$= \frac{3 \cdot \cancel{3}^{1}}{5 \cdot \cancel{3}_{1}}$	Divide out common factor
	$= \frac{3}{5} \cdot 1$	Any number, except 0, divided by itself is equal to 1.		$= \frac{3 \cdot 1}{5 \cdot 1}$	Multiply numerator by numerator and denominator by denominator
	$= \frac{3}{5}$	Identity Property of Multiplication		$= \frac{3}{5}$	Identity Property of Multiplication

Similarly, a rational expression is said to be in simplified form when its numerator and denominator have no common factor other than 1.

The process of simplifying rational algebraic expressions is similar to simplifying fractions. That is, we write the rational algebraic expressions so that the numerator and denominator have no common factors other than 1.

Steps on Simplifying Rational Expression

1. Factor completely the numerator and denominator.
2. Separate and divide out common factor/s if there is/are any.
3. Multiply the remaining factors.

Examples

1. Write the rational expression $\frac{28x^3}{7x^4}$ in simplest form.

$\frac{28x^3}{7x^4} = \frac{4(7x^3)}{x(7x^3)}$ Factor completely the numerator and denominator.

$= \frac{4}{x} \cdot \frac{7x^3}{7x^3}$ Separate and divide out common factors.

$= \frac{4}{x} \cdot 1$ Multiplying the remaining factors.

$= \frac{4}{x}$

Thus, $\frac{4}{x}$ is the simplest form of $\frac{28x^3}{7x^4}$.

2. Write the rational expression $\frac{3x-12}{5x-20}$ in simplest form.

$\frac{3x-12}{5x-20} = \frac{3\,(x-4)}{5\,(x-4)}$ Factor completely the numerator and denominator.

$= \frac{3}{5} \cdot \frac{x-4}{x-4}$ Separate and divide out common factors.

$= \frac{3}{5} \cdot 1$ Multiplying the remaining factors.

$= \frac{3}{5}$

Thus, $\frac{3}{5}$ is the simplest form of $\frac{3x-12}{5x-20}$.

3. Express $\frac{x^2+xy+y^2}{x^3-y^3}$ in simplest form.

$\frac{x^2+xy+y^2}{x^3-y^3} = \frac{x^2+xy+y^2}{(x-y)(x^2+xy+y^2)}$ Factor completely the numerator and denominator.

$= \frac{1}{x-y} \cdot \frac{x^2+xy+y^2}{x^2+xy+y^2}$ Separate and divide out common factors.

$= \frac{1}{x-y} \cdot 1$ Multiplying the remaining factors.

$= \frac{1}{x-y}$

Thus, $\frac{1}{x-y}$ is the simplest form of $\frac{x^2+xy+y^2}{x^3-y^3}$.

4. Simplify $\frac{p^3+q^3}{p^2-q^2}$.

$\frac{p^3+q^3}{p^2-q^2} = \frac{(p+q)(p^2-pq+q^2)}{(p+q)(p-q)}$ Factor completely the numerator and denominator.

$= \frac{p^2-pq+q^2}{p-q} \cdot \frac{p+q}{p+q}$ Separate and divide out common factors.

$= \frac{p^2-pq+q^2}{p-q} \cdot 1$ Multiplying the remaining factors.

$= \frac{p^2-pq+q^2}{p-q}$

Thus, $\frac{p^2-pq+q^2}{p-q}$ is the simplest form of $\frac{p^3-q^3}{p^2-q^2}$.

In some instance, you may encounter certain situations where a factor in the numerator is in opposite sign of a factor in the denominator. To proceed with this kind of problem, factor out negative one (-1) or a negative number so that the factors will become equivalent.

Examples:

1. Express $\frac{x-y}{y-x}$ in simplest form.

$\frac{x-y}{y-x} = \frac{x-y}{-1(x-y)}$ Factor completely the numerator and denominator (by factoring -1 in the denominator).

$= \frac{1}{-1} \cdot \frac{x-y}{x-y}$ Separate and divide out common factors.

$= \frac{1}{-1} \cdot 1$ Multiplying the remaining factors.

$= -1$

Thus, -1 is the simplest form of $\frac{x-y}{y-x}$.

2. Simplify $\frac{3x-9}{12-4x}$.

$\frac{3x-9}{12-4x} = \frac{3(x-3)}{-4(x-3)}$ Factor completely the numerator and denominator (by factoring -4 in the denominator).

$= \frac{3}{-4} \cdot \frac{x-3}{x-3}$ Separate and divide out common factors.

