



Mathematics

Quarter 1 – Module 4: Rational Algebraic Expressions 2



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Mathematics – Grade 8
Alternative Delivery Mode
Quarter 1 – Module 4: Rational Algebraic Expressions
First Edition, 2020

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Published by the Department of Education
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Undersecretary: Diosdado M. San Antonio

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Printed in the Philippines by the Schools Division Office of Quezon City
Department of Education – National Capital Region

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Mathematics

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Introductory Message

For the facilitator:

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

This module was collaboratively designed, developed and reviewed by educators both from public schools 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. This also aims to help learners acquire the needed 21st century skills while taking into consideration their needs and circumstances.

In addition to the material in the main text, you will also see this box in the body of the module:



Notes to the Teacher

This contains helpful tips or strategies that will help you in guiding the learners.

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 Rational Algebraic Expressions.

The hand is one of the most symbolized parts of the human body. It is often used to depict skill, action and purpose. Through our hands we may learn, create and accomplish many things. Hence, the hand in this learning resource signifies that you as a learner is capable and empowered to successfully achieve the relevant competencies and skills at your own pace and time. Your academic success lies in your own hands!

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 able 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 such as 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. This also tends retention of learned concepts.



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. Write your answers in all activities in a separate sheet of paper found at the back of this module.
5. Observe honesty and integrity in doing the tasks and checking your answers.
6. Finish the task at hand before proceeding to the next.
7. 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 with you in mind. It is here to help you master the operations on Rational Algebraic Expressions and its applications in real-life situation. The scope of this module is helpful in answering many real-life problems. The language used recognizes the diverse vocabulary level of students. 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.

The module is divided into two lessons, namely:

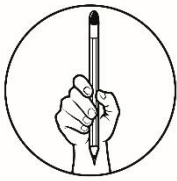
- Lesson 1 – Addition and Subtraction of Rational Algebraic Expressions
- Lesson 2 – Problem Solving Involving Rational Algebraic Expressions

After going through this module, you are expected to:

1. discuss the steps on how to add or subtract rational algebraic expressions;
2. find the sum or difference of rational algebraic expressions;
3. solve equations involving rational algebraic expressions; and
4. develop logical thinking to understand how equations involving rational algebraic expressions are solved using the examples.

Lesson**1****Addition and Subtraction
of Rational Algebraic
Expressions**

Just like in the previous module, the theorem that we used in addition and subtraction of fractions are the same theorem we need in addition and subtraction of rational algebraic expressions.

***What I Know***

Directions: Choose the letter of the correct answer. Write your answer on a separate sheet of paper.

1. Find the LCD of $\frac{5}{8x^3y}$ and $\frac{1}{12xy^4}$.
A. $24x^3y^4$ B. $4xy$ C. $4x^3y^4$ D. $96x^3y^4$
2. What is the combined form of the rational expressions $\frac{3x}{2x+y}$ and $\frac{4y}{2x+y}$?
A. $\frac{3x+4y}{2x+y}$ B. $\frac{7xy}{2x+y}$ C. $\frac{3x+4y}{4x+2y}$ D. $\frac{7xy}{4x+2y}$
3. What is the sum of $\frac{1}{3x}$, $\frac{1}{5x}$ and $\frac{1}{7x}$?
A. $\frac{15}{35x}$ B. $\frac{35}{42x}$ C. $\frac{52}{85x}$ D. $\frac{71}{105x}$
4. Find the difference of $\frac{5x}{3} - \frac{1}{3}$.
A. $\frac{6x}{9}$ B. $\frac{4x}{3}$ C. $\frac{5x-1}{3}$ D. $\frac{5x-1}{9}$
5. Which of the following pairs of rational algebraic expressions have $a(a-2)$ as their LCD?
A. $\frac{1}{a+2}$ & $\frac{a}{a^2-4}$ C. $\frac{1}{a+2}$ & $\frac{a}{a-2}$
B. $\frac{1}{2a}$ & $\frac{a}{a^2+3a+2}$ D. $\frac{1}{a^2-2a}$ & $\frac{a}{a-2}$



What's In

Recall:

1. What is the LCD of $\frac{3}{4}$, $\frac{1}{5}$ and $\frac{7}{10}$?
2. What is the factored form of $a^2 - 2a$?
3. What are the factors of $a^2 - 1$?
4. What are the factors of $x^2 - 3x - 28$?
5. Perform the indicated operations: $2x - 3 + 2(2 - x)$.