$= \frac{3}{-4} \cdot 1$ Multiplying the remaining factors.

$= -\frac{3}{4}$

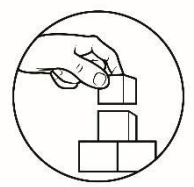
Thus, $-\frac{3}{4}$ is the simplest form of $\frac{3x-9}{12-4x}$.

3. Write $\frac{x^2+5x-14}{4-x^2}$ in lowest terms.

$\frac{x^2+5x-14}{4-x^2}$	=	$\frac{x^2+5x-14}{-1(x^2-4)}$	Factor out -1 in the denominator.
		$\frac{(x-2)(x+7)}{-1(x-2)(x+2)}$	Factor completely the numerator and denominator
	=	$\frac{x+7}{-1(x+2)} \cdot \frac{x-2}{x-2}$	Separate and divide out common factors.
	=	$\frac{x+7}{-1(x+2)} \cdot 1$	Multiplying the remaining factors.
	=	$-\frac{x+7}{x+2}$	

Thus, $-\frac{x+7}{x+2}$ is the simplest form of $\frac{x^2+5x-14}{4-x^2}$.

Note that given the expression $\frac{a}{-a}$ such that $a \neq 0$, the rational expression a over the opposite of a is equal to negative one. That is, $\frac{a}{-a} = -1$.



What's More

Activity 1: Simplest, or Not Simplest, that is the Question

Identify if the given rational expression is in simplest form or not. Write S if the given is in simplest form otherwise write NS. Write your answer on a separate sheet of paper.

1. $\frac{8b^2}{4ab}$
2. $\frac{x+4}{4+x}$
3. $\frac{2x+4}{x+2}$
4. $\frac{x}{x+2}$
5. $\frac{x^2+4x+3}{x^2+6x+8}$
6. $\frac{3b^2-a}{3a-b^2}$
7. $\frac{-(x+4)}{x-4}$
8. $\frac{2x+3}{-(3+2x)}$
9. $\frac{x+2}{2x+2}$
10. $\frac{m^2-n^2}{m^3+n^3}$

Activity 2: The Simplest of Them All

Express the given algebraic expression to its simplest form. Write your answer on a separate sheet of paper.

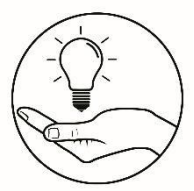
1. $\frac{45a^2b}{30ab}$
2. $\frac{4a-1}{1-4a}$
3. $\frac{12a^2-21a}{12a^2-28a}$
4. $\frac{4x^2-9}{8x^3-27}$
5. $\frac{2a^2-2}{2a^2+4a-6}$
6. $\frac{x^2-3x-10}{x^2-7x+10}$

7. $\frac{x^2-2x-3}{15-2x-x^2}$

8. $\frac{-x^2+x+2}{x^2-3x+2}$

9. $\frac{2x^2+x-21}{2x^2-3x-9}$

10. $\frac{(x^2-y^2)(x^2+xy+y^2)}{(x^3-y^3)(x+y)}$



What I Have Learned

What a Wonderful Week

Reflect on the topic and activities you have done this week by completing the following statements. Write your answers on a separate sheet of paper.

- This week, I learned about _____.
- To reduce a rational algebraic expression to simplest form, there are steps to follow. First _____, then _____, and lastly _____.
- For instance, in reducing $\frac{x^2+x-2}{x^2+2x-3}$, it should be written as:

$$\frac{x^2+x-2}{x^2+2x-3} = \_\_\_\_\_$$
$$= \_\_\_\_\_$$
$$= \_\_\_\_\_$$

- It is also possible to encounter a certain case where a factor in the numerator is in opposite sign of a factor in the denominator. In this situation, I need to factor _____ so that the factors will be equivalent.
- Just like in solving $\frac{2x^2-8x}{12-3x}$, , it should be written as

$$\frac{2x^2-8x}{12-3x} = \_\_\_\_\_$$
$$= \_\_\_\_\_$$
$$= \_\_\_\_\_$$
$$= \_\_\_\_\_$$

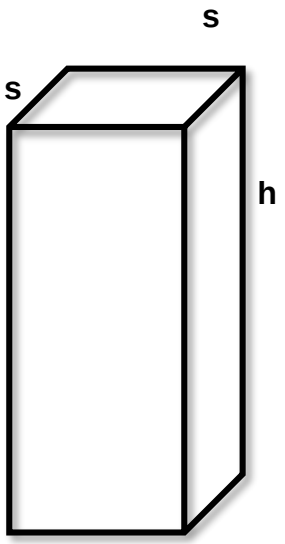
- In general, given an expression $a \neq 0$, the rational expression a over the opposite of a is equal to _____ that is, $\frac{a}{-a}$ =_____.
- Finally, I can say that a rational expression is in simplest form when its numerator and denominator have _____.