What's New

Activity 1:

TRIVIA: What does the expression “chicken feed” mean?

To find out, identify the least common denominator (LCD) of each pair of rational expressions. Write the letter of the correct answer.

A	U	F	M	T	E
$\frac{1}{5}, \frac{x}{15}$	$\frac{x^2}{9}, \frac{3}{8}$	$\frac{x}{30}, \frac{x}{25}$	$\frac{2x}{7}, \frac{5}{2}$	$\frac{3x^3}{5}, \frac{1}{10}$	$\frac{x^2}{4}, \frac{3x}{10}$

O	Y	R	N	L	S
$\frac{x-1}{12}, \frac{x}{15}$	$\frac{x^2}{6}, \frac{x}{8}$	$\frac{x+1}{6}, \frac{x-1}{12}$	$\frac{x^2}{9}, \frac{5}{3}$	$\frac{12x+1}{3}, \frac{x-2}{6}$	$\frac{3-x}{2}, \frac{x-3}{4}$

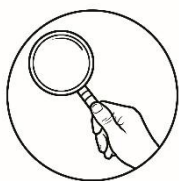
ANSWER:

4	14	15	6	6

15	14	60	72	9	10

60	150

14	60	9	20	24



What is It

Rational algebraic expressions are added or subtracted in the same method as fractions. Remember that only similar fractions can be readily combined. Two fractions are similar if they have the same denominator.

Theorem: If a , b and c are any real numbers and $b \neq 0$, then

$$\frac{a}{b} + \frac{c}{b} = \frac{a+c}{b} \text{ and } \frac{a}{b} - \frac{c}{b} = \frac{a-c}{b}$$

Example 1. Find the sum of $\frac{3x}{y+5}$ and $\frac{4-2x}{y+5}$.

$$\begin{aligned} \text{Solution: } \frac{3x}{y+5} + \frac{4-2x}{y+5} &= \frac{3x+4-2x}{y+5} \\ &= \frac{x+4}{y+5} \end{aligned}$$

Add the numerators and copy the common denominator.

Combine similar terms

Example 2. $\frac{x^2+4x}{x+2} + \frac{4}{x+2}$

$$\begin{aligned} \text{Solution: } \frac{x^2+4x}{x+2} + \frac{4}{x+2} &= \frac{x^2+4x+4}{x+2} \\ &= \frac{(x+2)(x+2)}{x+2} \\ &= \frac{\cancel{(x+2)}(x+2)}{\cancel{x+2}} = x+2 \end{aligned}$$

Add the numerators and copy the denominator.

Factor out $x^2 + 4x + 4$ and cancel factors equal to 1

Example 3. Subtract: $\frac{3x+5}{x+y} - \frac{2x+7}{x+y}$

$$\begin{aligned} \text{Solution: } \frac{3x+5}{x+y} - \frac{2x+7}{x+y} &= \frac{3x+5-(2x+7)}{x+y} \\ &= \frac{x-2}{x+y} \end{aligned}$$

Add the numerators and copy the common denominator.

Combine similar terms

Like fractions, there are instances that you need to get the least common denominator (LCD) before you add or subtract rational expressions. Two or more rational algebraic expressions with unlike denominators are made similar by finding the least common multiple (LCM) which is used as the least common denominator (LCD) of the given expressions. To find the LCD of two or more expressions follow the following steps:

1. Express each denominator as a product of its prime factors;
2. List all the different factors that appears in each denominator. If a factor is common for any of the denominators, list only the factor with the highest exponent.

Example 4. $\frac{2x+1}{4} + \frac{x-2}{6}$

Solution: $4 = 2 \cdot 2$ or 2^2
 $6 = 3 \cdot 2$

Find the LCM of 4 and 6.
 $2^2 \cdot 3 = 2 \cdot 2 \cdot 3 = 12$

The least common denominator (LCD) of $\frac{2x+1}{4}$ and $\frac{x-2}{6}$ is 12.

Therefore: $\frac{2x+1}{4} + \frac{x-2}{6} = \frac{3(2x+1)}{12} + \frac{2(x-2)}{12}$

Since the LCD is 12, we should express the two rational algebraic expression (RAE) to its equivalent expression whose denominator is 12.

Divide the LCD by the denominator of the first expression and multiply the result to the numerator. Do the same in the second expression.

$$= \frac{6x+3}{12} + \frac{2x-4}{12} = \frac{6x+3+2x-4}{12} \quad \begin{array}{l} \text{by distributive property} \\ \text{combine similar terms} \end{array}$$

$$= \frac{8x-1}{12}$$

Example 5. Give the sum: $\frac{5}{a} + \frac{3}{4a}$.

Solution: $a = a$

$$4a = 2 \cdot 2 \cdot a = 2^2 \cdot a$$

Find the LCM of a and $4a$

$$2^2 \cdot a = 2 \cdot 2 \cdot a = 4a$$

The least common denominator of $\frac{5}{a}$ and $\frac{3}{4a}$ is $4a$.

$$\text{Hence, } \frac{5}{a} + \frac{3}{4a} = \frac{4(5)}{4a} + \frac{1(3)}{4a}$$

Express the first RAE to an equivalent expression whose denominator is $4a$. Again, divide the LCD by the denominator of the first expression and multiply the result to the numerator. Do the same in the second expression.

$$= \frac{20}{4a} + \frac{3}{4a} = \frac{20+3}{4a} = \frac{23}{4a} \quad \text{Multiply and combine similar terms}$$

Example 6. What is $\frac{3}{x^2-2x} - \frac{2x+1}{x^2-4}$?

Solution: $x^2 - 2x = x(x - 2)$

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

Express the denominators as prime factors

The LCM of $x^2 - 2x$ and $x^2 - 4$ is $x(x + 2)(x - 2)$.

The LCD of $\frac{3}{x^2-2x}$ and $\frac{2x+1}{x^2-4}$ is $x(x + 2)(x - 2)$.

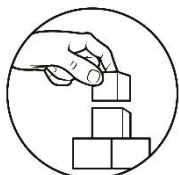
$$\text{Therefore, } \frac{3}{x^2-2x} - \frac{2x+1}{x^2-4} = \frac{3}{x(x-2)} - \frac{2x+1}{(x+2)(x-2)}$$

$$\begin{aligned}
&= \frac{3(x+2)}{x(x+2)(x-2)} - \frac{x(2x+1)}{x(x+2)(x-2)} \\
&= \frac{3x+6}{x(x+2)(x-2)} - \frac{2x^2+x}{x(x+2)(x-2)} \\
&= \frac{3x+6-(2x^2+x)}{x(x+2)(x-2)} = \frac{3x+6-2x^2-x}{x(x+2)(x-2)} \\
&= \frac{-2x^2+2x+6}{x(x+2)(x-2)} \text{ or } \frac{-2(x^2-x-3)}{x(x+2)(x-2)}
\end{aligned}$$

Express each denominator to its equivalent expressions

by distributive property

combining similar terms



What's More

A. Find the sum or difference of the following rational algebraic expressions. Express your answer in simplest form.

1. $\frac{x}{5} + \frac{y}{5}$

3. $\frac{7}{5x} - \frac{2}{5x}$

5. $\frac{4}{2x+y} + \frac{2}{2x+y}$

2. $\frac{3x+5}{x-2y} - \frac{2x-7}{x-2y}$

4. $\frac{5}{3m} + \frac{8}{3m} - \frac{11}{3m}$

B. Perform the indicated operations. Express your answer in simplest form.

1. $\frac{x}{6} + \frac{y}{8}$

2. $\frac{3}{x+1} - \frac{5}{x-1}$

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



What I Have Learned

To add or subtract rational expressions with the same denominator, add or subtract the numerators then copy the common denominator.