What I can Do

Unboxing

Vince' s parents bought him a new pair of school shoes. The shoes was placed in an ultra-thin rectangular shoe box with square base which has a volume $V = s^2h$ and a surface area $S_A = 2s^2 + 4sh$.

Express the ratio of the volume to its surface area ($\frac{V}{S_A}$) in simplest form. Write your answer on a separate sheet of paper.



Assessment

Choose the letter of the correct answer and write it on your answer sheet.

1. Which of the following fractions is expressed in simplified form?

A. $\frac{2}{3}$ C. $\frac{13}{39}$

B. $\frac{4}{12}$ D. $\frac{7}{42}$

2. Which of the following is the correct order of simplifying rational algebraic expressions?

I. Multiply the remaining factors.
II. Factor completely the numerator and denominator.
III. Separate and divide out common factor/s if there is/are any.

A. 1, II, III C. II, III, I
B. I, III, II D. III, II, I

3. Which of the following is a rational expression in simplest form?

A. $\frac{2y}{4x}$ C. $\frac{a^2-1}{a^3+1}$

B. $\frac{2x-6}{34}$ D. $\frac{2a^2+7a-4}{a+2}$

4. Which of the following is equivalent to the rational expression $\frac{7-x}{x-7}$?

A. -1 C. -1 and 1

B. 1 D. Neither -1 nor 1

5. Which of the following is the simplest form of $\frac{8xy^2}{12x^2y}$?

A. $\frac{2y}{3x}$ C. $\frac{y}{4x}$

B. $\frac{2x}{3y}$ D. $\frac{4x}{y}$

6. Which of the following is the simplest form of $\frac{x^3-2x^2+x}{x^3-x}$?

A. $\frac{x+1}{x-1}$ C. $\frac{1-x}{x+1}$

B. $\frac{x+1}{1-x}$ D. $\frac{x-1}{x+1}$

7. Which of the following is the simplest form of $\frac{x^2-1}{x^3-1}$?

A. $\frac{1}{x-1}$.

C. $\frac{x+1}{x^2-x+1}$

B. $\frac{x+1}{x^2+x+1}$

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

8. Which of the following rational expression has -1 as simplest form?

A. $\frac{x+1}{x-1}$

C. $\frac{1-x}{x-1}$

B. $\frac{-x+1}{1-x}$

D. $\frac{x-1}{x-1}$

9. Which of the following is the simplest form of $\frac{x^3-1}{1-x^3}$?

A. 3

C. 1

B. -3

D. -1

10. Which of the following is the simplest form of $\frac{6x^2+5x+1}{6x^2-x-1}$?

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

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

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

D. $\frac{2x+1}{2x-1}$

11. Given $\frac{x^2-1}{x^3-1} = \frac{(x+1)(x-1)}{x(x^2-1)} = \frac{(x+1)(x-1)}{x(x+1)(x-1)} = \frac{1}{x} \cdot \frac{(x+1)(x-1)}{(x+1)(x-1)} = \frac{1}{x} \cdot 1 = \frac{1}{x}$. Is the process of simplifying the rational expression correct?

A. Yes, because the process followed the steps in simplifying rational expression.

B. Yes, because $\frac{x^2-1}{x^2-x}$ is equivalent to $\frac{1}{1}$ which is equal to1.

C. No, because the factors in the denominator are incorrect.

D. No, because dividing out common factors were done incorrectly.

12. Suppose the city plaza has a perimeter of $4s$ and an area of s^2. What is the ratio of the area to the perimeter of the city plaza in simplest form?

A. $\frac{1}{2}$

C. $\frac{s}{4}$

B. $\frac{1}{2s}$

D. $\frac{s^2}{4}$

13. Suppose you are baking a cake with circular base whose volume is $\pi r^2 h$ and surface area of $2\pi rh + \pi r^2$. What is the ratio of the surface area to the volume of the cake in simplest form?