To add or subtract rational expressions with different denominators:

- Find the least common denominator;
- Express each rational expression to an equivalent expression whose denominator is the LCD;
- Perform the indicated operations and always express your answer in simplest form.



What I Can Do

A. Find the sum or difference of the following rational algebraic expressions. Express your answer in simplest form.

1. $\frac{x}{4} + \frac{y}{4}$

3. $\frac{6}{m} - \frac{5}{m}$

5. $\frac{x-3y}{6xy} - \frac{x+3y}{6xy}$

2. $\frac{6x}{y-5} + \frac{3-4x}{y-5}$

4. $\frac{x+y}{y+2} - \frac{2x-y}{y+2}$

B. Add and simplify.

1. $\frac{x}{5} + \frac{y}{3}$

2. $\frac{2}{x+1} + \frac{5}{x-1}$

3. $\frac{1}{2x+4} - \frac{5}{x^2-4}$



Assessment

Directions: Choose the letter of the correct answer. Write your answer on a separate sheet of paper.

1. Perform the indicated operations: $\frac{5}{d} + \frac{2}{d} - \frac{1}{d}$.

A. $\frac{8}{d}$

B. $\frac{6}{d}$

C. $\frac{2}{d}$

D. $\frac{4}{d}$

2. What is $\frac{x-2}{10} + \frac{x-1}{10}$ equal to?

A. $\frac{x^2-3}{10}$

B. $\frac{2x+3}{10}$

C. $\frac{2x-3}{10}$

D. $\frac{x-3}{5}$

3. Give the sum: $\frac{8}{z} + \frac{2}{3z}$.

A. $\frac{26}{3z}$

B. $\frac{10}{3z}$

C. $\frac{5}{2z}$

D. $\frac{13}{2z}$

4. What is $\frac{y+4}{y^2-2y} - \frac{1}{y-2}$?

A. $\frac{y-3}{y(y-2)}$

B. $\frac{2y+4}{y(y-2)}$

C. $\frac{4}{y(y-2)}$

D. $\frac{2}{y(y-1)}$

5. Subtract: $\frac{a+5}{a^2+8a+15} - \frac{2}{a+5}$.

A. $-\frac{a+1}{(a+3)(a+5)}$

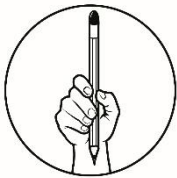
B. $\frac{a-1}{(a+3)(a+5)}$

C. $\frac{a+1}{(a+3)(a+5)}$

D. $\frac{-a+1}{(a+3)(a+5)}$

Lesson**2****Problem Solving Involving
Rational Algebraic
Expressions**

Rational expressions can help solve problems like work rate, that usually involves two people working at different rates to finish a work, geometric problems, number problems and others. Equations containing rational expressions are called **rational equations**. Rational equation is useful in representing and solving real-life problems.

***What I Know***

Directions: Choose the letter of the correct answer. Write your answer on a separate sheet of paper.

1. What value of h will satisfy $\frac{2}{h} + \frac{1}{h} = \frac{1}{2}$
A. 2 B. 4 C. 6 D. 8
2. What value of c will satisfy $\frac{c}{5} + \frac{c}{6} = 11$?
A. 25 B. 30 C. 35 D. 40
3. The ratio of an angle to its complement is $\frac{2}{3}$. Find the angle.
A. 36° B. 38° C. 40° D. 42°
4. Rene can paint the wall in 4 hours, and Joseph can do it in 6 hours. How long will it take them to paint the wall if they will work together?
A. $\frac{12}{5}$ days B. $\frac{5}{12}$ days C. $\frac{24}{5}$ days D. $\frac{5}{24}$ days
5. Find a number which when added to both the numerator and denominator of $\frac{3}{7}$, will make the fraction equal to $\frac{1}{3}$.
A. -2 B. -1 C. 1 D. 2



What's In

Recall:

1. Solve for x in $2x = 10$.
2. If $y + 2 = 5$, what is the value of y ?
3. What value of b will satisfy $3b - 4 = 8$?
4. What is the LCD of $\frac{d}{d-2}$ and $\frac{6}{5}$?
5. What is the product of 2 and $(b-6)$?



What's New

Activity 1: Represent Me.

Read the problem below and answer the questions that follow.

Shaina can clean their house in 3 hours, and Ronnie can do it in 4 hours. How long will it take them cleaning if they will work together?

Guide Questions:

- a. What part of the job can be completed by Shaina in 1 hour?
- b. What part of the job can be completed by Ronnie in 1 hour?
- c. What part of the job can be completed in 1 hour if they will work together?
- d. What expression will represent the rate of Angela and Jack working together?
- e. Working together, how long will take then to finish cleaning the house?



What is It

If an equation contains one or more rational algebraic expressions, it is called a rational equation. Rational equations can be solved if you first eliminate all denominators. In this case the LCD will help you to simplify and then solve the equations.

Let us discuss the solution in the above problem.

Solution:

Given: 3 hours = Shaina can finish cleaning the house
 4 hours = Ronnie can finish cleaning the house
 x hours = Shaina and Ronnie, working together, can finish cleaning the house.

- a. Since Shaina can clean the house in 3 hours, then in one hour she can clean $\frac{1}{3}$ of the house. Her rate of work is $\frac{1}{3}$ of the house each hour. Let us illustrate Shaina's rate using a table.

Rate of work (house cleaned in 1 hour)	Time worked	Work done (house cleaned)
$\frac{1}{3}$	1 hour	$\frac{1}{3}$
$\frac{1}{3}$	next 1 hour	$\frac{2}{3}$
$\frac{1}{3}$	another next 1 hour	$\frac{3}{3}$ or 1

This means Shaina can finish cleaning $\frac{1}{3}$ of the house in 1 hour, $\frac{2}{3}$ of the house after 2 hours and $\frac{3}{3}$ or 1, the whole house, after 3 hours.

- b. Ronnie can clean the house in 4 hours, then in one hour he can clean $\frac{1}{4}$ of the house.
 c. Shaina and Ronnie can clean the house in x hours, then in one hour they can clean $\frac{1}{x}$ of the house.
 d. $\frac{1}{3} + \frac{1}{4} = \text{combine rate of Shaina and Ronnie}$
 e. $\frac{1}{3} + \frac{1}{4} = \frac{1}{x}$

$$\begin{array}{ll}
 12x \left[\frac{1}{3} + \frac{1}{4} \right] = \left[\frac{1}{x} \right] 12x & \text{multiply both sides by the LCD which is } 12x \\
 4x + 3x = 12 & \text{distributive property} \\
 7x = 12 & \text{combine similar terms} \\
 x = \frac{12}{7} & \text{Multiplication Property of Equality (MPE)}
 \end{array}$$

Therefore, working together, Shaina and Ronnie can finish cleaning the house in $\frac{12}{7}$ or $1\frac{5}{7}$ days.

To check:

$$\frac{1}{3} + \frac{1}{4} = \frac{1}{x} \quad , \quad \text{but } x = \frac{12}{7}$$

$$\frac{1}{3} + \frac{1}{4} = \frac{1}{\frac{12}{7}}$$

substitute the value of x

$$\frac{1}{3} + \frac{1}{4} = 1 \cdot \frac{7}{12}$$

divide first the right side of the equation

$$\frac{1}{3} + \frac{1}{4} = \frac{7}{12}$$

$$\frac{4(1)}{12} + \frac{3(1)}{12} = \frac{7}{12}$$

find the LCD and change to its equivalent form

$$\frac{4}{12} + \frac{3}{12} = \frac{7}{12}$$

simplifying

$$\frac{7}{12} = \frac{7}{12}$$

since the left side of the equation is equal to the right side of the equation that means the solution is correct.