A. $\frac{rh}{2h+r}$

C. $\frac{rh}{2\pi h+r}$

B. $\frac{2h+r}{rh}$

D. $\frac{\pi rh}{2h+r}$

14. Is the rational expression $\frac{x+1}{x^2-1}$ in simplest form?

A. Yes, because the numerator and the denominator are in simplest form of a polynomial expression.

B. Yes, because the numerator and the denominator have no common factor.

C. No, because the numerator and the denominator have different degrees.

D. No, because the denominator is not factored completely.

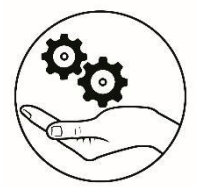
15. Is the rational expression $\frac{1+x}{x+1}$ in simplest form?

A. Yes, because the numerator and the denominator are in simplest form of a polynomial expression.

B. Yes, because the numerator and the denominator are both polynomial expression.

C. No, because negative one can still be factored from either the numerator or the denominator.

D. No, because the numerator and the denominator can still be divide out.



Additional Activity

Express the given rational algebraic expression to its simplest form. Write your answer on a separate sheet of paper.

1. $\frac{3x}{6x^2}$
2. $\frac{2x+4}{2x-16}$
3. $\frac{15\ a^3b^3}{20\ a^4b^4}$
4. $\frac{7a\ +7b}{a^2-b^2}$
5. $\frac{a^2-6a\ +9}{a^2-9}$
6. $\frac{8x^3-y^3}{4x^2-y^2}$
7. $\frac{x^2-5x+4}{4+3x-x^2}$
8. $\frac{b^2-a^2}{a^3+b^3}$
9. $\frac{x^2+4x+4}{4-x^2}$
10. $\frac{2x^2+5x+2}{2x^2+x-6}$

Answer Key

Pre - assessment

1. C 6. C 11. C
2. D 7. B 12. C
3. B 8. C 13. B
4. B 9. C 14. A
5. A 10.D 15. C

Plain and Simplest

1. E 4. C
2. A 5. D
3. F

Let Go and Be Unique

1.

Given	Factors	Let Go	Be Unique
$x^2 + x - 6$	$(x-2)(x+3)$	$x + 3$	$x - 2$
$x^2 - 9$	$(x-3)(x+3)$		$x - 3$

2.

Given	Factors	Let Go	Be Unique
$15a$	$3a(5)$	$3a$	5
$12a^2b$	$3a(4ab)$		$4ab$

3.

Given	Factors	Let Go	Be Unique
$3x^2 - 12x$	$3x(x-4)$	$3x$	$x - 4$
$6x^2 + 3x$	$3x(2x+1)$		$2x + 1$

4.

Given	Factors	Let Go	Be Unique
$x^2 + 4x + 3$	$(x+3)(x+1)$	$x + 1$	$x + 3$
$x^2 - 3x - 4$	$(x-4)(x+1)$		$x - 4$

5.

Given	Factors	Let Go	Be Unique
$2x^2 + 11x + 5$	$(2x+1)(x+5)$	$x + 5$	$2x + 1$
$x^2 + 6x + 5$	$(x+1)(x+5)$		$x + 1$

Act. 1

1. NS 6. S
2. NS 7. S
3. NS 8. NS
4. S 9. S
5. S 10.NS

Act. 2

1. $\frac{3a}{2}$
2. -1
3. $\frac{12a-21}{12a-28}$
4. $\frac{2x+3}{4x^2+6x+9}$
5. $\frac{a+1}{a+3}$
6. $\frac{x+2}{x-2}$
7. $-\frac{x+1}{5+x}$
8. $-\frac{x+1}{x-1}$
9. $\frac{2x+7}{2x+3}$
10. 1

Unboxing

$$\frac{V}{S_A} = \frac{sh}{2s+4h}$$

Assessment

1. A 6. D 11. C
2. C 7. B 12. C
3. D 8. C 13. B
4. A 9. D 14. D
5. A 10.D 15. D

Additional Activity

1. $\frac{1}{2x}$
2. $\frac{x+2}{x-8}$
3. $\frac{3}{4ab}$
4. $\frac{7}{a-b}$
5. $\frac{a-3}{a+3}$
6. $\frac{4x^2+xy+y^2}{2x+y}$
7. $-\frac{x-1}{x+1}$
8. $\frac{b-a}{a^2-ab+b^2}$
9. $\frac{x+2}{2-x}$
10. $\frac{2x+1}{2x-3}$

References

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Teachers Guide in Mathematics 8 pp 76 – 80

Mathematics Learner's Module 8; 2013 pp 66-71

Website Links

https://www.mesacc.edu/~scotz47781/mat120/notes/rational/simplifying/simplifying.html

https://www.mathwarehouse.com/algebra/rational-expression/how-to-simplify-rational-expressions.php

https://www.purplemath.com/modules/rtnldefs2.htm

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