The process in solving problems which involve rational algebraic equations will be illustrated for you using some examples.

Examples:

1. The ratio of an angle to its complement is $\frac{2}{3}$. Find the angle.

Representation:

Let: $x =$ be the angle

$90 - x =$ complement of the angle

Equation: $\frac{x}{90-x} = \frac{2}{3}$

Solution:

$$3(90 - x) \left[\frac{x}{90 - x} \right] = \left[\frac{2}{3} \right] 3(90 - x)$$

multiply both sides by the LCD

$$3(90 - \cancel{x}) \left[\frac{\cancel{x}}{90 - \cancel{x}} \right] = \left[\frac{2}{\cancel{3}} \right] 3(90 - x)$$

cancel factors equal to 1

$$3x = 2(90 - x)$$

$$3x = 180 - 2x$$

distributive property

$$3x + 2x = 180 - 2x + 2x$$

addition property

$$5x = 180$$

multiplication property

$$[5x] = 180$$

$$x = 36$$

The angle is a 36° angle.

To check:

Complement of the angle is $90^\circ - 36^\circ = 54^\circ$

The ratio of the angle to its complement is $\frac{36}{54} = \frac{2}{3}$

2. When 8 is subtracted from the reciprocal of a number, the result is 2.

What is the number?

Representation:

Let: n = be the number

$\frac{1}{n}$ = reciprocal of the number

Equation: $\frac{1}{n} - 8 = 2$

Solution: $n \left[\frac{1}{n} - 8 \right] = [2] n$ multiply by the LCD
 $1 - 8n = 2n$ distributive property
 $1 - 8n + 8n = 2n + 8n$ addition property of equality
 $1 = 10n$ combine similar terms
 $\frac{1}{10} = n$ multiplication property of equality

The number is $\frac{1}{10}$.

To check: Since $n = \frac{1}{10}$, then $\frac{1}{n} = 10$, hence, $10 - 8 = 2$

3. Find a number which when added to both the numerator and denominator of $\frac{3}{7}$ will make the fraction equal to $\frac{1}{3}$.

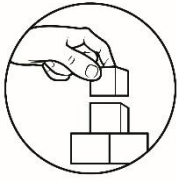
Representation: Let x be the number

Equation: $\frac{3+x}{7+x} = \frac{1}{3}$

Solution: Let us follow the same procedure to solve for x .

$3(7+x) \left[\frac{3+x}{7+x} \right] = \left[\frac{1}{3} \right] 3(7+x)$
 $3(3+x) = 7+x$
 $9 + (-9) + 3x + (-x) = 7 + x + (-9) + (-x)$
 $3x - x = 7 - 9$
 $2x = -2$
 $x = -1$. The required number is -1 .

To check: $\frac{3-1}{7-1} = \frac{2}{6} = \frac{1}{3}$.



What's More

Read and answer the following problems.

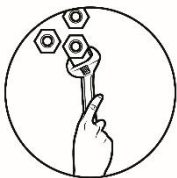
1. The ratio of an angle to its complement is $\frac{4}{5}$. Find the angle.
2. When 6 is subtracted from the reciprocal of a number, the result is 4.
What is the number?
3. Lorenzo can do his project in 45 minutes and Miguel can do the same work in 30 minutes. How long will it take them to finish the same work if they work together?



What I Have Learned

To solve problems involving rational algebraic expressions, I have learned to:

- a. identify the quantity being asked in the problem
- b. use the facts of the problem to form an equation
- c. solve the equation; and
- d. check my answer by going back to the question asked in the problem



What I Can Do

Answer the following problems.

1. Kelly can clean their house in 3 hours, and Keona can do it in 2 hours.
How long will it take them cleaning if they will together?
2. The sum of $\frac{1}{2}$ of a certain number and $\frac{1}{4}$ of the same number is 15. Find the number.



Assessment

Directions: Choose the letter of the correct answer.

1. A filler pipe can fill a tank in 12 *hours*, while an outlet pipe can empty the tank in 18 *hours*. How long would it take to fill the empty tank with both pipes operating?

- A. 16 *hours* B. 17 *hours* C. 21 *hours* D. 36 *hours*

For # 2 - 3. The denominator of a fraction is 8 more than the numerator. If 3 is added to both the numerator and the denominator, the value of the resulting fraction is $\frac{1}{2}$.

2. Which of the following equations can be used to find the correct answer?

- A. $\frac{n+11}{n+3} = \frac{1}{2}$ B. $\frac{n+3}{n+11} = \frac{1}{2}$ C. $\frac{n+3}{n+3} = \frac{1}{2}$ D. $\frac{n}{n+11} = \frac{1}{2}$

3. What is the original fraction?

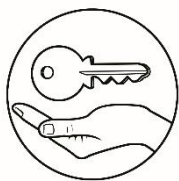
- A. $\frac{5}{10}$ B. $\frac{6}{12}$ C. $\frac{8}{16}$ D. $\frac{5}{13}$

4. The denominator of a certain fraction is 2 more than its numerator. When both numerator and denominator are increased by 3, the resulting fraction is $\frac{3}{4}$. Find the original fraction.

- A. $\frac{3}{5}$ B. $\frac{1}{3}$ C. $\frac{9}{11}$ D. $\frac{5}{7}$

5. Working alone; a painter can paint a small apartment in 10 *hours*. Her helper can paint the same apartment in 15 *hours*. How long would it take the painter and her helper to complete the job if they work together?

- A. 3 *hours* B. 12 *hours* C. 6 *hours* D. 8 *hours*



Answer Key

<p>Lesson 2:</p> <p>What I Know</p> <ol style="list-style-type: none"> C B A A B <p>What's In</p> <ol style="list-style-type: none"> 5 3 4 $5(d - 2)$ $2b - 12$ <p>What's More</p> <ol style="list-style-type: none"> 40° $\frac{1}{10}$ 18 minutes <p>What I Can Do</p> <ol style="list-style-type: none"> $\frac{5}{6}$ days 20 <p>Assessment</p> <ol style="list-style-type: none"> D B D A C 	<p>What I Can Do</p> <ol style="list-style-type: none"> $\frac{x+y}{4}$ $\frac{2x+3}{y-5}$ $\frac{1}{m}$ $\frac{-x+2y}{y+2}$ $-\frac{1}{x}$ $\frac{3x+5y}{15}$ <ol style="list-style-type: none"> $\frac{(x+1)(x-1)}{7x+3}$ $\frac{x-12}{2(x+2)(x-2)}$ <p>Assessment</p> <ol style="list-style-type: none"> B C A C A 	<p>Lesson 1:</p> <p>What I Know</p> <ol style="list-style-type: none"> A A D C D <p>What's In</p> <ol style="list-style-type: none"> 20 $a(a - 2)$ $(a + 1)(a - 1)$ $(x - 7)(x + 4)$ 1 <p>What's New</p> <p>SMALL AMOUNT OF MONEY</p> <p>What's More</p> <ol style="list-style-type: none"> $\frac{x+y}{5}$ $\frac{x+12}{x-2y}$ $\frac{1}{x}$ $\frac{x}{2}$ <ol style="list-style-type: none"> $\frac{4x+3y}{24}$ or $\frac{-2x-8}{2(x+4)}$ $\frac{(x+1)(x-1)}{2(x+4)}$ $\frac{x-1}{(x+3)(x-3)}$
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